NOTES

STUDIES ON DISSOLVED CARBOHYDRATE CONTENT (DCHO) IN A TROPICAL ESTUARY

ABSTRACT

Variations in dissolved carbohydrate content in the Cochin Backwater over a period of 24 hours have been given. The DCHO was measured at 2-hour intervals. Its maximum concentration was recorded at 1630 hrs and the minimum at 0430 hrs. Carbon assimilation as a percentage of carbon released in DCHO was 45.29% as determined by the experimental method and 84.11% by direct sampling method.

LARGE quantities of dissolved organic matter occur in natural waters as dissolved organic acids and carbohydrates, and their rate of turn-over is fairly high to be of much ecological significance (Fogg, 1962). Besides the seasonal and spatial changes in the DCHO, a regular diurnal cycle has been reported which has been attributed to the changes in the activities of living organisms (Collier *et al.*, 1953 and Walsh, 1965). Except for recent work by Sumitra *et al.* (1969), very little is known about this important constituent in tropical waters. The tropical estuary commonly known as the Cochin Backwater, has been studied fairly intensively during the past few years (Qasim and Reddy, 1967 ; Qasim *et al.*, 1968 *a* and *b*) but no mention has been made of the dissolved carbohydrates. Therefore, the present work was undertaken to know, whether any diurnal trend exists in the dissolved carbohydrate and what is its relationship with chlorophyll *a* and rate of photosynthesis as measured by the light-and-dark bottle method. Thus, one station (Bolghatty Jetty) in the Cochin Backwater was selected and studies were made on the surface samples only. The general features of the Cochin Backwater have been dealt by Qasim *et al.* (1968).

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Diurnal studies were conducted from 0830 hrs on 30th of January to 0830 hrs the next day. Frequency of sampling was at 2-hour intervals. Diel changes in DCHO and primary production were studied by light-and-dark bottle method. The experiments were carried out during the lighted part of the day (0630-1830 hrs) at 2-hour intervals.

Water samples were incubated in duplicates in 150 ml bottles *in situ* and suspended vertically from a float. DCHO was determined by anthrone method (Umbreit *et al.*, 1959) using glucose as the standard and the optical density was measured in a Evelyn photoelectric colorimeter. Chlorophyll *a* was measured according to Strickland and Parson (1960). Carbon assimilation was calculated from the oxygen data using PQ of 1. For calculating the amount of carbon released in DCHO carbon was assumed to contain 40% of the weight of carbohydrate as suggested by Walsh (1965).

From Fig. 1 it is evident that DCHO concentration showed a slight decrease from 6.4 mg/l at 0830 hrs to 5.3 mg/l at 1030 hrs. DCHO rose to the maximum

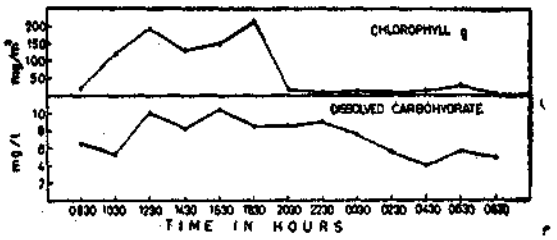

Fig. 1. Diurnal variations in DCHO and Chlorophyll *a*.

value of 10.4 mg/l at 1630 hrs and subsequently decreased till 2030 hrs. At 2230 hrs, it showed a slight increase, followed by a gradual decrease till 0430 hrs the next day. Between 0430 and 0630 hrs, there was again an increase in DCHO levels. The peak for DCHO was obtained between 1230 and 2230 hrs. Thus, it is seen that a definite diurnal cycle of DCHO exists in the estuary. Although trends in fluctuations of DCHO and chlorophyll *a* appears to be more or less similar, from Fig. 2 it is clear that the relationship is not direct. However, regulation of DCHO by the photosynthetic organisms have been shown by Collier *et al.* (1953) and Walsh (1965).

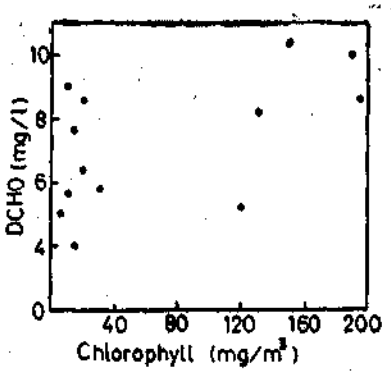

Fig. 2. The relation between DCHO and Chlorophyll *a*.

To calculate the amount of carbon assimilated during photosynthesis, the amount of DCHO produced and carbon released in DCHO, the results of primary production and DCHO experiments were used. These are given in Table 1. The direct sampling method showed that the carbon assimilated formed 84.11% of the carbon released. By experimental method it is clear that the assimilated carbon forms only 45.29% of the carbon released in DCHO. In contrast to this finding, Walsh (1965) reported that in Oyster pond, carbon released in DCHO was totally derived from assimilated carbon. Since there is no information on this aspect in the Cochin Backwater and this communication forms only a preliminary report, it is difficult to arrive at any conclusion regarding the source of DCHO.

TABLE 1. *Carbon assimilation, dissolved carbohydrate production and carbon released in DCHO [calculated from direct sampling of water and from light* (LB) *and dark bottle* (DB) *experiments]*

		gC/M³/day	
		Direct sampling	LB-DB
Carbon assimilated	..	2.49	3.46
DCHO produced	..	7.40	19.10
Carbon released in DCHO	..	2.96	7.64
Carbon assimilated as a percentage of carbon released in DCHO	..	84.11	45.29

The Backwater being an estuarine system is subjected to wide fluctuations in physico-chemical and biological factors and hence a detailed study on other sources contributing to DCHO are necessary.

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