Bacterioplankton production and its relation to phytoplankton production

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The relation between bacterioplankton production and phytoplankton production was studied on monthly basis from January 1980 to September 1982 in the area of the coastal (Kastela Bay) and open (Stoncica) Middle Adriatic.

Bacterioplankton production constitutes a significant percentage of primary production values in both study areas (Table 1). This means that, apart from primary phytoplankton production, bacteria play an important part in carbon supply to the study areas.

Bacterioplankton production constitutes, on the average, 9 to 28% of phytoplankton production in the Kastela Bay upper layers, and from 10 to 40% in the open sea.

Bacterioplankton appears to play a more important part in organic carbon environmental supply in the open sea, an oligotrophic area, than in the Kastela Bay where other members of food chain occur in greater numbers.

However, it should be emphasized that on some occasions bacterioplankton production may exceed phytoplankton production. This occurs during maximum bacterioplankton activity and termination of phytoplankton bloom (summer) and very often in deeper layers (Table 1) where primary production is minimum due to poor light penetration This was established only for a shorter period of time (in the Kastela Bay in July and at Stoncica in August), whereas annual values for phytoplankton production were considerably higher.

Bacterioplankton production maxima were recorded from both study areas mainly in summer, and those of phytoplankton in spring. This means that there is a time shift in their succession. This shift is more regular in the open sea than in the changed natural environment of the Kastela Bay.

Table 1.- Bacterioplankton production and its relation to phytoplankton (%) (means for 1980-1982 period)

Month	Depth	K.B.	St.	Month	Depth	K.B.	St.
	0	12.4	35.6		0	89.8	99.0
	10	21.7	17.3		10	98.4	<100.0
I	20	12.8	27.5	VII	20	>100.0	>100.0
	30	74.9	49.0		30	>100.0	>100.0
	50		33.9		50		>100.0
	75		49.5		75		>100.0
	0	8.3	25.6		0	82.6	>100.0
	10	4.3	12.4		10	>100.0	>100.0
II	20	6.7	40.3	VIII	20	>100.0	>100.0
	30	60.6	47.3		30	>100.0	>100.0
	50		33.9		50		>100.0
	75		>100.0		75		>100.0
	0	21.2	27.9		0	32.5	76.7
	10	9.0	26.6		10	25.5	73.4
III	20	17.7	15.8	IX	20	98.9	79.9
	30	39.4	36.2		30	>100.0	97.0
	50		45.4		50		>100.0
	75		>100.0		75		>100.0
	0	6.4	6.5		0		75.5
	10	11.5	28.1		10		73.4
IV	20	52.8	21.7	X	20		>100.0
	30	40.5	57.7		30		>100.0
	50		49.8		50		>100.0
	75		>100.0		75		>100.0
	0	8.3	21.7		0	6.7	22.6
	10	99.0	46.6		10	72.3	17.8
V	20	67.5	35.6	XI	20	>100.0	16.7
	30	>100.0	19.2		30	>100.0	42.6
	50		25.1		50		83.7
	75		>100.0		75		>100.0
	0	12.2	41.1		0	-	0.0
	10	15.2	34.4		10	9.7	20.5
VI	20	36.5	48.7	XII	20	>100.0	41.0
	30	69.8	42.5		30	>100.0	27.7
	50		33.1		50		36.2
	75		>100.0		75		>100.0

Light microscope histochemistry of Diatoms in the Gulf of Trieste (North Adriatic Sea)

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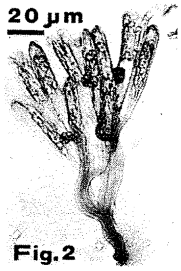
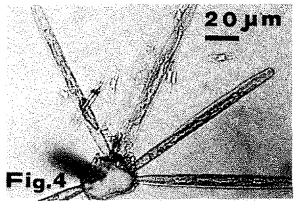
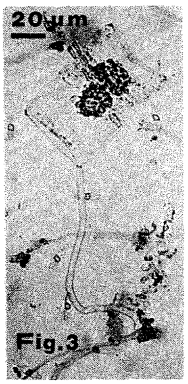
Benthic Diatoms are able to attach to surfaces whether natural (different grain-size sediment) or artificial (glass, ceramic, PVC, etc.). For this reason they are one of the component of the fouling. Attachment is invariably associated with the extracellular secretion of mucilagineous substances which may either remain a simple layer interposed between the Diatom and its substrate, or, through continued secretion, develop into morphologically distinct structures (DANIEL *et al.*, 1987). These morphological structures in unialgal cultures were differentiated by means of several cytochemical reactions (DANIEL, 1983; DANIEL *et al.*, 1987). The aim of this work is to investigate the polysaccharidic component of fouling Diatoms in their natural environment.

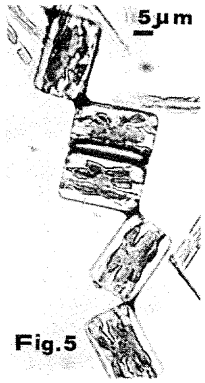
Twenty microscope slides fixed on a PVC support were dipped (lm. beneath the surface) in a station localized near the Marine Biology Laboratory (Trieste) in the winter of 1990. These slides were collected and then fixed for 24 h in a 4% (v/v) acid formaldehyde solution in filtered sea water. Ten slides were afterwards stained with Alcian Blue at 2.5 pH (BARKA & ANDERSON, 1963), while the remaining ten slides were stained with Ruthenium Red (BLANQUET, 1976). All light microscope observations were conducted using a Leitz diaplan microscope equipped with a Wild Photoautomat camera using Kodak Ektachrome films.

Using these cytochemical tests we have examined in detail some attachment systems. The stalk of both the *Licmophora* species (Fig. 1, 2) examined comprise polysaccharides of anionic reaction. The stalk is flat and with many branches which yield colonies. *Licmophora flabellata* (Carm.) Ag. (Fig. 1) stalk shows longitudinal striations which correspond to the fused secretions of the individual cells. The stalk of *Striatella unipunctata* Lyngb. (Fig. 3) is weakly stained for anionic polysaccharides. Well developed is the basal and unipolar pad of *Synedra* sp. (Fig. 4) showing intense reaction after Alcian Blue staining. The intercellular adhesive pads of *Grammatophora* sp. (Fig. 5) are also stained with Ruthenium Red and appear as a strong purple spot. Furthermore the subfrustular layer appears like an area weakly stained. *Achnanthes longipes* Ag. (Fig. 6) species shows a stalk with a characteristic collar at basal cell pole and intense staining with Ruthenium Red.









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