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MEIOFAUNA IN A SHALLOW MARINE
EMBAYMENT

by

FRANK R. CANTELMO

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1978

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ABSTRACT

THE ECOLOGY OF SUBLITTORAL
MEIOFAUNA IN A SHALLOW MARINE
EMBAYMENT

by

FRANK R. CANTELMO

Advisor: John H. Tietjen

A shallow subtidal area in Sandy Hook Bay, N.J. was sampled monthly at mean low water from March 1975 to March 1976. Hand-operated cores were taken to a depth of 10 cm for quantitative and qualitative enumeration of meiofauna, Eh, pH, chlorophyll a, organic carbon, interstitial water content and granulometric properties. Interstitial water samples were also taken to a depth of 10 cm for dissolved oxygen, salinity and hydrogen sulfide concentrations.

Generally, an oxidized zone persisted throughout the year to a depth of 2 cm; this overlays a more reduced zone from 2-10 cm. The 0-2 cm zone is characterized by significantly higher Eh, dissolved oxygen and chlorophyll a and significantly lower hydrogen sulfide than the 2-10 cm layers.

Population densities of meiofauna averaged $3844 \text{ } 10 \text{ cm}^{-2}$. The nematodes, the most abundant taxon, averaged 69.3% ($2665 \text{ } 10 \text{ cm}^{-2}$) of the total meiofauna. Copepods, ostracods, oligochaetes and polychaetes occurred in significantly higher densities during the period of June - September compared to rest of the year. There were no

significant seasonal changes in nematode densities, nematode families and relative abundance of trophic types. At the species level, some nematodes showed distinct seasonal patterns, however, the majority did not undergo significant seasonal changes. Greater than 95% of the total meiofauna occurred in the upper 6 cm and their vertical densities were significantly positively correlated with dissolved oxygen, Eh and chlorophyll a and negatively correlated with hydrogen sulfide.

Cluster analysis on nematode populations indicated the presence of a surface cluster at 0-2 cm and a deeper cluster at 2-6 cm. The surface zone is dominated by epigrowth feeders whereas the deeper zone is dominated by selective deposit feeders. Some nematodes (Polysigma uniforme, Desmodora scaldensis, Desmodora polychaeta, Odontophora setosa and Theristus acer) occurred in relatively equal abundances throughout the 0-6 cm layers. These species may be able to exist over a broader range of environmental conditions because of increase plasticity of food and metabolic requirements than species living primarily in either the 0-2 cm layer or 2-6 cm layer. Some nematodes that are more evenly distributed throughout the sediment may act as conveyor-belt detritivores that are capable of bringing sediment from lower depths to the surface or as conveyor-belt herbivores that bring oxidized material into more reduced zones. Thus, nematodes at Sandy Hook and in other estuarine sediments may be extremely important in the mineralization of detritus and recycling of nutrients.

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Introduction

In recent years, the increased interest in meiofauna has produced an expanding volume of literature, and reviews by McIntyre (1969), Gerlach (1971) and Coull (1973) point to the importance of meiofauna in benthic systems. Most investigations, however, have been conducted on tidal or atidal beaches because of easy accessibility. The subtidal zone has received far less attention, and most studies have been conducted over only a limited time (Moore 1931; Krough & Sparck 1936; Mare 1942; Purasjoki 1947; Wieser 1960; Wieser and Kanwisher 1961; Bregnballe 1961; Wigley and McIntyre 1964; Fenchel and Jansson 1966; Teal and Wieser 1966; Muus 1967; Jansson 1969; Guille and Soyer 1968; Skoolmun and Gerlach 1971; Thiel 1966, 1971, 1972; Tietjen 1971; Elmgren 1973; De Bovee and Soyer 1974; Coull et al. 1977); relatively few studies have been carried out for periods as long as one year (McIntyre 1964; Tietjen 1969; Stripp 1969; Coull 1970; Soyer 1971; McIntyre and Murison 1973; Nyholm and Olsson 1973; Scheibel 1973; Juario 1975; Lasserre et al. 1976; Coull personal communication).

Nematoda are generally the most dominant meiofauna taxon, and their diverse morphology, wide adaptation to a variety of habitats, and great abundance suggest that nematodes play a significant ecological role in marine sediments (Hope 1971). Although an assessment of the role of nematodes in the benthic food web involves a knowledge of population size and fluctuation, only a few studies (Tietjen 1969; Warwick and Buchanan 1970, 1971; Skoolmun and Gerlach 1971; Lorenzen 1974; Juario 1975) have considered the qualitative and quantitative changes in species

composition throughout an entire year in a subtidal environment. In addition, although distinct vertical patterns of distribution have been shown for nematode species in intertidal areas (Ott 1972; Ott and Schiemer 1973; Wieser et al. 1974; Wieser and Schiemer 1977) few data (Juario, 1975) are available on the vertical distribution of nematode species in subtidal areas throughout the year. The stability or change in vertical distribution patterns must be assessed in order to evaluate the importance of nematodes in material cycling and mineralization in marine sediments. For example, Wieser and Schiemer (1977) found that the distribution of some species of nematodes was as distinct in the summer as it was in the winter with certain nematode species occurring in the upper 2 cm in the winter and summer and others occurring primarily below 2 cm during both seasons. If patterns like those observed by Wieser and Schiemer exist in other areas, new evaluations have to be made concerning the cycling of materials between the upper aerobic zones and the lower more reduced zones of marine sediments.

In order to further understand the vertical distribution patterns of nematode species, the gradients of important abiotic parameters such as oxygen, hydrogen sulfide, and Eh, must be evaluated. Microgradients of various abiotic parameters may produce marked heterogeneity in the sediment and subsequent habitat diversification. Since many nematodes inhabit the interstices of marine sediments, small changes in microgradients of various abiotic parameters may affect the vertical distribution of nematode species.

The objectives of the present study were to: (1) describe the temporal and vertical distribution of the meiofauna in a shallow sub-

tidal sandy sediment with particular emphasis on the phylum Nematoda; (2) to determine the main abiotic factors governing meiofauna distribution patterns again with emphasis on the Nematoda and (3) to assess the significance of these distribution patterns in benthic communities.

Materials and Methods

Study Area

The study area was situated in the Sandy Hook Bay estuary, (40 24'54"N, 73 59'0"W) Highlands, New Jersey (Figure 1). The station was located approximately 40 meters from a "low energy" non surf-stressed sandy beach and had an average depth of one meter at mean low water. The sediment consisted of a medium-coarse, well-sorted sand with a low silt-clay content and was in an area in which macrobenthic vegetation was absent. Underwater markers and a floating styrofoam block permanently fixed the position of the sampling station.

