## The planktonic cyanobacteria int the Gulf of Aqaba, Red Sea : Species composition and biomass

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Earlier records of Cyanobacteria in the northern part of the Gulf of Aqaba off Eilat (Fig.1) revealed two annual peaks, in May-June and October-November, coinciding with the transition periods in the temperature of the water (KIMOR and GOLANSKY, 1977). These peaks were found to consist mainly of *Trichodesmium eythraeum*, recently reidentified as *T. thiebautii* (courtesy A. SOURNIA), occurring mostly in the surface waters down to about 100m, then gradually diminishing with depth.

Current studies of the planktonic microbiota were carried out at an offshore and at a reef station in the same area using the filter-transfer-freeze (FTF) technique for collection and preservation (HEWS and HOLM-HANSEN, 1983). The algal biomass was calculated by multiplying cell volume by cell/biomass conversion factor (STRATHMANN, 1967). These studies indicated the occurrence of *T.thiebautii* during October 1989 and October 1990 (Fig.2). In October 1989, it constituted 61.13% C of total autotrophs in the surface layer, gradually declining with depth to 6.26% C at 60m. However, the overall biomass within the whole water column was low (0.2-0.3gr C m2). The minor record of *T. thiebautii* during October 1990 was located at 80m depth and its biomass was similarly very low. A second *Trichodesmium* species, identified as *T. hildebrandtii* (courtesy A. SOURNIA), characterized by broader and shorter cells, was also recorded sporadically in the samples.

A number of *Oscillatoria* species, both at the off-shore and at the reef sampling stations, varying in cell size and shape, add to the species diversity of Cyanobacteria in the Gulf, though not necessarily to the autotrophic biomass. They may however be transition forms rather than well-defined species. The occurrence of the lilttle-known species *Katagnymene pelagica* is significant, as this appears to be the first record after its original description at the turn of the century (LEMMERMANN, 1899; KARSTEN, 1907).

The chroococcoid Cyanobacteria are represented in the Gulf by the ubiquitous *Synechococcus/Synechocystis* populations, which constitute an important component of the total autotrophic biomass (Fig.2). Among the colonial forms, the ephemeral occurrence was recorded of *Aphanocapsa litoralis* with amorphous thallus without any definite shape and of the raft-shaped *Merismopedia* sp.

Symbiotic Cyanobacteria have been found to occur either as ectobionts, known as phaeosomes, in the horizontal grooves of heterotrophic dinoflagellates or as trichomes of nitrogen-fixing *Richelia intracellularis*, within several species of centric diatoms of the genera *Rhizosolenia* and *Hemiaulus*.

None of the species recorded so far in this study was found in bloom condition. However, some species, both free-living and symbiotic, are known to have the ability to fix molecular nitrogen in oligotrophic seas and, as such, they may be important to the nitrogen budget of the Gulf. Furthermore, the co-existence of two species of *Trichodesmium* in the plankton of this environment requires further elucidation as to their ecological requirements and bloom-forming ability.

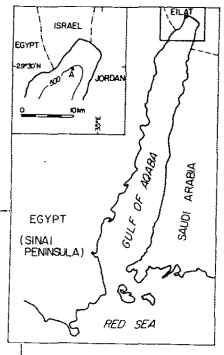


Fig.1: Location of the study area in the Gulf of Aqaba off Eilat (inset).

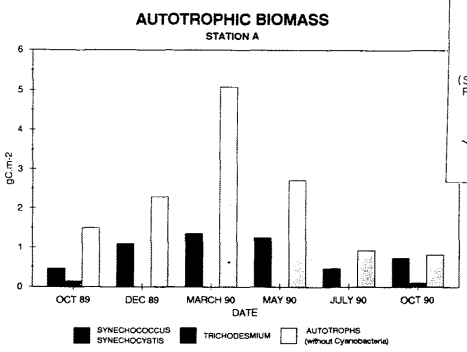


Fig.2: The contribution of Synechococcus/Synecocystis and Trichodesmium (gr C/m2) to the total autotrophic biomass with the whole water column, October 1989-October 1990.

