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MEIOFAUNA OF GULF OF MANNAR

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INTRODUCTION

Meiofaunal organisms are mobile metazoans, which are smaller than macrofauna and larger than microfauna. Meiofauna can be defined as those animals, which will pass through a sieve with a mesh size of 0.5 mm but be retained by 0.045 mm sieve. Some reach 1 or 2 mm in length but can pass through the larger sieve because they are long and slender. Being small and less conspicuous, they are often ignored altogether. Meiofauna live in both freshwater and Marine habitats. The meiofauna often extremely abundant in fine particle beaches, sometimes exceed the macro fauna in biomass in coarser sands. They also inhabit complex surfaces and the spaces between them such as are found on seaweeds and other structures.

The meiofauna consists of various representatives of the Gastrottricha, Kinorhyncha, Nematoda, Copepoda, Ostracoda, Mystacocarida, Halacarina and many groups of Turbellaria and Oligochaeta, some Polychaeta and a few specialized species of the Hydrozoa, Nemertina, Bryozoa, Gastropoda, Aplacophora, Holothuroidea and Tunicata.

All of them are small and may have a worm like shape. Meiofauna have been distinguished into the burrowing muddy sediments forms and interstitial sandy sediments forms. Intertidal sediments tend to be dominated by nematodes, which can reach very high densities on finer particles beaches. Nematodes are usually long and thin, a shape well suited for moving through interstices. Slender species inhabit the larger interstitial spaces found on sandy beaches are bulkier epibenthic and shallow burrowing forms are more common in fine sediments.

The present paper gives a taxonomic account and distribution of 36 species belonging to 31 genera, 24 families of nematodes, copepods, foraminiferans, ostracods and polychaetes of Gulf of Mannar.

REVIEW OF LITERATURE

During 1900-1950, which was a period of early meiofaunal research. Many animals were discovered and described. Mare (1942) introduced and defined the term 'Meiobenthos'. The term 'Interstitial fauna introduced by Nichol's (1935) for animals living in the interstitial water of sand

and its equivalent terms Mesopsammon introduced by Remane (1940) are often confused with the term meiofauna. Organism living in the interstitial spaces between particles of all types of sediment are referred to as interstitial if they move through the habitat with a minimum of disturbances of constituent particles. The term meiofauna is derived from Greek Meio meaning "smaller". In this context it refers to the fauna smaller than what has been defined as the lower size limit for macrofauna.

Nematodes populating North American shores (Cobb, 1914, 1920) and the Archiannelids of the Northern French coast (Giard, 1904), Remane who is described as the "father of Meiofaunal research" was the first to recognize the rich populations in intertidal beaches, subtidal sands, muds and algal habitats. Remane described Gastrotricha, Rotifera, Archiannelids, Kinorhyncha and other taxa.

The free-living marine nematodes usually constitute the most abundant group of organisms in the meiofauna of littoral sediments. The works of Wieser (1953, 1954, 1956), Timm (1961) and Gerlach (1962, 1963, 1964) proved quite useful in the identification of many common genera and species of these marine nematodes.

Total and relative measurements of body are absolutely necessary for identification of marine nematodes. Structure of stoma, cup shaped with minute teeth, structure of tail, types of oesophagus, types of Amphids, are the identification characters. For this the Demanian formula is usually employed indicating, $a = \text{total body length}/\text{maximum body diameter}$, $b = \text{total body length}/\text{length of tail}$. The position of nerve ring, excretory pore and vulva is expressed in percentage of body or oesophageal length.