Station Design

The station was sampled monthly at mean low water from March 28, 1975 to March 15, 1976. The sampling grid (Fig. 2) consisted of two circles 15 cm in diameter and approximately 15 cm apart. Each circle contained five spikes 7 cm in length equidistantly spaced around each circle. The design of this grid allowed for the closest association of the environmental parameters with the meiofauna samples without the risk of disturbing adjacent sampling areas. The grid was placed in the vicinity of the underwater markers prior to sampling.

In the areas between the spikes, interstitial water samples for measurement of dissolved oxygen, salinity and hydrogen sulfide were taken at 1 cm intervals to a depth of 10 cm (Fig. 2). The water immediately overlying the sediment was also sampled for measurement of the same variables. After all interstitial water samples were taken, in situ temperature was recorded at 1 cm intervals to a depth of 10 cm with a

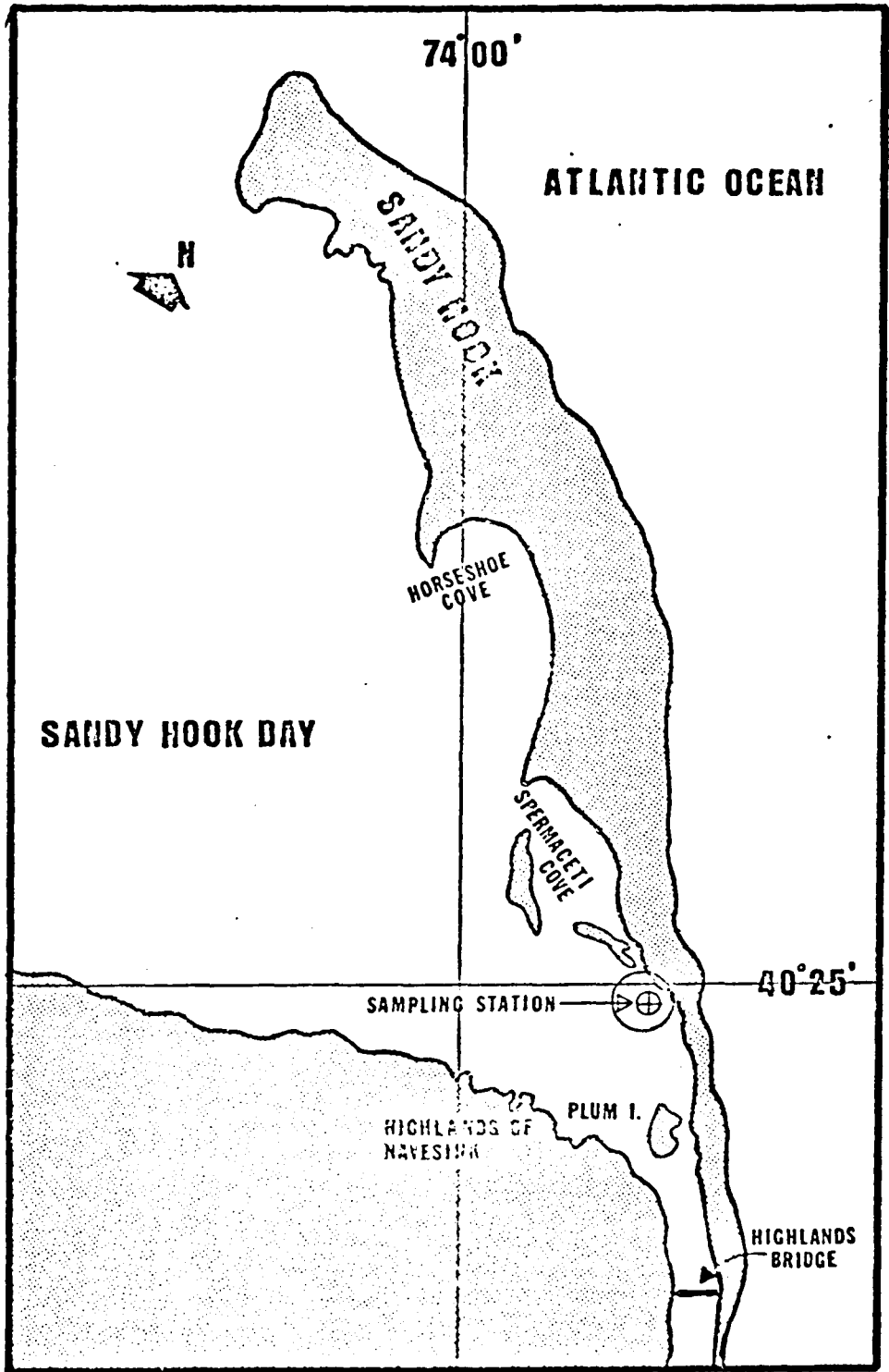


Fig. 1 The location of the sampling station (+) in Sandy Hook Bay, N.J.

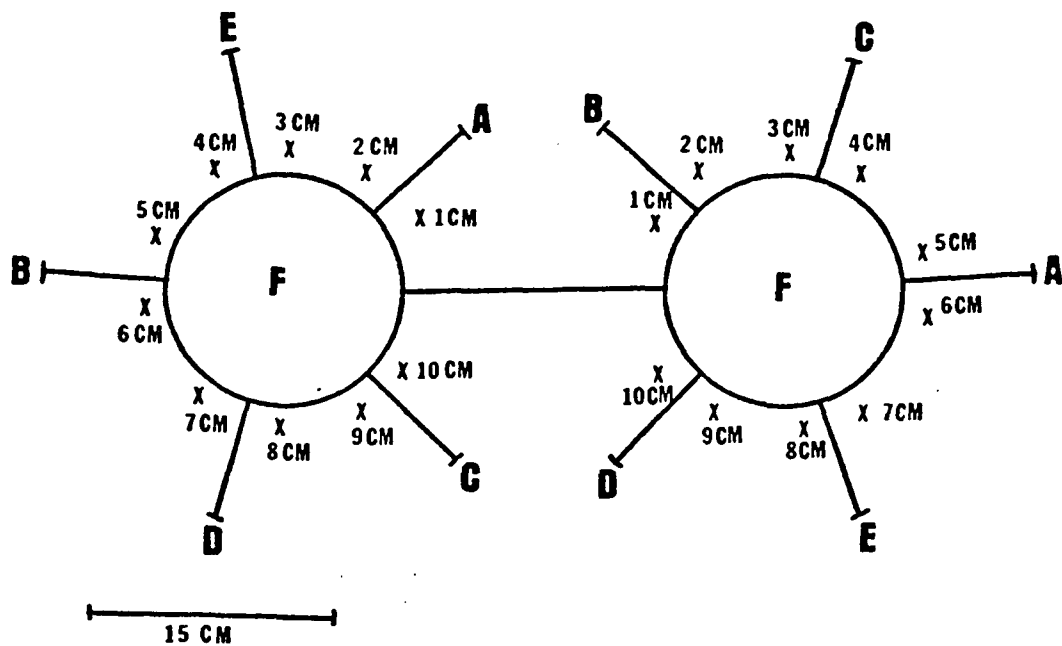


Fig. 2 The sampling grid showing location (X) and depth of interstitial water samples and location of sediment cores for Eh (A), pH (B), organic carbon (C), chlorophyll a (D), mechanical properties of the sediment (E), interstitial water content (E) and meiofauna (F).

