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THE PARTICULATE MATTER OF THE VELLAR ESTUARY

ABSTRACT

The composition of the particulate matter at two stations in the Vellar estuary was determined and the relationships between organic carbon, chlorophyll *a* and particulate phosphorus were examined. The regression of chlorophyll on carbon possibly indicated the presence of an appreciable quantity of carbon contributed by detrital material. Chlorophyll *a* versus phosphorus showed a better relationship than carbon versus phosphorus. The particulate matter of the estuary seem to be largely composed of detritus.

THE distribution of particulate organic matter has been investigated by various workers, chiefly from the open ocean. Earlier studies on suspended matter have been reviewed by Parsons (1963). Ryther and Menzel (1965) investigated the production of organic matter and also its composition and distribution in the Western Arabian sea. Steele and Baird (1965) determined the chlorophyll *a* and organic carbon content of particulate organic matter from the Northern North sea. However, in coastal waters and estuaries where particulate matter accumulates in large quantities practically no information is available. This report gives the constituents such as chlorophyll *a*, organic carbon, carbohydrate and particulate phosphorus of the particulate matter collected from two stations in the Vellar estuary.

Particulate matter was obtained by filtering 0.5 to 1 litre of water obtained from two stations in the Vellar Estuary. The position of these two stations is shown in Fig. 1a. The Station A was at the mouth of the estuary and station B opposite to the Biological Station. Only surface water samples were collected once a week at the two stations from August 5, 1969 to September, 25, 1969. Water samples were filtered through 'Oxoid' membrane filters (pore size 0.5μ) soaked with $MgCO_3$ suspension and mounted on a Millipore filter assembly. For the determination of organic carbon, particulate matter was collected on Watman GF/C glass fibre pads soaked with $MgCO_3$ suspension. The particulate matter was removed from the filters and organic carbon, carbohydrate and particulate phosphorus were estimated by adopting the procedure suggested by Strickland and Parsons (1965). Chlorophyll *a* was determined by the method of Steele and Baird (1965) and carbohydrate was estimated by the phenolsulphuric acid method of Dubois *et al.* (1956).

Particulate matter : In the Vellar estuary the concentration of particulate matter during the period of study, ranged from 20.6 mg/l - 98.7 mg/l at Station A and from 25.2 mg/l - 99.6 mg/l at Station B (Table 1). Maximal amounts at both the stations were found during the first fortnight of August, which corresponded with a peak in phytoplankton abundance. A further evidence of such a correlation was obtained from the high chlorophyll *a* values of the water samples.

Chlorophyll a : Chlorophyll *a* content of the particulate matter was high at both the stations during August. The maximum and minimum values observed for the Station A were 7.74 mg/m³ and 1.74 mg/m³ respectively (Table 1). The maximum was observed around the middle of August. Thereafter, the chlorophyll

TABLE 1. *Composition of Particulate Matter at the two Estuarine Stations*

<i>Date of collection</i>	<i>Station A</i>					<i>Station B</i>				
	<i>Particulate Matter mg/l.</i>	<i>Chlorophyll mg/m³</i>	<i>Organic Carbon mg/m³</i>	<i>Carbohydrate mg/m³</i>	<i>Particulate Phosphorus µg/m³</i>	<i>Particulate Matter mg/l.</i>	<i>Chlorophyll mg/m³</i>	<i>Organic Carbon mg/m³</i>	<i>Carbohydrate mg/m³</i>	<i>Particulate Phosphorus µg/m³</i>
5-8-'69	41.8	3.00	912.84	1018.0	63.73	99.6	16.20	1989.24	2465.0	152.26
12-8-'69	98.7	7.74	1945.60	2350.0	136.01	67.8	4.44	1936.00	2358.0	137.29
19-8-'69	84.8	6.60	2202.20	1262.0	60.73	61.6	4.08	2214.30	1212.0	68.43
26-8-'69	59.6	4.20	580.80	1340.0	77.84	53.8	3.60	595.32	2200.0	93.67
3-9-'69	40.08	2.76	1512.50	3860.0	29.08	51.8	3.60	1548.80	2220.0	32.08
10-9-'69	20.06	1.68	1476.20	1118.0	34.22	27.8	1.80	1568.16	892.0	45.34
18-9-'69	43.6	3.78	849.42	864.0	45.34	65.7	4.50	929.28	1016.0	62.44
25-9-'69	21.2	1.74	520.30	1016.0	59.45	25.2	1.62	508.20	1048.0	35.50

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a content decreased except on one occasion, when it was fairly high (Table 1). A similar trend was observed at Station B. However, at this station maximum chlorophyll was recorded in the beginning of August. Further, the chlorophyll

