

MEIOBENTHOS FROM THE KARWAR REGION (CENTRAL WEST COAST OF INDIA)

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ABSTRACT

Abundance and distribution of meiobenthos in shallow, sub-tidal region of Karwar were studied. The sediments were predominantly composed of silt and clay. The fauna largely consisted of nematodes, foraminiferans, polychaetes, copepods and ostracods. Nematodes and foraminiferans formed the main groups in the fauna. Approximately 70% of the total fauna occurred in the upper 2 cm of the sediments. Nematodes, foraminiferans and polychaetes were found in the entire 6 cm long core, while copepods, ostracods, lamellibranchs, kinorhynchs and turbellarians were limited to the upper 0-4 cm layer of the sediments.

INTRODUCTION

Quantitative data on sub-littoral meiobenthos of the Indian coast are very limited (Damodaran, 1972). There is practically no information on the meiobenthic fauna of the Karwar region. The present communication gives some information on

meiofauna from the shallow regions of Karwar. The area of investigation lies between $74^{\circ}6'$ long. $14^{\circ}46'$ lat. and $74^{\circ}8'$ long. $14^{\circ}48'$ lat. on the central west coast of India (Fig.1).

MATERIAL AND METHODS

Twenty four core samples were taken in duplicate from four stations during March-May, 1976 using a grab. A core tube of 10 cm length and 3.4 cm^2 in area was used to collect the samples of meiobenthos from the grab. The top 5 cm layer of the core was taken and broken into three 2 cm layer sub-samples. The samples were preserved in 1:500 Rose Bengal, sea water and formaldehyde (5%) mixture (Tietjen 1969). In the laboratory,

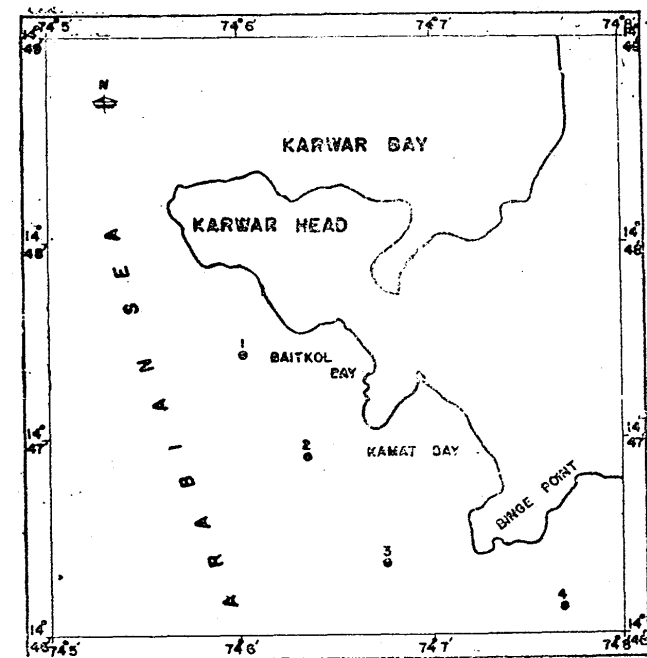


Fig. 1. Map showing location of 4 sampling stations.

the sediment was passed through a set of two sieves, the top one with a mesh size of 0.5 mm and the bottom one with a mesh size of 0.062 mm. Animals

retained by the fine screen were taken as meiobenthos. Wet weight of the major taxa was taken by weighing 10–20 representative specimens of each group. Sediment analysis was done by the method of Buchanan and Kain (1971).

RESULTS

Hydrography: During the year temperature of the sediment varied from 23.9 to 29.4°C with an average value of 27.4°C. Salinity showed a greater fluctuation with a range of 8.83–35.35‰. Dissolved oxygen at the bottom ranged from 2.06 ml/l to 3.76 ml/l.

Table I. Percentage weight of sediments grain size composition.

Station No.	Depth m	Percentage of sand				Silt (%) (0.062–0.0039 mm)	Clay (%) (<0.0039mm)
		Coarse (1–0.5 mm)	Medium (0.5–0.25 mm)	Fine (0.25–0.125 mm)	Very fine (0.125–0.062 mm)		
1	8	—	3.24	5.03	7.22	45.79	38.72
2	7	—	1.21	4.68	21.35	40.35	32.41
3	7	1.32	1.98	4.39	14.48	59.57	18.36
4	6	3.24	2.38	7.58	8.52	57.11	21.17

Table II. Numbers and wet weights of meiofauna groups.