thermistor-type temperature probe attached to a rigid metal rod. The temperature probe was connected to a Yellow Springs Instrument Company telethermometer.

Following the temperature measurements, twelve hand-operated cores (3.5 cm inside diameter) were taken to a depth of 10 cm. One core was obtained in the center of each circle (Fig. 2) for quantitative and qualitative enumeration of the meiofauna. One core was also obtained at the end of each spike (Fig. 2) for measurement of Eh, pH, chlorophyll, organic carbon, interstitial water content and sediment granulometry.

Meiofauna Samples

The sediment in each corer was immediately sectioned at 1 cm intervals using the suction-corer extraction technique of Riedl and Ott (1970). This method yields relatively undisturbed sections and does not cause core compression. Each section was preserved in a buffered 5% formalin and Rose Bengal (0.3 g Rose Bengal l⁻¹ 5% formalin) solution. The sediment from each section was then transferred to a 1 l Erlenmeyer flask and thoroughly agitated with tap water. After allowing the heavier particles to settle for a few seconds, the supernatant was poured through a 50 μ mesh nylon sieve. This decantation procedure was repeated four times and yielded more than 99% extraction efficiency for the groups considered in this study.

The meiofauna retained on the 50 μ sieve was washed into petri dishes, hand-sorted and counted. Nematodes were transferred to a 12-hole spotplate containing a 3% aqueous glycerin solution. After a week of gradual glycerin infiltration, the nematodes were transferred to anhydrous glycerin for the preparation of permanent glass slides. All coverslips were ringed with 75% Permunt diluted with xylene.

Interstitial Water Samples

Interstitial water samples were taken with a specially modified cannula attached to a 2 ml hypodermic syringe (Fig. 3A), similar to the one designed by Jansson (1967b). The inside diameter of the cannula was 1.5 mm and a solid brass tip aided in penetration of the substratum (Fig. 3B). A small piece of polyester wool which acted as a primary filter to prevent the syringe from clogging with sand or silt particles was inserted at the top of the cannula. Two laterally drilled holes (1.5 mm in diameter) allowed water to be drawn from restricted layers.

The syringe and cannula were purged with nitrogen before interstitial water samples were obtained. This eliminated any air pockets in the dead spaces of the cannula and syringe and allowed samples to be drawn which were free from atmospheric gases. The syringe was lubricated with stop-cock grease to insure a tight seal between the plunger and syringe wall. This prevents invasion of atmospheric oxygen or seawater from the back of the syringe. Cannulas were designed to allow for sampling of sediment layers 1-10 cm below the surface by placing tight-fitting round rubber discs at specified distances from the lateral holes on each cannula. Each cannula was gently pushed into the sediment until the round rubber disc was flush with the surface of the substratum. Approximately 1.7 ml of interstitial water was drawn into the 2 ml syringe through the cannula from each depth for dissolved oxygen, salinity and hydrogen sulfide measurements. After removing the cannula, 0.7 ml was ejected into a vial and sealed for subsequent hydrogen sulfide and salinity measurements; the remaining 1 ml of water in the syringe was used for dissolved oxygen analysis.