Brady (1884) has given an exhaustive and excellent account of the Foraminifera from the dredgings of the Challenger' expedition which crossed the Indian Ocean far to the south of the Peninsula. Chapman (1895) reported on the Foraminifera obtained by the Royal Indian Marine survey ship S.S. 'Investigator' from the Arabian Sea near Laccadive Islands. Stubbings (1939) reported on the distribution and biology of nearly 300 species of Foraminifera from the Marine deposits of the Arabian Sea collected during the Johan Murray' expedition. Carter (1888) on the specimens dredged up from the Gulf of Mannar. Dakin (1906) recorded 131 species of Foraminifera from the Gulf of Mannar off Ceylon coast. Gnanamuthu (1943) has listed 47 species of littoral Foraminifera from the Krusadai islands in the Gulf of Mannar. The identification of various families and genera is based on the classification adopted by Cushman (1948) K.M.S. Ameer Hamsa (1971) reported Foraminifera of the Palk Bay and Gulf of Mannar. Ganapati and Satyavati (1958) recorded the Report on the Foraminifera in bottom sediments in the Bay of Bengal off the east coast of India.

Sewell (1919, 1924) reported on the copepod fauna of Chilka Lake and more recently Devasundaram and Roy (1954) have discussed briefly the occurrence and seasonal variations of the copepods in the plankton of the Chilka Lake for the period 1950-1951.

There are brief references to Copepoda in the accounts on the brackishwater fauna of Adyar and other estuarine areas around Madras, by Panikkar and Aiyar (1937), Krishnaswamy (1953) and Chako *et al.* (1953).

Sewell (1919) described a new copepod from the Cochin backwater. The first attempt of making a systematic study and ecology of the planktonic copepods of the Cochin backwater was made by George (1958). Pillai (1970) while giving a list of the Pseudodiaptomus Herrick. The following authors also have contributed to our knowledge of the copepods on habiting brackish waters of India : Kasturirangan (1963), Sewell (1948, 1956) and Ummerkutty (1960). All the above studies have recorded a total of 62 species of Calanoid copepods from different estuaries in India as follows.

MATERIALS AND METHODS

The meiofauna along the beach are collected and field studies made during low tide when the inter tidal zone is fully exposed. A Perspex corer having 40 cm long and had an internal cross-sectional area of 10 cm² was used for the collection of the sand samples (Nybakkan, 1997). The corer tube was vertically thrust into the beach sand up to 10-30 cm and the top portion of the corer was tightly closed with a rubber bung. Later the corer was carefully removed from the substratum, without disturbing the entire samples. To each core sample was added 4% solution of formaldehyde as preservative and a few drops of rose Bengal for necessary staining. In the laboratory, the meiofauna was extracted by washing with 10% solution of magnesium chloride. Then the solution was filtered on a 63 µm diameter mesh size plankton cloth and the concentrated organisms were carefully collected in petridishes. Later the organisms were sorted into different groups and numerically counted up to species level.

SAMPLE PROCESSING

Samples were processed in the laboratory using the methods of Higgins & Thiel (1988) to extract the fauna from the sand grains. Each sample in the vial is stirred with filtered sea water. The supernatant was decanted on to a 63 µm sieve and the fauna were preserved in 4% buffered formalin with rose Bengal stain. The Meiofauna collected on a finer sieve is then washed into a petridish, examined and counted under the binocular microscope.

Standard manuals and monographs were followed to identify the meiofaunal species.

LIST OF SPECIES RECORDED

Phy ARTHROPODA

Class CRUSTACEA

Order HARPACTICOIDA

Family LONGIPEDIIDAE

1. *Longipedia weberii* (A. scott)

Family TACHIDIIDAE

2. *Euterpina acutifrons* (Dana)

