

NOTES

A PRELIMINARY NOTE ON THE FLUCTUATION OF SOME HYDROGRAPHIC PROPERTIES IN THE ARABIAN SEA

THE Marine Biology and Oceanography Division of the Central Marine Fisheries Research Institute has been carrying out extensive hydrographical and biological investigations along the west coast of India since 1957 and more than 3,500 stations have already been covered. It was, therefore, thought worthwhile to study the changes in the average values of the hydrographical properties such as temperature, salinity and dissolved oxygen year-wise and month-wise in each one degree latitude-longitude squares. The average of many such studies intensively over the same area spread over a period of time will eliminate small differences and will provide a better overall picture of the changes taking place (Subramanyan, 1959 ; Subramanyan & Sarma, 1961). Work on plankton on these lines is in progress at this Institute. Further, similar studies as regards fisheries should enable an accurate interpretation of the fisheries resources and their correlation with hydrographical features.

Work carried out for the 1° squares 9°N-75°E and 9°N-76°E are presented here (an area of 7,200 nautical sq. miles). The Tables 1, 2 & 3 give respectively the average surface values of sea temperature, salinity and dissolved oxygen month-wise for seven years from 1957 to 1963 and also the mean values of these properties for each month. Even though there are no observations in some months due to circumstances beyond our control, the data still show some general features.

Temperature : (Table 1) During July and August the surface temperatures are low with values near about 26.26°C. This is attributed to the influence of upwelling which commences with the onset of monsoon within the area (Ramamirtham & Jayaraman, 1960 ; Sastry & Myrland, 1960). By October the waters warm up and by November the water temperatures are much higher than in the earlier months, with a rise of about 2°C. in both the areas. In December, January and February the values indicate that both the areas are isothermal. By March, the temperature values show an increasing trend and uniform high temperatures prevail in the months of April and May. By June again the temperature values show a decrease and present an indication as to the development of temperature gradients eastwards with the onset of monsoon. The range of variation in temperature in a year is about 4°C.

Salinity : (Table 2) During July and August the salinity values are low in both the areas, about 33‰, and in September the same trend is seen in the area near the coast (9°N-76°E). Soon after, the values show an increase in both the areas especially in the one away from the coast, 9°N-75°E. In October, a trend towards stabilisation of the isohaline conditions in both the areas is seen, and by the appearance of the sinking season in December, the salinity values are lower than those in November, obviously due to the incursion of low salinity water from the Bay of Bengal into the coastal circulation which at this time is from south to north. In January, again, the salinity values fall but in February there is a definite increase with the onset of summer. In March, April, May and June, salinity values are higher, 35.98‰ in the area 9°N-76°E. In the area near the coast (9°N-76°E), in June, the salinity values tend to fall, obviously due to the onset of monsoon rains.

TABLE I. TEMPERATURE

SQUARE 9°N-75°E

Year	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
1957	..	..	..	..	..	..	..	..	26.90	..	29.46	..
1958	..	28.35	29.80	29.99	..	..	..	24.57	26.71	26.22	28.56	28.73
1959	28.20	28.77	..	30.46	31.10	29.68	..	26.65	26.20	26.06	27.99	28.52
1960	28.32	28.41	29.15	..	..	..	..	..	..	..	..	..
1961	28.25	28.28	29.94	..	..	..	..	..	..	..	..	..
1962	28.39	28.30	..	..	..	28.92	..	..	27.20	..	..	..
1963	..	..	..	30.75	29.78	..	..	27.56	27.95	28.80	..	28.12
Mean	28.29	28.42	29.63	30.40	30.44	29.30	..	26.26	26.95	27.03	28.67	28.46

SQUARE 9°N-76°E

1957	..	..	..	..	..	..	..	..	25.97	..	29.11	..
1958	..	..	29.93	30.13	..	..	..	24.01	26.68	26.43	28.70	28.13
1959	28.46	29.52	..	30.89	30.45	29.00	27.00	25.94	26.23	27.46	28.14	26.00
1960	28.34	28.76	..	..	..	..	..	..	..	..	..	..
1961	27.38	28.19	29.44	..	..	..	..	..	..	..	..	..
1962	28.65	28.36	..	..	..	28.45	..	..	..	..	28.78	..
1963	..	..	..	30.95	29.20	..	..	26.98	27.93	29.28	..	28.45
Mean	28.21	28.71	29.69	30.66	29.83	28.73	27.00	25.64	26.70	27.72	28.68	27.53