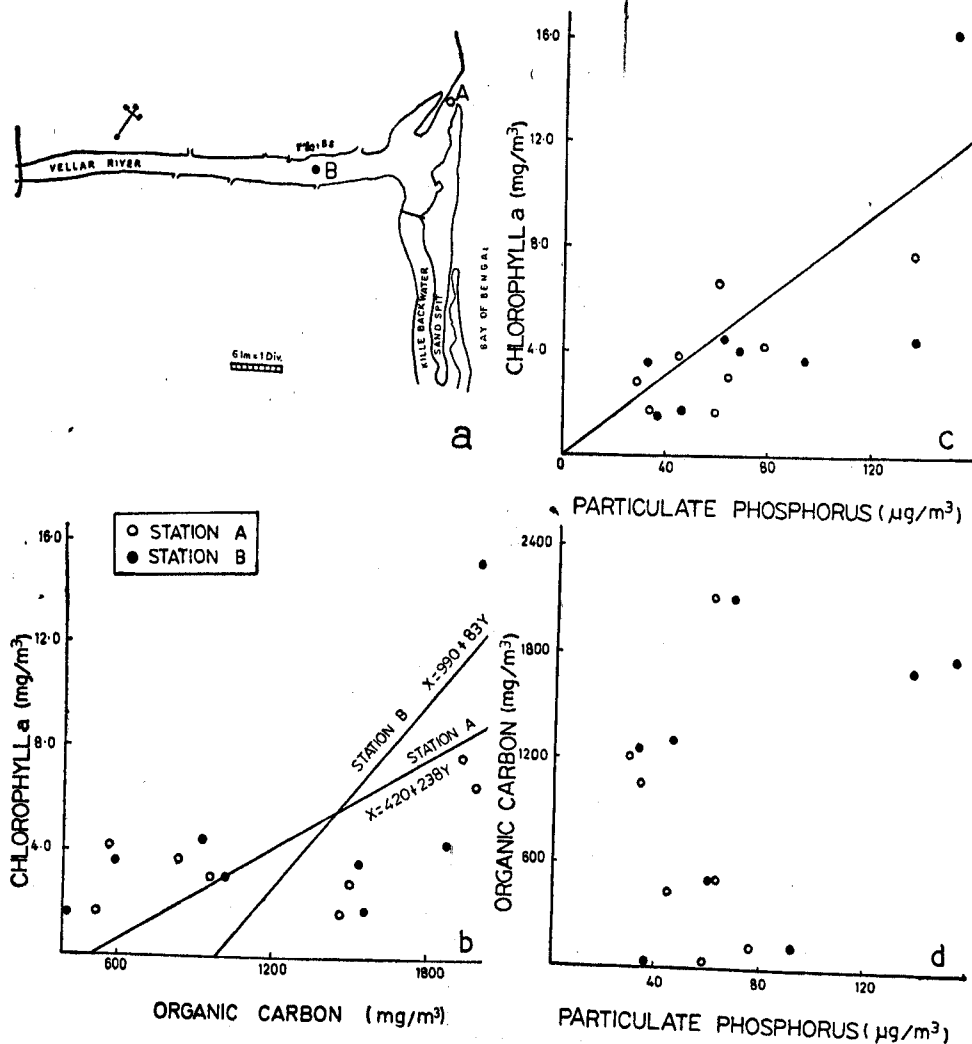


FIG. 1. (a) Map showing the position of the two sampling stations A and B in the Vellar estuary; (b) Regression of chlorophyll *a* on carbon for stations A and B; (c) Scatter diagram showing the relationship between chlorophyll *a* and particulate phosphorus; and (d) Scatter diagram showing the relationship between organic carbon and particulate phosphorus.

maximum observed at Station B during the same period was about twice that observed at Station A. Studies on primary production in the Vellar estuary also revealed a high rate of production at this station during August.

Organic carbon: The particulate organic carbon varied very widely (Table 1) at both the stations. The variation in the particulate carbon with time was some-

what similar to that of chlorophyll *a*. Maximum values at both the stations were observed in mid-August.

The ratio of carbon to chlorophyll a : The ratio of carbon to chlorophyll in the Vellar estuary ranged from 5 : 1 to 483 : 1 at Station A and from 4 : 1 to 304 : 1 at Station B. The slopes of the regression and the intercept of chlorophyll on carbon axis (Fig. 1b) were entirely different for the two stations, which probably indicated the existence of varied amounts of detrital carbon (1000 mg/m³ for station B and 510 mg/m³ for station A) in the particulate matter.

Phosphorus : The concentration of particulate phosphorus ranged from 29.08 µg/m³ to 136.01 µg/m³ at Station A and from 32.08 µg/m³ to 152.26 µg/m³ at Station B. The general trend in the distribution of particulate phosphorus was similar to that of chlorophyll. The data obtained for chlorophyll, when plotted against phosphorus and carbon against phosphorus (Figs. 1c and d) showed a large scatter.

Carbohydrate : Total carbohydrate content of the particulate matter varied between 864.0 mg/m³ and 2465.0 mg/m³ (Table 1).

Thus, of the four variables analyzed, namely chlorophyll *a*, carbon, carbohydrate and particulate phosphorus, the relationship between chlorophyll *a* and carbon seems of some value in estimating the quantity of living and detrital material in the particulate matter.

U.G.C. Centre of Advanced Study in Marine Biology,
Porto Novo.

V. K. VENUGOPALAN

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