Stations		1	2	3	4
Depth of core in cm		0–6	0–6	0–6	0–6
Nematodes	No/10 cm ²	1107	896	769	938
	mg/10 cm ²	9.96	7.38	6.48	8.44
Foraminiferans	No/10 cm ²	99	72	302	215
	mg/10 cm ²	0.89	0.62	2.71	1.96
Polychaetes	No/10 cm ²	14	3	7	15
	mg/10 cm ²	0.43	0.09	0.22	0.45
Copepods	No/10 cm ²	8	25	9	19
	mg/10 cm ²	0.056	0.104	0.24	0.22
Ostracods	No/10 cm ²	8	25	9	19
	mg/10 cm ²	0.33	1.02	0.27	0.76
Lamellibranchs	No/10 cm ²	3	4	3	12
	mg/10 cm ²	0.09	0.09	0.09	0.35
Kinorhynchs	No/10 cm ²	6	13	4	16
	mg/10 cm ²	0.024	0.052	0.013	0.064
Turbellarians	No/10 cm ²	13	9	6	13
	mg/10 cm ²	0.117	0.088	0.054	0.117
Total	No/10 cm ²	1250	1022	1100	1228
	mg/10 cm ²	11.567	8.424	9.807	11.601

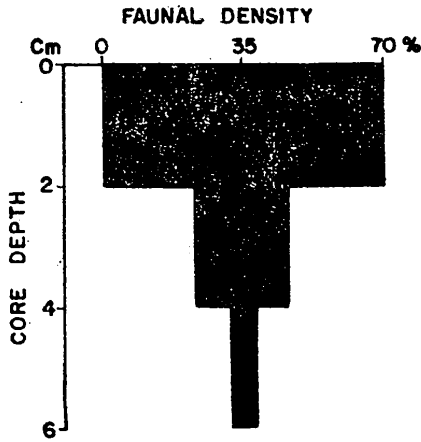


Fig. 2. Vertical distribution of meiobenthos.

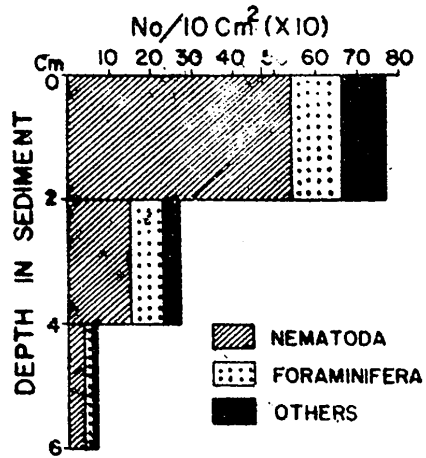


Fig. 3. Vertical distribution of dominant meiobenthic groups.

Sediments: Particle analysis of the sediments is given in Table I. The sediment was greyish green in colour and included silt and clay at all the stations. Sand particles were generally not more than 20%, except at the station 2, where the sediments were composed of fine grain particles (62 μ -1000 μ diameter). Silt (3.9 μ -62 μ diameter) was the major constituent of the sediments, followed by clay particles (<3.9 μ diameter).

Meiofauna: The number of organisms and the wet weights of the various groups of meiofauna are given in Table II. Total number of specimens ranged between 1022 and 1250/10 cm² with an average value of 1098 animals/10 cm². The biomass (wet weight) ranged between 8.424 and 11.601 mg/10 cm² (average 10.38 mg/10 cm²). Nematodes, foraminiferans, polychaetes, copepods and ostracods were the most abundant and the most widely distributed groups. Of these, nematodes alone contributed between 68 and 85% of the total fauna followed by foraminiferans. Lamellibranchs, kinorhynchs and turbellarians were observed only occasionally. Sediments with low percentage of sands contained a higher percentage of fauna.