NOTES

TABLE 2. SALINITY

SQUARE 9°N-75°E

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1957	..	..	..	..	..	..	..	..	34.94	..	34.78	..
1958	..	33.22	34.02	33.90	..	..	..	32.29	33.58	34.04	34.70	33.31
1959	32.45	33.94	..	34.51	34.60	34.58	..	32.78	33.84	31.92	33.25	33.25
1960	32.38	33.51	33.87	..	..	..	..	..	..	..	..	..
1961	33.59	33.78	34.96	..	..	..	..	..	..	..	..	..
1962	34.45	34.08	..	..	..	35.38	..	..	35.34	..	..	..
1963	..	..	..	34.11	34.42	..	..	35.07	34.45	34.53	..	35.03
Mean	33.22	33.71	34.28	24.17	34.51	34.98	..	33.38	34.43	33.50	34.24	33.86

SQUARE 9°N-75°E

1957	..	..	..	..	..	..	..	..	34.86	..	34.51	..
1958	..	..	34.26	34.30	..	..	..	32.86	30.91	32.71	33.11	33.38
1959	31.89	33.96	..	34.66	34.59	33.98	23.73	33.63	32.77	32.25	35.16	32.44
1960	32.33	33.20	..	..	..	..	..	..	..	..	..	..
1961	33.84	33.75	34.86	..	..	..	..	..	..	..	..	..
1962	34.56	34.08	..	..	..	34.40	..	..	..	..	34.92	..
1963	..	..	..	34.48	34.51	..	..	28.19	34.21	29.21	..	34.65
Mean	33.16	33.75	34.56	34.48	34.55	34.19	23.73	31.56	33.19	31.39	34.43	33.49

TABLE 3. OXYGEN

SQUARE 9°N-75°E

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1957	..	..	..	..	..	..	..	..	..	..	..	..
1958	..	..	..	..	..	..	..	4.25	5.23	3.95	4.54	4.71
1959	4.71	5.53	..	3.87	4.58	4.10	..	5.00	4.55	4.65	4.50	4.41
1960	4.35	4.45	..	..	..	..	..	..	..	..	..	..
1961	4.38	..	4.60	..	..	..	..	..	..	..	..	..
1962	4.55	4.45	..	..	..	..	..	..	5.10	..	..	..
1963	..	..	..	4.65	3.81	..	..	4.56	4.98	4.69	..	4.48
Mean	4.50	4.81	4.60	4.26	4.20	4.10	..	4.60	4.97	4.43	4.52	4.40

SQUARE 9°N-76 E

1957	..	..	..	..	..	..	..	..	..	..	..	..
1958	..	..	..	..	..	..	..	3.70	5.20	4.79	5.40	4.55
1959	4.46	4.05	..	3.40	4.21	..	..	5.46	4.30	4.15	4.15	4.49
1960	4.35	4.85	..	..	..	..	..	..	..	..	..	..
1961	4.30	..	4.48	..	..	..	..	..	..	..	..	..
1962	4.60	4.45	..	..	..	..	..	..	..	..	4.95	..
1963	..	..	..	4.50	3.00	..	..	4.90	5.68	5.38	..	4.58
Mean	4.43	4.34	4.48	3.95	3.61	..	..	4.69	5.06	4.77	4.83	4.54

NOTES

Oxygen : (Table 3) Notable monthly and yearly changes in the average dissolved oxygen content at the surface are not at all evident. Wind and wave action produce thorough aeration of the surface waters. The variation of oxygen values throughout the year is generally between 4.10 to 5.06 ml/L except for the two months, April and May, in the area near the coast, where the values are slightly lower.

Detailed work on similar lines for various squares along with statistical analysis of the data will be published elsewhere in due course.

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THE ECTOPROCTOUS BRYOZOANS OF THE INDIAN WATERS

The marine and brackish water bryozoans of the Indian waters are as yet poorly known. The latest comprehensive work (Robertson 1921) on the polyzoan fauna of the Indian waters is nearly fortyfive years old. Earlier publications of Hincks (1885) Thurston (1894), Thornely (1905, 1907), Annandale (1907a, b, 1908, 1911a, b, 1912a, b, c and 1916), Gravely (1927) give information about the bryozoan fauna of Indian waters. Recently Chhappgar and Sane (1966) recorded 11 species of bryozoans from the inter-tidal zone of the Bombay coast.

A list comprising 70 species of ectoproctous bryozoans recorded for the first time from the west and east coasts of India is presented in this paper. Since a comprehensive list of the Bryozoa of the Indian coasts especially those of the southwest coast has, hitherto, not been published, it was deemed useful to report the names of species recorded by the authors. It is hoped that this preliminary list is likely to be of assistance to workers concerned with this group.

LIST OF SPECIES

1. *Aetea ligulata* Busk
2. *Membranipora amoyensis* Robertson
3. *Electra crustulenta* (Pallas)
5. *Conopeum commensale* Kirkpatrick & Metzelaar
4. *C. eriophorum* (Lamx.)
6. *Caleschara levisenii* Harmer