Hydrogen sulfide concentration was measured using the Strickland and

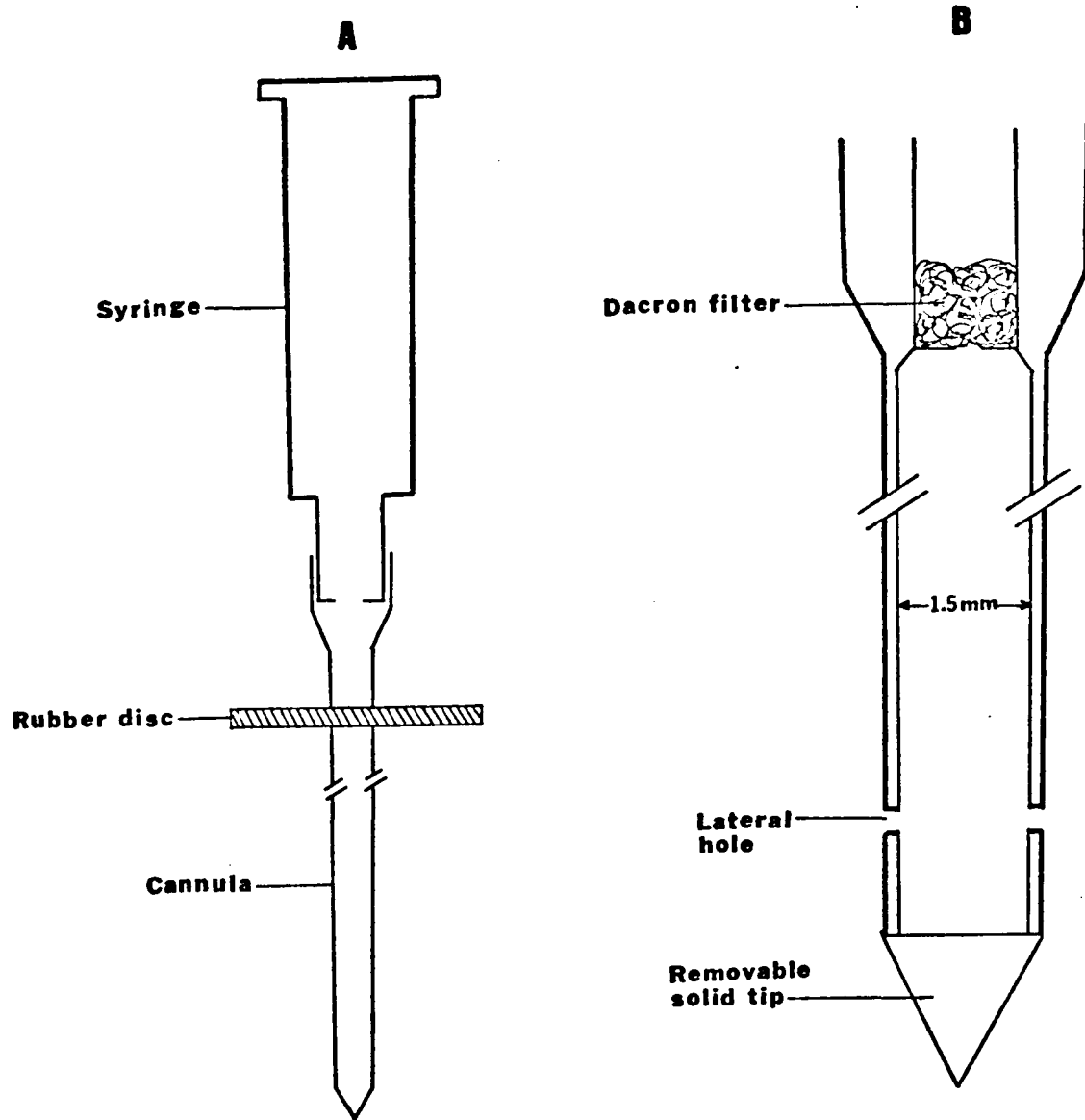


Fig. 3A Interstitial water sampler used during the study.

Fig. 3B Enlarged view of interstitial water cannula used during the study.

Parsons (1972) method, modified for 0.5 ml of water. The 0.5 ml sample was transferred with an Oxford Microsampler to a vial containing 9.5 ml of oxygen-free water. The diluent was deoxygenated in the laboratory and sealed in vials before being transported to the field station. Diluted samples and reagent blanks were immediately treated with 1 ml of p-phenylenediamine hydrochloride and 0.2 ml of ferric chloride. This modified method allowed for the detection of hydrogen sulfide in concentrations ranging from 0.14 mg l^{-1} to 272 mg l^{-1} .

Salinity was measured with an Advanced Instrument Osmometer using 0.2 ml of the interstitial water sample. The osmometer was calibrated with Copenhagen Standard Sea Water (chlorinity 19.3675‰). Because there is a linear relationship between salinity and osmolality, sample readings in milliosmoles can be converted to salinity values using the equation: Salinity (‰) = (0.0335) (milliosmoles).

Oxygen concentration was measured on the 1 ml of water remaining in each syringe according to the azide modification of the Winkler method modified for small samples. All Winkler reagents were purged with nitrogen prior to usage to exclude any air which might cause erroneously high readings in small volumes of water. Approximately 0.1 ml of manganese chloride (27.5 g l^{-1}) and 0.1 ml of alkaline iodide-sodium azide (44 g of sodium hydroxide, 13.8 g of potassium iodide and 0.9 g of sodium azide l^{-1}) were drawn up into each syringe. The syringes were capped, gently agitated and transported to the laboratory. After the addition of 0.1 ml of concentrated phosphoric acid, samples were ejected into small shell vials and titrated with 0.001 N phenylarsine oxide using a Gilmont microburette.

Sediment Samples

A modified suction-corer (Riedl and Ott 1970) was used to obtain cores for Eh and pH measurements. The plastic corer had a spiral series of holes drilled at 1 cm intervals to accommodate the Eh and pH electrodes. Eh was measured with a saturated calomel half cell as a reference and a platinum indicating electrode (Riedl and Ott 1970). The electrodes for Eh measurements were calibrated before each field trip with a standard redox solution (Zobell 1946). For pH determinations, a calomel half cell (Corning No. 476109) was used as a reference and an Ag/AgCl electrode as an indicator.

Cores for organic carbon were sectioned at 1 cm intervals using the suction-corer extraction technique (Riedl and Ott 1970) and preserved in chloroform. Organic carbon content was measured by potassium dichromate - sulfuric acid wet oxidation (Maciolek 1962).

Granulometric properties of the sediment (median grain size, sorting coefficient and percent silt clay) and interstitial water content were measured from the same core. The cores for interstitial water content and sediment granulometry were sectioned at 2 cm intervals using the suction-corer extraction technique (Riedl and Ott 1970). The wet sediment from each section was weighed, dried at 25°C under a laboratory hood to a constant weight, and reweighed. Since there were no statistically significant differences between cores dried at 110°C and cores dried at 25°C under a laboratory hood for one week, the later method was used. The wet weight minus the dry weight was used to calculate the percent of interstitial water. The dried sediment was then analyzed for granulometric properties according to the methodology outlined by Emery (1938).

Corers for taking chlorophyll samples were taped with black electrical tape prior to sampling to prevent any photooxidation from taking place immediately after the cores were taken. The taped corers were then placed in an ice chest and kept in the dark. Sedimentary pigment determinations were made using Tietjen's (1968) application of the fluorescence technique of Yentsch and Menzel (1963).

Statistical Analyses

All statistical analyses followed procedures outlined in Sokal and Rohlf (1969). Meiofauna densities, nematode species composition and environmental parameters were analyzed by means of a two way analysis of variance (ANOVA) based on \log_{10} transformed values to assess for significant seasonal and vertical differences. All percentage data were transformed to arcsin functions before conducting the ANOVA. When appropriate, the two way analysis of variance was followed by Student Neuman and Keul's (SNK) multiple range test. Correlations among nematode species composition and nematode species composition and environmental parameters were analyzed by Pearsons Product Moment Correlation Coefficient. The 5% significance level was used as the rejection value for all statistical tests, and unless otherwise noted, application of the word "significant" will be restricted to such cases.

Results

A. Environmental Parameters

A summary of the environmental data appears in Tables 1 and 2. Each value in Table 1 represents the mean of 22 analyses (two each for all depths) for each month. Environmental data in Table 2 represents the mean of 26 analyses (two for each depth for 13 months) throughout the year. Vertical profiles for each month from March 1975 to March 1976 appear in Tables 3-15. Each of the values in Tables 3-15 represents the mean of two analyses.

Generally, an oxidized zone persisted throughout the year to a depth of 2 cm; this overlays a more reduced zone from 2-10 cm. The 0-2 cm zone was characterized by significantly higher Eh, dissolved oxygen and chlorophyll a concentrations and significantly lower hydrogen sulfide concentrations than the 2-10 cm layers. While significant vertical differences in many parameters occurred, most of the environmental parameters measured throughout the year did not exhibit distinct seasonal patterns.

