A SURVEY OF THE MEIOFAUNA OF THE FLEET

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Introduction

This paper is essentially an abstract of an M.Sc. dissertation submitted through the Department of Oceanography, University of Southampton.

Marine zoologists classify bottom-living invertebrates, in terms of size, into MACROFAUNA - the larger bivalves, worms and crustaceans which are easily seen with the naked eye and can often be picked up with the bare hands; MICROFAUNA - consisting mostly of tiny, single-celled organisms visible only en-masse or in microscopic preparations and MEIOFAUNA - "in between sizes" which can be picked up individually with forceps or pipette.

The meiofauna is a vital link in many of the complex food webs involving bottom-living creatures. It consists of forms such as Nematoda (roundworms), Narpacticoid copepods, Ostracoda (tiny, bivalved crustaceans), Foraminifera (Protozoa similar to amoebae), small species of polychaete and oligochaete worms and a number of other forms of similar size.

In recent years the study of the meiofauna has received a lot of attention following the definition of the meiofauna, in 1942, by Mare. The first international conference on the meiofauna was held in 1969.

Methods

For the present study five stations were chosen with five samples taken at each station (Fig. 1). The lower size limit of the meiofauna was taken as those animals retained by a 63μm sieve.

A comparison was to be made between stations so each one was sampled at low water, and as near to the water line as possible. At each station five core samples for the meiofauna, five larger core samples for macrofauna, the salinity and temperature of the water, temperature of the sediment, pH of the water and samples of sediment for particle size analysis and organic content were taken.

To take the meiofauna samples a core tube of 13mm diameter was used. The corer was made of glass which has the advantage of being transparent, thus making it possible to examine the sediment sample inside but has the disadvantage of being easily broken. After a trial period reasonable samples were taken of 30mm depth and this became standard throughout the programme.

Results and Discussion

Table 1 shows temperature, salinity, pH and sediment organic content variations at the stations sampled.

The highest mean water temperature (17.3°C), and the highest mean sediment temperature (17.2°C) were both at station B (Table 1). This is lower than the temperature Whittaker obtained about May 1968 as then the minimum temperature of the Fleet was given as 17.5°C and the maximum was 25.5°C. In May 1969 Whittaker found a minimum water temperature of 12.9°C and a maximum of 23.9°C.

The field measurements of pH (Table 1) were high compared with sea water (about pH 8). This feature was also noted by Whittaker. The high pH recorded in the Fleet may be a factor in influencing the preservation of empty Foraminifera tests. One sample was estimated to contain about 6000 foraminiferids but only about 800 were counted as living (station D).

The sediment at the stations in the Fleet was found to be very poorly sorted containing a high proportion of coarse material. The coarsest material was found at station B where the highest number of individuals and species richness occurred.

Grain size and distribution of the meiofauna in the Fleet showed no direct relationship as high numbers occurred not only at station B, which had the highest mean grain size (2.1mm), but also at station E which had a much lower mean grain size (0.4mm). The degree of sorting at station E was the highest found in the Fleet though at a value of 0.975 it is still relatively poorly sorted.

The lowest measurement of the organic content (Table 1) was at station D where the lowest numbers of individuals were recorded. A possible correlation between numbers of individuals and organic content was investigated but no relationship was found.

In terms of overall numbers of meiofaunal animals station B was quantitatively the richest area (10122/10cm^2), followed by station E (9517/10cm^2), station C (7078/10cm^2), station A (6062/10cm^2) and the poorest station D (4335/10cm^2) (Table 2). The highest values of peak meiofaunal abundances on sandy beaches were given by Gray & Reiger as 9416/10cm^2, by Harris as 1914/10cm^2 and McIntyre & Murison as 6689/10cm^2. McIntyre & Murison gave a value for May of 3081/10cm^2. Nikouyan (1980) gives 2600/10cm^2 for meiofaunal densities in a fine sandy estuarine beach in Southampton Water. He also looked at meiofauna densities in association with the burrows of the lugworm Arenicola marina in the same area and found much higher densities of 2600/10cm^2 and 15000/10cm^2. From these figures it can be seen that the Fleet is generally a very rich area in terms of meiofaunal abundance.

In conclusion, this preliminary survey has shown the Fleet to be very rich with regard to both species and species numbers (Tables 2-5). The Harpacticoida and Foraminifera, both of which were taken to the species level, were found to exhibit relatively high species diversity.