Vertical distribution of meiofauna (Fig. 2) showed that there was no significant difference in the total population and biomass in the upper 0-2 cm layer of the sediment at all the stations. About 70% of the total fauna was found in the upper 2 cm layer, 24% in the 2-4 cm layer and only 6% in 4-6 cm layer of the sediment. Nematodes and foraminiferans were generally found in significant numbers in the upper 0-2 cm layer of the sediment. Nematodes, foraminiferans and polychaetes were present in the entire 6 cm long core, while copepods, ostracods, lamellibranchs, kinorhynchs and turbellarians were mostly restricted to the upper 0-4 cm layer of the sediment. The vertical distribution of the dominant meiofaunal groups is given in Fig. 3.

DISCUSSION

Vertical distribution of meiofauna in the sediments has been studied by several earlier workers (Mare, 1942; Tietjen, 1969; Damodaran, 1972). The sublittoral meio-

fauna has been reported to be concentrated in the upper few centimetres of deposits, and in some cases, most of the animals were even restricted to the 2 cm layer as observed in the present study. Below 4 cm level, the numbers were usually very low. The faunal concentration in the upper sediment layers is because of higher oxygen availability as well as a greater concentration of food material (McIntyre, 1969). Deeper penetration of some of the groups, specially nematodes, is probably due to their ability to exist at lower concentrations of oxygen. Also, the slender shapes of the nematodes make them better adapted to remain in fine interstices (Wieser, 1959). Thus the fauna in the present study was dominated by nematodes as the sediment was predominantly composed of silt and clay. Foraminiferans showed a preference towards coarse sediments as indicated by their density in sandy bottom. Copepods, ostracods and kinorhynchs seem to be associated with the particle size and the large amount of silt present in the sediments.

A comparison of the results obtained by the previous workers on the density of meiofauna (Table III) shows that there is wide variation in the total number of meiofauna in different areas, probably because of variability in the sampling depths. However, in all cases, the dominant group were nematodes and their overall contribution to the total meiofauna at each place was almost similar. It appears from Table III that shallow waters harbour more meiofauna than the deeper waters as indicated earlier by Tietjen (1969).

By comparing the quantitative abundance of meiobenthos and macrobenthos, Gerlach (1971) stressed the importance of meiobenthos in terms of their consumption as food. He reported that the total meiobenthic biomass is 15% greater than the macro-

Table III Summary of quantitative meiofauna data.

Reference	Locality and depth	Total meiofauna number/10 cm ²	Dominant group and its density/10 cm ²
Wieser (1960)	Buzzard, Bay mass 12-30 m	169-1861	Nematoda 150-1800
Wigley and McIntyre (1964)	New England, USA 69-179 m	235-537	Nematoda 202-507
McIntyre (1964)	Loch Neuis, Scotland 101 m	541-2224	Nematoda 405-2072
Tietjen (1969)	New England, USA 1 m	1184-5163	Nematoda 802-4811
Tietjen (1971)	Off N. Carolina, USA 50-100 m	352-849	Nematoda 157-593
Damodaran (1972)	Kerala coast, India 4 m	78-1455	Nematoda 42-1146
Scheibel (1976)	Western Baltic Sea 2-26 m	300-1995	Nematoda 178-1594
Present study	Off Karwar, India 6-8 m	1022-1250	Nematoda 769-1107

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benthos, while in terms of standing stock it is just 3%. In the present study the ratio of macro to meiofauna was 1:314 by number and 18:1 by weight. In other

	<i>Macrobenthos</i>	<i>Meiobenthos</i>	<i>Ratio</i>
Number/m ²	3461	1,088,000	1: 314
Biomass g/m ²	185.85	10.38	18: 1

words, the meiofauna was 314 times greater in number than macrofauna. However, due to their smaller size, their contribution to the biomass was also very low. The richness of meiofauna in the substratum predominantly composed of silt suggest their preference for such sediments. McIntyre (1969) found high macro/meiofauna ratio in muddy bottoms and reported meiofauna 30 to 770 times more numerous than the macrofauna. The short generation time and the high metabolic rate of meiobenthos (McIntyre, 1964; Fenchel, 1969) seem to accelerate the meiobenthic production which ultimately contributes towards the food of the bottom feeding animals.

ACKNOWLEDGEMENT

I am grateful to Dr. S. Z. Qasim, Director, National Institute of Oceanography, for his guidance and encouragements. Thanks are also due to Dr. M. J. George and Dr. A. H. Parulekar for their suggestions on the manuscript.

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