1. Temperature

The temperature of the water lying immediately over the sediment ranged from 1.8°C to 29.8°C throughout the year (Table 2). Interstitial water temperature did not generally exhibit any significant changes with depth and closely followed the temperature of the overlying water (Table 2).

2. Salinity

Throughout the year, the salinity of the overlying water ranged from 17.4‰ to 25.4‰. Statistically significant seasonal differences occurred in salinity; these differences, however, were well within the range of typical diurnal salinity variations in Sandy Hook Bay of $\pm 5\text{‰}$ (Draxler,

TABLE 1 Summary of environmental data at Sandy Hook from March 1971. Parameters represent the mean of two cores 10cm deep. Standard deviations are shown. * Denotes variables measured at 2cm intervals. ** Denotes

Environmental Parameter	MAR	APR	MAY	MONTH JUNE
Water Temperature (°C)	6.2±.1	12.5±0	20.0±.2	23.1±
Salinity (0/00)	21.4±.1	20.8±.2	21.3±.1	22.1±
Median Grain Size (mm)*	0.61±.30	0.62±.30	0.59±.25	0.59±
Percent Silt-Clay* (by wt.)	0.26±.02	0.19±.03	0.36±.07	0.33±.0
Sorting*	1.56±.08	1.49±.03	1.48±.02	1.45±
Percent Interstitial Water* (by wt.)	17.3±.2	16.7±.6	17.7±.2	17.3±
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)	1.6±.1	1.7±.1	2.4±.2	1.7±.
pH	7.7±.1	8.1±.1	7.9±.1	7.6±.
Eh (+mv)	192±30	219±23	151±19	152±19
Dissolved Oxygen (% saturation)	39±14	37±12	29±14	32±18
Hydrogen Sulfide (mg/l)	**	**	**	**
Percent Chlorophyll <u>a</u> (of total pigment)	**	**	**	55±8
Chlorophyll <u>a</u> (µg/gm(DW) sed)	**	**	**	2.56±

from March 1975 through March 1976. All environmental
 10cm deep. Standard errors of the mean are also given.
 s. ** Denotes that data were not available.

	MONTH				
	JUNE	JULY	AUG	SEPT	OCT
2	23.1 [±] .2	28.4 [±] .3	24.0 [±] .1	19.8 [±] .2	14.6 [±] .4
1	22.1 [±] .3	20.6 [±] .4	24.8 [±] .1	25.3 [±] .1	18.0 [±] .2
25	0.59 [±] .17	0.55 [±] .23	0.55 [±] .32	0.56 [±] .47	0.67 [±] .53
17	0.33 [±] .02	0.28 [±] .02	0.32 [±] .06	0.28 [±] .02	0.28 [±] .02
02	1.45 [±] .01	1.46 [±] .03	1.47 [±] .02	1.50 [±] .07	1.48 [±] .01
2	17.3 [±] .2	17.4 [±] .4	17.6 [±] .6	17.5 [±] .4	17.5 [±] .4
	1.7 [±] .1	1.3 [±] .1	1.6 [±] .1	1.2 [±] .1	1.4 [±] .1
	7.6 [±] .1	7.4 [±] .1	7.8 [±] .1	7.7 [±] .1	7.4 [±] .1
	152 [±] 19	69 [±] 17	117 [±] 31	140 [±] 25	193 [±] 33
	32 [±] 18	36 [±] 29	26 [±] 15	30 [±] 17	18 [±] 9
	**	**	0.63 [±] .21	0.43 [±] .11	0.75 [±] .16
	55 [±] 8	67 [±] 4	54 [±] 7	63 [±] 5	55 [±] 6
	2.56 [±] .78	3.31 [±] .89	2.35 [±] .76	2.68 [±] .70	2.85 [±] .86

SEPT	OCT	NOV	DEC	MONTH JAN	FEB
19.8 [±] .2	14.6 [±] .4	9.1 [±] 0	3.7 [±] .1	1.2 [±] .1	7.2 [±]
25.3 [±] .1	18.0 [±] .2	20.5 [±] .1	20.6 [±] .2	22.4 [±] .5	20.0
0.56 [±] .47	0.67 [±] .53	0.71 [±] .49	0.64 [±] .46	0.67 [±] .24	0.6
0.28 [±] .02	0.28 [±] .02	0.21 [±] .02	0.24 [±] .03	0.20 [±] .02	0.31
1.50 [±] .07	1.48 [±] .01	1.65 [±] .08	1.53 [±] .06	1.46 [±] .02	1.50
17.5 [±] .4	17.5 [±] .4	17.5 [±] .4	17.5 [±] .4	17.1 [±] .6	16.0
1.2 [±] .1	1.4 [±] .1	1.5 [±] .1	1.7 [±] .2	1.2 [±] .1	1.5
7.7 [±] .1	7.4 [±] .1	7.7 [±] .1	7.7 [±] 0	7.7 [±] .1	8.3
140 [±] 25	193 [±] 33	203 [±] 25	182 [±] 35	113 [±] 3	165
30 [±] 17	18 [±] 9	23 [±] 12	17 [±] 9	21 [±] 11	26 [±]
0.43 [±] .11	0.75 [±] .16	0.53 [±] .08	0.52 [±] .10	0.36 [±] .06	1.2
63 [±] 5	55 [±] 6	78 [±] 3	74 [±] 5	65 [±] 7	79 [±]
2.68 [±] .70	2.85 [±] .86	3.96 [±] 1.07	4.50 [±] 1.45	3.11 [±] 1.22	6.6

	MONTH			
	DEC	JAN	FEB	MAR
	3.7 [±] .1	1.2 [±] .1	7.2 [±] .1	7.9 [±] .1
	20.6 [±] .2	22.4 [±] .5	20.0 [±] .5	19.2 [±] .1
9	0.64 [±] .46	0.67 [±] .24	0.61 [±] .32	0.59 [±] .33
	0.24 [±] .03	0.20 [±] .02	0.31 [±] .03	0.30 [±] .03
8	1.53 [±] .06	1.46 [±] .02	1.56 [±] .07	1.67 [±] .12
	17.5 [±] .4	17.1 [±] .6	16.8 [±] .5	17.6 [±] .6
	1.7 [±] .2	1.2 [±] .1	1.5 [±] .1	1.4 [±] .1
	7.7 [±] .0	7.7 [±] .1	8.3 [±] .1	7.9 [±] .1
	182 [±] 35	113 [±] 3	165 [±] 29	132 [±] 38
	17 [±] 9	21 [±] 11	26 [±] 17	19 [±] 12
3	0.52 [±] .10	0.36 [±] .06	1.23 [±] .37	0.63 [±] .17
	74 [±] 5	65 [±] 7	79 [±] 3	63 [±] 5
07	4.50 [±] 1.45	3.11 [±] 1.22	6.65 [±] 2.21	4.07 [±] 1.46

TABLE 2 Summary of environmental data at Sandy Hook from the overlying water. All environmental parameters represent the mean values for each depth range and standard error of the mean for each measurement are also measured at 2 cm intervals.