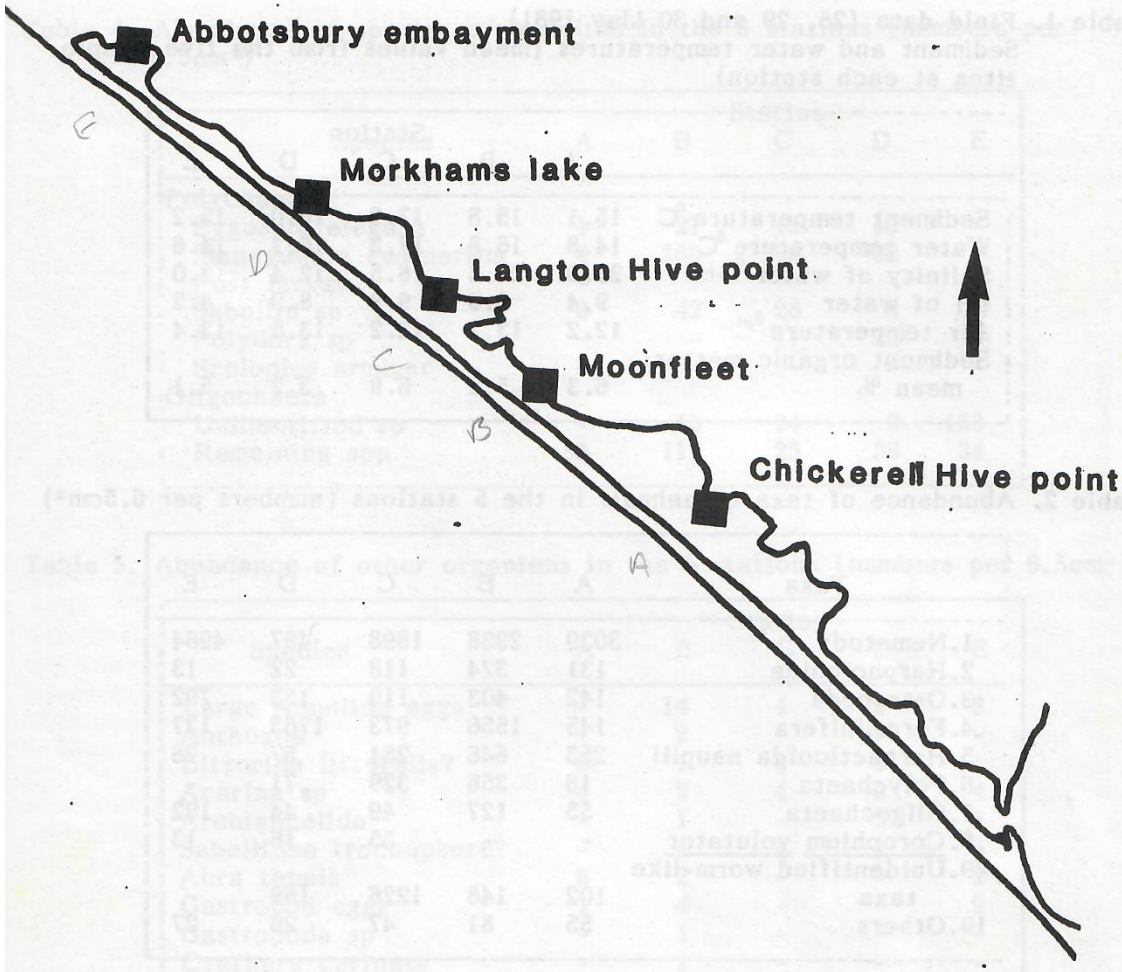

Figure 1. Map showing sites sampled. A. Chickerell Hive point; B. Moonfleet; C. Langton Hive point; D. Morkhams lake; E. Abbotsbury Embayment.

Table 1. Field data (28, 29 and 30 May 1981).
Sediment and water temperatures (mean values from the five sample sites at each station)

	Station A	B	C	D	E
Sediment temperature °C	15.1	15.8	17.2	16.0	15.2
Water temperature °C	14.8	16.8	17.3	16.1	14.6
Salinity of water ‰	25.0	20.6	16.5	12.4	3.0
pH of water	9.4	9.9	9.9	8.9	8.2
Air temperature °C	12.2	13.2	13.2	13.8	13.4
Sediment organic matter mean %	6.3	5.2	6.9	3.2	5.1

Table 2. Abundance of taxa of animals in the 5 stations (numbers per 6.5cm²)

Taxa	A	B	C	D	E
1. Nematoda	3039	2938	1898	497	4984
2. Harpacicoida	131	324	118	22	13
3. Ostracoda	142	403	119	153	792
4. Foraminifera	145	1556	973	1763	137
5. Harpacticoida nauplii	253	646	281	57	28
6. Polychaeta	18	356	329	71	-
7. Oligochaeta	55	127	49	44	192
8. Corophium volutator	-	-	35	16	13
9. Unidentified worm-like taxa	102	148	1226	169	-
10. Others	55	81	47	26	27

Table 3. Abundance of species of Foraminifera in the 5 stations (numbers per 6.5cm²)

	Station A	B	C	D	E
Ammonia beccarii	38	561	597	604	34
Elphidium spp	37	630	248	598	48
Elphidium macellum	19	57	7	-	-
Planispiral forms	9	68	60	409	45
Trochammina inflata?	12	69	5	11	6
Milliammina fusca?	28	16	3	1	1
Quinqueloculina seminulum?	2	78	26	42	-
Jadammina macrescens?	-	44	16	81	3
Pateoris hauerinoides?	-	9	3	5	-
Q. oblonga?	-	15	4	2	-
Q. dimidiata?	-	5	-	7	-
Reophax mobiliformis	-	1	-	-	-
Unidentified sp	-	3	4	3	-

Table 4. Abundance of species of Annelida in the 5 stations (numbers per 6.5cm²)

Species	Station A	B	C	D	E
Polychaeta					
Pygospio elegans	1	27	15	13	-
Manayunkia aestuarina	4	280	269	32	-
Post larvae	-	7	-	-	-
Sabellid sp	6	42	28	4	-
Polydora sp	-	-	17	22	-
Scoloplos armiger	8	-	-	-	-
Oligochaeta					
Unidentified sp	-	15	24	9	158
Remaining spp	55	112	25	35	34

Table 5. Abundance of other organisms in the 5 stations (numbers per 6.5cm²)

Species	Station A	B	C	D	E
Large Annelida eggs	-	14	4	2	9
Anthozoa	-	2	-	-	-
Littorina littoralis?	8	1	8	6	1
Acarina sp	4	2	4	3	4
Archiannelida	-	1	-	3	1
Sabellidae trochophore?	-	-	-	1	-
Abra tenuis	8	2	-	-	2
Gastropod eggs	1	4	-	-	9
Gastropoda sp	-	1	-	-	-
Cyathura carinata	-	1	-	-	-
Microdeutopus sp	1	-	-	-	-
Chironomidae larvae	-	-	4	2	1