- Family ECTINOSOMIDAE
3. *Microsetella norvegica* (Boek)
- Family MACROSETELLIDAE
4. *Macrosetella gracilis* (Dana)
- Family CENTROPAGIDAE
5. *Isias tropica* (Sewell)
- Family PARAMESOCHRIDAE
6. *Paramesochra arenicola* (Klie, 1929)
7. *Emertonia pseudogracilis* Krishnaswamy, 1957
- Phy NEMATODA
- Class ADENOPHOREA
- Order ENOPLIDA
- Family ANTICOMIDAE
8. *Anticoma* sp.
9. *Anticoma acuminata* (Eberth, 1863)
- Family OXYSTOMINIDAE
10. *Porocoma striata* Cobb, 1920
- Family MONHYSTERIDAE
11. *Theristus* sp.
12. *Theristus pertenuis*
13. *Theristus tortuosa* Timm, 1961
- Family CHONIOLAIMIDAE
14. *Latronema orcinum* (Gerlach, 1952)
- Family SPHAEROLAIMIDAE
15. *Sphaerolaimus pacificus* Allgen
- Family ONCHOLAIMIDAE
16. *Oncholaimus* sp.
17. *Oncholaimus brachyceus* De Man, 1889
18. *Viscosia viscosa*, De Man, 1980
- Family CAMACOLAIMIDAE
19. *Procamacolaimus tubifer* Gerlach, 1953
- Family NEOTONCHIADAE
20. *Neotonchus* sp. W.B. Blome, 1982
- Family TRIPYLOIDIDAE
21. *Tripyloides gracilis*, (Ditlevsen, 1918)

- Family XYALIDAE
22. *Daptonema* sp. (1)
 23. *Daptonema* sp. (2) W. sm. Wetzel, 1993
 Family LINHOMOEIDAE
24. *Metalinhomoeus* sp. Chitwood, 1951
 Family CERAMONONEMATIDAE
25. *Pselionema* sp.
 Family ANOPLSTOMIDAE
26. *Anoplostoma* sp.
 Family RHYNCHONAMTIDAE
27. *Rhynchonema* sp.
 Family THORACOSTOMOPSIDAE
28. *Enoplolaimus* sp.
 Family CHROMADORIDAE
29. *Chromadora* sp.
 Family ROTALIIDAE
30. *Rotalia pulchela* D'Orbigny, 1939
 Family MILIOLIDAE
31. *Quinqueloculina vulgaris* D'Orbigny, 1826
 32. *Trochammina inflata* (Montagu, 1808)
 Family NONIONIDAE
33. *Elphidium reticulosum* Cushman, 1948
 34. *Bullia vittata* Linnaeus, 1767
 OSTRACOD
35. *Conskoecia indica*
 POLYCHAETA
 Order PHYLLODOCIDA
 Family SYLLIDAE
36. *Typosyllis* sp.

CONCLUSION

Table 1 shows a total of 36 species of meiofauna including 21 species of nematodes belonging to 20 genera, 4 species belonging to 4 genera of foraminiferans, Ostracod such as *Conskoecia indica*, Polychaeta such as *Typosyllis* sp. Nematodes were most abundant group of meiofauna at all the sampling sites, followed by harpacticoid copepods (8 species) and foraminiferans.

Totally five species of nematodes were dominated, which occurred in all the 16 stations i.e., *Daptonema* sp. (1) *Daptonema* sp. (2) *Anoplostoma* sp. (3) *Oncholaimus* sp, (4) *Viscosia viscosa*,

Table-1 : Occurrence and distribution of meiofauna of southeast coast (i-Keelakarai, ii-Sethukarai, iii-Kalimangundu, iv Muthupettai, v-Periapatnam, vi-Ervadi, vii-China Ervadi, viii-Pamban bridge, ix-Rameswaram, x-Thangatchimadam, xi-Single Island, xi-Krusadai Island, xiii-Pullivasal Island, xiv-Poomarichan, xv-Mnauli, xvi-Hare Island, xvii-Nallathani Island.