Environmental Parameter	Overlying Water	DEPTH (cm)		
		0-1	1-2	2-3
Water Temperature (°C)	14.0±2.4 (1.8-29.8)	13.9±2.5 (1.0-30.0)	13.8±2.4 (1.0-29.0)	13.8±2.4 (1.0-29.0)
Salinity (0/00)	20.4±.8 (17.4-25.4)	20.5±.8 (17.5-25.9)	21.1±.7 (17.6-25.8)	21.1±.7 (17.6-25.8)
Median Grain Size (nm)*		0.72±.028 (.59-.92)		
Percent Silt-Clay* (by wt.)		0.29±.03 (.01-.45)		
Sorting*		1.65±.04 (1.50-1.82)		
Percent Interstitial Water* (by wt.)		19.3±.3 (17.0-20.9)		
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.9±.1 (1.4-2.8)	1.7±.1 (1.2-2.4)	1.8±.1 (1.3-2.3)
pH	7.9±.1 (7.4-8.4)	7.9±.1 (7.3-8.4)	7.8±.1 (7.3-8.3)	7.7±.1 (7.3-8.1)
Eh (+mv)	340±17 (205-400)	273±16 (150-340)	214±18 (83-285)	180±15 (70-290)
Dissolved Oxygen (% saturation)	162±16 (99-326)	57±7 (23-99)	11±2 (3-32)	5±1 (0-1)
Hydrogen Sulfide (mg/l)	.014±.003 (.01-.04)	.33±.07 (.09-.76)	.40±.07 (.20-.72)	1.0±.1 (.5-1.5)
Percent Chlorophyll <u>a</u> (of total pigment)		81±2 (71-96)	80±2 (72-90)	80±2 (72-90)
Chlorophyll <u>a</u> (µg/gm(DW) sed)		10.04±1.53 (6.26-20.94)	8.40±1.05 (4.93-14.78)	6.0±.5 (3.0-9.0)

from the overlying water to a sediment depth of 10cm.
 mean values for each depth throughout the year. The
 ch measurement are also given. * Denotes variables

DEPTH (cm)			4-5	5-6
1-2	2-3	3-4		
13.8±2.4 (1.0-29.0)	13.8±2.4 (1.0-28.7)	13.6±2.6 (1.2-28.3)	13.6±2.6 (1.2-28.0)	13.6±2.6 (1.2-28.0)
21.1±.7 (17.6-25.8)	21.2±.7 (17.9-25.2)	21.3±.6 (17.4-25.2)	21.5±.6 (17.9-25.8)	21.5±.6 (17.9-25.8)
	0.65±.019 (.58-.81)		0.61±.017 (.54-.76)	
	0.27±.03 (.15-.40)		0.28±.03 (.15-.35)	
	1.56±.05 (1.43-1.92)		1.51±.04 (1.42-1.87)	
	17.0±.2 (16.3-17.8)		16.4±.2 (15.8-17.7)	
1.7±.1 (1.2-2.4)	1.8±.2 (.9-2.9)	1.6±.2 (1.1-3.4)	1.6±.2 (1.2-3.1)	1.6±.2 (1.0-2.4)
7.8±.1 (7.3-8.3)	7.7±.1 (7.3-8.3)	7.8±.1 (7.4-8.2)	7.7±.1 (7.3-8.2)	7.7±.1 (7.3-8.2)
14±18 (3-285)	180±15 (70-240)	139±12 (53-205)	125±16 (30-205)	116±16 (30-205)
1±2 (0-32)	5±1 (0-16)	6±2 (0-24)	6±2 (0-24)	6±2 (0-24)
1.40±.07 (.20-.72)	1.12±.26 (.31-2.55)	1.17±.35 (.62-3.46)	1.05±.18 (.50-1.98)	0.8±.1 (.5-1.1)
80±2 (72-90)	80±4 (57-94)	75±2 (67-84)	74±3 (64-87)	68±2 (48-88)
8.40±1.05 (4.93-14.78)	6.25±.79 (3.02-10.36)	3.89±.27 (2.45-4.93)	2.69±.34 (2.00-5.46)	1.8±.2 (.8-2.8)

DEPTH (cm)				
4-5	5-6	6-7	7-8	8-9
13.6 [±] 2.6 (1.2-28.0)	13.5 [±] 2.6 (1.2-27.6)	13.5 [±] 2.6 (1.2-28.2)	13.4 [±] 2.6 (1.2-27.6)	13.3 [±] 2.5 (1.3-27.5)
21.5 [±] .6 (17.9-25.8)	21.5 [±] .6 (18.2-25.3)	21.6 [±] .6 (18.2-24.6)	21.7 [±] .6 (18.1-25.8)	21.8 [±] .6 (18.8-25.5)
	0.61 [±] .017 (.54-.76)		0.56 [±] .012 (.49-.67)	
	0.28 [±] .03 (.15-.35)		0.30 [±] .02 (.20-.40)	
	1.51 [±] .04 (1.42-1.87)		1.46 [±] .01 (1.41-1.56)	
	16.4 [±] .2 (15.8-17.7)		16.6 [±] .2 (15.0-17.7)	
1.6 [±] .2 (1.2-3.1)	1.6 [±] .1 (1.0-2.4)	1.5 [±] .1 (1.2-1.9)	1.5 [±] .1 (0.1-1.8)	1.2 [±] .1 (0.1-1.6)
7.7 [±] .1 (7.3-8.2)	7.7 [±] .1 (7.3-8.2)	7.7 [±] .1 (7.3-8.4)	7.7 [±] .1 (7.2-8.2)	7.7 [±] .1 (7.3-8.3)
125 [±] 16 (30-205)	116 [±] 16 (30-195)	96 [±] 15 (10-190)	88 [±] 15 (5-185)	70 [±] 11 (10-140)
6 [±] 2 (0-24)	6 [±] 2 (0-25)	11 [±] 2 (0-29)	11 [±] 2 (2-22)	12 [±] 2 (0-24)
1.05 [±] .18 (.50-1.98)	0.87 [±] .18 (.50-2.05)	0.47 [±] .08 (.18-.91)	0.47 [±] .09 (.16-.85)	0.80 [±] .37 (.03-3.2)
74 [±] 3 (64-87)	68 [±] 3 (48-82)	61 [±] 5 (43-85)	52 [±] 5 (31-70)	45 [±] 6 (21-70)
2.69 [±] .34 (2.00-5.46)	1.80 [±] .25 (.88-3.46)	1.14 [±] .18 (.45-2.06)	0.76 [±] .13 (.31-1.59)	0.49 [±] .11 (.12-1.2)

