PHYTOPLANKTON OF THE GULF OF SUEZ AND THE EFFECT OF BALLAST WATER

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Abstract

The phytoplankton population in the Suez Gulf consists of 171 species and varieties belonging to 8 groups. The Gulf is an oligotrophic basin, affected by two man-made factors: turbidity caused by powerful ship propellers and the release of waste and ballast water from ships, respectively a negative and a positive factor. The latter factor creates micro-environments where brackish water species thrive. This effect was clear even at stations located far away from the coast and from any land-based sources.

Key words: Phytoplankton, ballast water, Suez Gulf

The Gulf of Suez extends 300 km to the northwest of the Red Sea proper and is connected to the Mediterranean by the Suez Canal. Up to 76 standard ships cross the canal per day (1). Very little is known about the phytoplankton of this Gulf (2, 3). Quantitative and qualitative samples were collected from April 1999 to May 2001 from thirteen stations, which differ regarding their location relative to the navigating Channel, to their proximity to the coast and regarding their total depth.

The Gulf phytoplankton consisted of 171 species and varieties belonging to 8 groups (Dinophyceae, 88 sp., Bacillariophyceae 69 sp., Chlorophyceae 5 sp., Cyanophyceae 4 sp. and Prymnesiophyceae 2 sp., Cryptophyceae, Euglenophyceae and Chrysophyceae with a single species each). The phytoplankton populations in both northern (St 1 to 3) and intermediate zones (St 4 to 8) present similarities, but the southern zone (St 9 to 13) is different. The dinoflagellates are more diversified in this latter zone, contributing 65 % to the total. Eleven dinoflagellates were restricted to this zone throughout the period of study, especially at the offshore stations. They are true indicators of surface Red Sea influx: *Amphisolenia bidentata*, *Citharistes regius*, *C. deflexum*, *C. reflexum*, *Dinophysis monacantha*, *Gyrodinium nasutum*, *Noctiluca scintillans*, *Parahistoneis* sp., *Phalacroma ovum*, *Pyrocystis fusiforme* and *Pyrodinium bahamensis* var *compressum*. *Pyrodinium bahamensis* var *compressum* recorded only from the southern zone, is known however to have reached the Mediterranean at Port Said (4). Several species, which are characteristic of the open Red Sea and the Indian Ocean became adapted to the Gulf waters and extend to the northernmost Gulf (St 1): *C. breve*, *C. humile* and *Protoperidinium sinaicum*.

Ceratium egyptiacum, described from the Bitter Lakes (5) in the Suez Canal, remains endemic to the Gulf of Suez, the canal and the East Mediterranean up to Lebanon (6) and to Turkish waters (7). It is not known from elsewhere, either in the Red Sea or the Mediterranean (8,9).

As the Gulf of Suez is an oligotrophic basin, the standing crop was very low (84 to 9900 cell l^{-1}). It is less affected by natural conditions than by two man-made factors: turbidity caused by ship propellers and waste water release from ships. The first factor is negative as turbidity inhibits photosynthesis while the second enhances production. An unexpected observation is the occurrence on many occasions of fresh water and brackish water species in this high salinity Gulf (average 42 psu): *Cyclotella meneghiniana*, *Euglena* sp., *Merismopedia* sp., *Nitzschia closterium*, *Oscillatoria* sp., *Pandorina* sp., *Pediastrum* sp., *Spirulina* sp., *Staurastrum* sp. and *Synedra ulna*. Brackish species occur at stations scattered along the north-south axis, ranging in standing crop from 18 to 6250 cell l^{-1}. Their appearance is not related to season or location, but to the release of ship ballast and waste water causing local enrichment in nutrient salts. Ballast water therefore creates micro-environments of low salinity in the Gulf, where alien species thrive. The relation is positive between the average standing crop of brackish water species and the average vessels in ballast (Fig. 1).

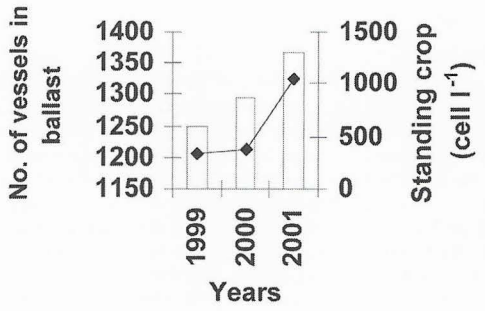

Fig. 1. Average vessels in ballast and average standing crop of brackish water species in the Suez Gulf.

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