Sl. No.	Species	Stations																
		i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv	xv	xvi	xvii
1.	1. <i>Longipedia weberii</i>	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+
2.	2. <i>Euterpina acutifrons</i>	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-
3.	3. <i>Microsetella norvegica</i>	+		+	-	-	+	+	+	-	-	-	-	-	+	-	-	-
4.	4. <i>Macrosetella gracilis</i>	+	+	-	-	+	-	-	+	+	-	-	-	+	+	-	-	-
5.	5. <i>Paramesochra arenicola</i>	-	-	-	-	+	-	+	-	-	-	-	-	-	-	+	-	-
6.	6. <i>Emertonia pseudogracilis</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
7.	7. <i>Isias tropica</i>	-	-	-	-	-	-	-	+	-	-	+	-	-	-	+	-	-
9.	8. <i>Anticoma acuminata</i>	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
10.	9. <i>Porocoma striata</i>	+	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-
11.	10. <i>Theristus tortuosa</i>	+	+	+	-	+	+	-	+	-	-	-	+	-	-	-	-	-
12.	11. <i>Latronema orcinum</i>	-	+	-	-	-	-	+	-	-	-	+	-	-	+	-	-	-
13.	12. <i>Sphaerolaimus pacificus</i>	-	-	+	-	-	-	-	-	-	-	-	+	-	-	+	-	-
14.	13. <i>Oncholaimus brachyceus</i>	-	-	-	-	+	+	-	-	-	-	-	+	-	-	-	-	-
15.	14. <i>Procamacolaimus tubifer</i>	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-
16.	15. <i>Neotonchus</i> sp.	-	-	+	-	-	-	+	-	-	-	-	-	+	-	-	-	-
17.	16. <i>Rotalia pulchella</i> -	+	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-
18.	17. <i>Quinqueloculina vulgaris</i> -	+	-	+	-	+	-	-	+	+		+	-	-	+	-	-	-

Table-1 : (Cont'd).

Sl. No.	Species	Stations																
		i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv	xv	xvi	xvii
19.	18. <i>Trochammina inflata</i> -	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-
20.	19. <i>Elphidium reticulosum</i> -	+	-	+	-	+	-	-	-	+		+	+	+	-	-	-	-
22.	20. <i>Conascoecia indica</i>	-	-	+	-	-	-	-	-	-	-	+	+	-	+	-	-	-
23.	21. <i>Bullia vittata</i>	-	-	-	-	+	-	+	+	-	-	+	+	-	+	-	-	-
24.	22. <i>Typosyllis</i> sp.	+	-	-	-	+	-	-	-	+	-	-	-	-	+	-	-	-
	23. <i>Tripyloides gracilis</i>	+	-	-	-	-	+	-	+	-	-	+	-	-	+	-	-	
	24. <i>Chromadora</i> sp.	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	-	
	25. <i>Daptonema</i> sp. (1)	-	+	-	-	-	-	-	+	-	-	+	-	-	+	+	-	
	26. <i>Daptonema</i> sp. (2)	-	+	-	-	-	-	-	+	-	-	+	-	-	+	+	-	
	27. <i>Metalinhomoeus</i> sp.	+	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	
	28. <i>Theristus</i> sp.	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	
	29. <i>Theristus pertenuis</i>	-	-	-	-	-	-	-	-	-	+	-	+	-	+	-	-	
	30. <i>Pselionema</i> sp.	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	
	31. <i>Anoplostoma</i> sp.	+	-	-	-	+	-	-	-	-	-	+	+	-	-	-		
	32. <i>Oncholaimus</i> sp.	+	+	-	-	-	-	-	-	+	-	-	-	-	-	+	+	
	33. <i>Anticoma</i> sp.	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	
	34. <i>Rhynchonema</i> sp.	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	
	35. <i>Viscosia viscosa</i> -	+	-	-	-	-	-	+	+	-	-	-	-	-	+	-	+	
	36. <i>Enoplolaimus</i> sp.	+	-	-	-	-	-	-	-	-	-	-	+	-	-		-	

(+ present, - absent)

(5) *Theristus tortuosa*. The foraminiferans species such as four species by (1) *Rotalia pulchella*, (2) *Quinqueloculina vulgaris*, (3) *Trochammina inflata*, (4) *Elphidium reticulosu*. The harpacticoids copepods species such as (1) *Euterpina acutifrons*, (2) *Microsetella norvegica*, (3) *Macrosetella gracilis* were occurred sporadically. The greater diversity is occurred in muddy environment.

The greater diversity was observed at station I and XII, which had a cover of muddy with seagrass environment. At station IX (Rameswaram) is low diversity by human impact.

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