DEPTH (cm)				
6-7	7-8	8-9	9-10	
13.5 [±] 2.6 (1.2-28.2)	13.4 [±] 2.6 (1.2-27.6)	13.3 [±] 2.5 (1.3-27.5)	13.3 [±] 2.5 (1.5-27.5)	
21.6 [±] .6 (18.2-24.6)	21.7 [±] .6 (18.1-25.8)	21.8 [±] .6 (18.8-25.5)	22.0 [±] .6 (19.1-25.3)	
	0.56 [±] .012 (.49-.67)		.53 [±] .19 (.43-.78)	
	0.30 [±] .02 (.20-.40)		0.24 [±] .02 (.10-.40)	
	1.46 [±] .01 (1.41-1.56)		1.42 [±] .01 (1.36-1.53)	
	16.6 [±] .2 (15.0-17.7)		17.4 [±] .2 (16.2-18.4)	
1.5 [±] .1 (1.2-1.9)	1.5 [±] .1 (0.1-1.8)	1.2 [±] .1 (0.1-1.6)	1.1 [±] .2 (0.1-2.8)	
7.7 [±] .1 (7.3-8.4)	7.7 [±] .1 (7.2-8.2)	7.7 [±] .1 (7.3-8.3)	7.7 [±] .1 (7.1-8.3)	
96 [±] 15 (10-190)	88 [±] 15 (5-185)	70 [±] 11 (10-140)	81 [±] 11 (20-155)	
11 [±] 2 (0-29)	11 [±] 2 (2-22)	12 [±] 2 (0-24)	14 [±] 2 (5-28)	
0.47 [±] .08 (.18-.91)	0.47 [±] .09 (.16-.85)	0.80 [±] .37 (.03-3.20)	0.29 [±] .06 (.07-.56)	
61 [±] 5 (43-85)	52 [±] 5 (31-70)	45 [±] 6 (21-70)	37 [±] 5 (16-62)	
1.14 [±] .18 (.45-2.06)	0.76 [±] .13 (.31-1.59)	0.49 [±] .11 (.12-1.29)	0.27 [±] .06 (.08-.47)	

TABLE 3 Vertical distribution of environmental parameters at Sandy Hook, March 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	6.0	6.0	6.0	6.1	6.2	6.2	6.2	6.2	6.2	6.3	6.5
Salinity (0/00)	20.3	20.9	21.5	21.4	21.3	21.5	21.6	21.7	21.9	21.8	22.0
Median Grain Size (mm)*		0.71		0.65		0.61		0.56		0.54	
Percent Silt-Clay* (by wt.)		0.27		0.25		0.26		0.28		0.22	
Sorting Percent*		1.65		1.55		1.61		1.56		1.44	
Interstitial Water (by wt.)		19.5		17.2		16.6		16.2		17.2	
Organic Carbon Content (mgCg ⁻¹ (DW) of sed)		1.9	1.7	1.8	1.5	1.6	1.4	1.5	1.7	1.3	1.2
pH	7.9	7.9	7.8	7.7	7.7	7.6	7.5	7.8	7.7	7.6	7.7
Eh(mv)	+385	+295	+245	+225	+165	+205	+195	+175	+125	+ 35	+ 65
Dissolved Oxygen (ml l ⁻¹)	11.83	7.61	2.39	1.22	1.62	1.64	0.45	2.22	1.25	1.79	0.78
Dissolved Oxygen (% saturation)	155	99	32	16	21	21	6	29	16	24	10

TABLE 4 Vertical distribution of environmental parameters at Sandy Hook, April 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Salinity (0/00)	22.0	21.4	21.4	21.4	20.7	20.6	20.8	20.9	19.7	19.8	20.2
Median Grain Size (mm)*		0.75		0.66		0.59		0.59		0.52	
Percent Silt-Clay* (by wt.)		0.10		0.15		0.30		0.30		0.10	
Sorting* Percent*		1.63		1.43		1.44		1.49		1.44	
Interstitial Water (by wt.)		17.0		17.4		16.2		15.0		17.9	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.8	1.4	2.4	1.9	1.8	1.6	1.5	1.8	1.5	1.4
pH	8.0	7.9	8.1	8.0	8.1	8.1	8.2	8.2	8.1	8.2	8.3
Eh(mv)	+370	+340	+285	+220	+175	+175	+175	+190	+185	+140	+155
Dissolved Oxygen (ml l ⁻¹)	9.57	5.37	1.24	0.74	1.46	1.54	0.85	1.26	1.46	1.44	1.42
Dissolved Oxygen (% saturation)	146	82	19	11	22	24	13	19	22	22	22

TABLE 5 Vertical distribution of environmental parameters at Sandy Hook, May 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	21.0	20.7	20.8	20.4	20.2	20.0	19.8	19.7	19.4	19.0	19.0
Salinity (0/00)	20.4	20.7	21.5	21.5	21.5	21.1	21.3	21.6	21.5	21.6	21.8
Median Grain Size (mm)*		0.68		0.56		0.57		0.58		0.58	
Percent Silt-Clay* (by wt.)		0.35		0.40		0.40		0.40		0.25	
Sorting* Percent*		1.54		1.50		1.42		1.45		1.51	
Interstitial Water (by wt.)		17.9		17.8		17.7		17.7		17.3	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		2.2	2.4	2.9	3.4	3.1	2.4	1.9	1.7	1.6	2.8
pH	8.0	8.0	7.9	7.9	7.9	7.9	7.8	7.7	7.9	7.8	7.9
Eh(mv)	+271	+210	+200	+140	+130	+115	+125	+120	+110	+115	+130
Dissolved Oxygen (ml l ⁻¹)	9.39	1.31	0.19	0.07	0.21	0.72	1.37	0.80	1.13	1.08	1.29
Dissolved Oxygen (% saturation)	172	24	3	1	4	13	25	15	20	19	23

