

Marine fouling and periphyton growths on test panels in the Eastern Harbour of Alexandria

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The periphyton and fouling assemblage on exposed test panels were studied in the Eastern Harbour of Alexandria, during October 1990 to November 1991. A little is known about the annual numerical abundance of periphyton species growth in one and two weeks exposure periods successively over the year in relation to the fouling biomasses and composition. The E.H. is a relatively semi-closed bay covering an area of ca. 2.8 km² with water depth of about 6 m. The waters of the harbour are subjected to considerable amount of land and sewage drainage discharged annually average about 35.18 x 10⁶ m³ (DOWIDAR *et al.*, 1987).

The periphyton observation was carried out on the scraped fouling assemblage on one panel side which preserved with 5% formaline. Subtotals were counted for each species and categorized according to diatoms (*Baccillariophyceae*), *Dinophyceae*, blue-green algae (*Cyanophyceae*), *Chlorophyceae*, *Rhodophyceae*, and *Phaeophyceae*. The results are expressed as number of cells /100 cm² of the panel area.

The amplitude of seasonal changes in temperature of seawater at surface was 12° C. The values of water temperature raised to 28° C in July and the value measured 16° C in January. The salinity of seawater was 38.93 ‰ at surface layer in May and 39.36 ‰ at 4.5 m depth in October.

The periphyton term is confined to Algae growing on artificial surfaces exposed in seawater ROUND, 1982). Periphyton species colonized on panels after one and two weeks included 96 species, 59 of which are diatoms. *Navicula* spp. and *Nitzschia* spp. developed well and were found in large numbers 403,191 and 1118340 cells 10⁻² cm² of the panel area after one week immersion. Rich growth of periphyton species were extensively grown depending upon the duration of exposure which were more dense after two weeks than one week.

The picture of fouling assemblage on the submerged test panels at the E.H. of Alex. was very poor. The fouling data obtained on these short term exposures panels included microscopic and macroscopic fouling organisms were treated to know the seasonal rate of settlement, the rate of growth and the time of maximum attachment over the year.

The fouling organisms developed on the submerged panels after one and two weeks successively over the year included 7 main fouling groups. These groups are Algae, Hydroids, Bryozoa, Polychaeta, Cirripedia, Amphipoda, and Isopoda.

1) Algae : Five species of algae, *Ulva lactuca* L., *Enteromorpha compressa*, *Chaetomorpha aerea*, *Cladophora prolifera* and *Ectocarpus irregularis* are the dominant component of the early phase of macro-organisms on which the subsequent growth of fouling take place. They predominated more on 2-week exposure panels than on one-week exposures in particular during spring and summer seasons which the average of water temperature was 25.2° C and salinity was 38.04 ‰.

2) Hydroid : *Obelia geniculata* was the only coelenterate recorded on the submerged test panels after one or 2 weeks periods.

3) Bryozoa : Erect form, *Bugula neritina* was the most abundant fouling organisms in sea water showed marked seasonal variations in its abundance. It appeared over the year and the period of dense settling occurred when water temperature exceeded 20° C in April to September 1991, yielded 15-57 colonies 10 cm² after one week and in April to June numbered 213-392 colonies 10 cm² after 2 weeks exposure

4) Polychaeta : calcareous tube worms, *Hydroides elegans* was the dominant species which successfully colonized on the submerged surfaces during most of the year. It appeared in large numbers of tubes during October and November 1990, (average temperature 22° C and salinity 38.46 ‰) which yielded 818-948 tubes 10 cm² on one week panels, respectively. On 2 weeks exposures *H. elegans* predominated in fall (October to November 1990) which the maximum numbers encountered was 1145 and 916 tubes.

5) Cirripedia : barnacles, *Balanus amphitrite* var. *denticulata* and *B. eburneus* were the most constituent of fouling in the E.H. of Alex. (BANOUB, 1960, MEGALLY, 1970, GHOBASHY, 1976 and EL-KOMI, 1991). *Balanus amphitrite* was the dominant through August to November 1991, water temperature averaged 23.8° C and salinity 38.22 ‰, which 16-63 individuals 10 cm² in one week exposure period were recorded. *B. eburneus* was less frequent on the panels than *B. amphitrite*.

The biomass is less than one gram in one week exposure over the year. In general the fouling biomass was larger on panels after 2 weeks immersion than after one week depends upon the duration in seawater.

Rich growth of branched and unbranched algae as filaments of green, brown, red algae and diatoms are extensively grow on the submerged test surfaces which depend upon the duration of the exposure. The community and species composition of plankton attached to panels in the E.H. was very different in comparison to that actually grow in water column. This is due to the considerable division of the cells of diatoms, *Dinophyceae*, *Cyanophyceae* which grow on surfaces for one and two weeks over the year.

The seasonal fluctuation of settlement is clear from these results both the rate of growth and settlement raising to a maximum value in fall except for *Bugula neritina* occurred in spring. These data were low in winter which the temperature is markedly decreased below 20° C. The fluctuation take place in the numbers of organisms settling and their rate of growth as results of the environmental influences such as temperature, dissolved oxygen, organic matter and the degree of pollution inside this semi-closed bay. FLETCHER and CHAMBERLAIN (1975) stated that the first settlers on surfaces are bacteria and unicellular diatoms which are gradually replaced by colonial diatoms especially *Navicula* and in turn are overgrown by green algae, as *Enteromorpha* and brown algae, as *Ectocarpus*. The breeding of *Bugula neritina* and *Hydroides elegans*, *Balanus amphitrite* and algal development of *Ectocarpus irregularis* is continued over the year. Major spawning periods probably coincide with the warmer seasons when temperature raised above 20°C. The growth of microscopic filamentous of algae and diatoms affects on the attachment of the subsequent macro-fouling organisms.

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