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## Zooplankton structure and distribution in the Bulgarian Black Sea coastal eutrophicated zone in summer 1991

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The results of the zooplankton structure and distribution investigations in the Bulgarian Black Sea coastal waters are very important, for explanation of the phenomena related to the eutrophication processes. Most interesting in this aspect are the summer development and distribution of the main constituents as well as that of some species which in the past have been rarely found or were almost absent from the coastal waters (DIMOV, 1960; KONSOULOV, 1986).

The results discussed in the present report concern tne zooplankton of the shallow shelf zone in front of the Bulgarian coast with sea water quasihomogeneous structure during the summer of 1991. The samples were collected with a plankton net "Djeddy" (mesh size 100 mikrons) at stations located on 3, 10, 20 and 30 miles eastward from Krapets and cape Emine, at standard horizons for a stratified water basin. Monospecific biomass is calculated according to standard weights by IASHNOV (1934).

In the coastal region up to 3 miles offshore the unicellular euryphage *Noctiluca scintillans* is present with the highest quantitative abundance and biomass (555.52 mg/m3) in the summer zooplankton, followed by *Pleopis polyphemoides* (26.8 mg/m3), *Acartia clausi* (20.82 mg/m3), *Penilia avirostris* (11.32 mg/m3), *Cirripedia nauplii* and *Polychaeta larvae*.

At the same time 10 miles offshore *N. scintillans* participation abruptly drops: its share of the total biomass in this region (70.75 mg/m3) comprising species of Copepoda, Cladocera and benthic larvae, only amounts to 48.32% (34.18 mg/m3). Significantly lower quantitative abundance of Cladocera species is established in this same area and also affects the value of the biomass (Fig. 1).

*A. clausi* dominates in the quantitative structure of the zooplankton in the 20 miles offshore zone (23.18 mg/m3) followed by *P. polyphemoides* (17.44 mg/m3), *Evadne tergestina* (5.24 mg/m3), *Acartia copepodites, A. nauplii, Evadne spinifera* and *P. avirostris larvae*. *N. scintillans* is registered here with quantity of 2.5 mg/m3.

Thirty miles east from the coast the zooplankton is represented mainly by *A.clausi, P. polyphemoides, Pseudocalanus elongatus* and *N. scintillans* with biomasses of 5,09, 7,48, 2,75 and 2.16 mg/m3 respectively.

A more detailed analysis of these results shows that during the summer of 1991 the highest biomass values were due mainly to *N. scintillans* and *Cladocera species*. This fact allows us to consider this zooplankton complex as an indicator of the coastal zone higher eutrophication level in comparison with the open sea area. Moreover, the exclusively high biomass of *N. scintillans* in the coastal region determines to a large extent the changes in the biogenic potential, the intensity of phosphorus recycling and the mechanism of the plankton coenoses reproduction.

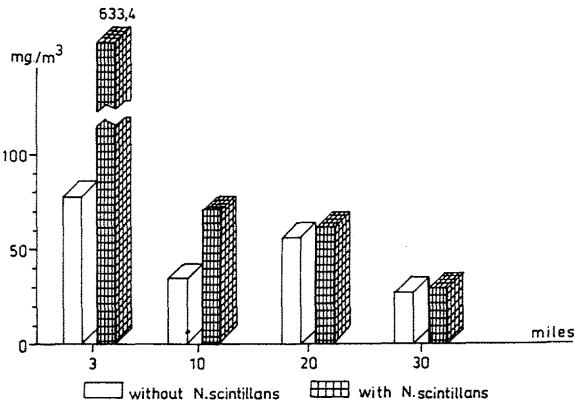


Fig. 1. Zooplankton biomass value (mg/m3)

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