TABLE 6 Vertical distribution of environmental parameters at Sandy Hook, June 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	23.8	23.8	23.7	23.5	23.3	23.0	22.8	22.6	22.5	22.5	22.5
Salinity (0/00)	19.8	20.9	22.1	22.2	22.1	22.4	22.7	22.9	23.0	22.5	22.4
Median Grain Size (mm)*		0.64		0.66		0.59		0.58		0.54	
Percent Silt-Clay* (by wt.)		0.35		0.35		0.25		0.30		0.40	
Sorting* Percent*		1.51		1.44		1.42		1.46		1.41	
Interstitial Water (by wt.)		18.2		17.4		16.8		17.0		17.6	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		2.1	2.2	1.8	1.5	1.6	1.6	1.8	1.4	1.4	1.4
pH	8.3	7.6	7.9	7.5	7.7	7.5	7.5	7.6	7.5	7.5	7.4
Eh(mv)	+260	+235	+225	+175	+160	+115	+120	+105	+105	+100	+75
Dissolved Oxygen (ml l ⁻¹)	10.44	2.82	0.54	0.34	0	0.14	0.31	0.29	1.04	0.92	1.46
Dissolved Oxygen (% saturation)	202	55	11	7	0	3	6	6	20	18	28
Percent Chlorophyll <u>a</u> (of total pigment)		79	78	75	72	67	66	43	31	26	16
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW)sed)		6.28	6.13	4.81	3.51	2.26	1.38	0.58	0.31	0.22	0.08

TABLE 7 Vertical distribution of environmental parameters at Sandy Hook, July 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	29.8	30.0	29.0	28.7	28.3	28.0	27.6	28.2	27.6	27.5	27.5
Salinity (0/00)	19.9	18.9	19.8	19.8	21.0	20.9	20.5	19.9	21.0	21.3	23.5
Median Grain Size (mm)*		0.65		0.58		0.57		0.50		0.46	
Percent Silt-Clay* (by wt.)		0.30		0.25		0.25		0.35		0.25	
Sorting* Percent*		1.63		1.50		1.39		1.41		1.38	
Interstitial Water (by wt.)		18.7		16.4		16.7		16.8		18.3	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.7	1.3	1.2	1.4	1.4	1.4	1.2	1.4	1.1	1.3
pH	7.8	7.8	7.6	7.5	7.4	7.3	7.3	7.3	7.2	7.3	7.1
Eh(mv)	+205	+150	+ 83	+ 70	+ 53	+ 38	+ 30	+ 30	+ 25	+ 30	+ 50
Dissolved Oxygen (ml l ⁻¹)	15.43	1.07	0.14	0	0	0	0	0.75	0.31	0.60	0.56
Dissolved Oxygen (% saturation)	326	23	3	0	0	0	0	15	6	12	12
Percent Chlorophyll <u>a</u> (of total pigment)		81	81	68	75	73	71	76	51	52	45
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW)sed)		6.26	7.40	7.12	4.70	2.82	1.39	1.58	0.70	0.66	0.44

TABLE 8 Vertical distribution of environmental parameters at Sandy Hook, August 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	24.3	24.3	24.3	24.1	24.0	23.9	23.8	23.8	23.8	23.7	23.6
Salinity (0/00)	25.3	24.7	24.8	24.9	24.5	24.4	24.6	24.9	25.8	24.9	24.2
Median Grain Size (mm)*		0.59		0.59		0.64		0.50		0.47	
Percent Silt-Clay* (by wt.)		0.45		0.40		0.30		0.20		0.15	
Sorting* Percent*		1.50		1.48		1.50		1.45		1.40	
Interstitial Water (by wt.)		20.8		16.7		15.7		17.3		17.3	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		2.0	1.7	1.8	1.7	1.7	1.7	1.7	1.7	1.2	1.1
pH	7.9	7.9	8.0	7.9	7.9	7.7	7.9	7.8	7.6	7.6	7.5
Eh(mv)	+360	+258	+100	+130	+95	+80	+55	+45	+40	+55	+70
Dissolved Oxygen (ml l ⁻¹)	8.49	3.02	0.36	0	0	0	0.23	0.39	0.43	0.99	0.59
Dissolved Oxygen (% saturation)	167	60	9	0	0	0	5	9	9	20	12
Hydrogen Sulfide (mg/l)	0.01	0.16	0.27	1.65	1.08	1.98	0.64	0.91	0.16	0.03	0.07
Percent Chlorophyll <u>a</u> (of total pigment)		85	74	57	73	64	67	45	32	21	20
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW) sed)		7.62	4.93	3.02	2.45	2.00	2.40	0.53	0.26	0.15	0.11

TABLE 9 Vertical distribution of environmental parameters at Sandy Hook, September 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	18.9	18.9	18.9	20.0	20.2	20.3	20.3	20.2	20.2	20.2	20.2
Salinity (0/00)	25.4	25.9	25.8	25.2	25.2	25.8	25.3	24.6	24.8	25.5	25.3
Median Grain Size (mm)*		0.73		0.59		0.54		0.49		0.43	
Percent Silt-Clay* (by wt.)		0.25		0.35		0.30		0.25		0.25	
Sorting* Percent*		1.79		1.49		1.43		1.46		1.36	
Interstitial Water (by st.)		19.1		17.9		16.3		16.7		17.6	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.5	1.5	1.4	1.1	1.5	1.3	1.2	0.1	0.1	0.1
pH	8.1	7.8	7.9	7.8	7.8	7.6	7.7	7.6	7.6	7.6	7.6
Eh(mv)	+330	+245	+180	+155	+125	+105	+ 80	+ 70	+ 80	+ 70	+105
Dissolved Oxygen (ml l ⁻¹)	10.29	4.31	1.19	0	0.12	0.14	0	0.48	0.74	0.71	0.25
Dissolved Oxygen (% saturation)	185	78	21	0	2	3	0	9	14	13	5
Hydrogen Sulfide (mg/l)	0.01	0.34	0.36	0.89	0.69	1.12	0.59	0.26	0.16	0.11	0.19
Percent Chlorophyll <u>a</u> (of total pigment)		83	75	82	72	68	65	61	52	42	32
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW)sed)		6.67	5.52	4.27	3.36	2.54	1.57	1.15	0.96	0.50	0.23

TABLE 10 Vertical distribution of environmental parameters at Sandy Hook, October 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	13.8	14.3	15.0	15.4	15.5	15.6	15.6	15.6	15.6	15.6	15.6
Salinity (0/00)	17.4	17.5	17.6	17.9	17.4	17.9	18.2	18.2	18.1	18.8	19.1
Median Grain Size (mm)*		0.90		0.81		0.66		0.54		0.55	
Percent Silt-Clay* (by wt.)		0.30		0.25		0.25		0.35		0.25	
Sorting* Percent*		1.63		1.50		1.52		1.46		1.43	
Interstitial Water (by wt.)		18.9		16.9		16.7		17.3		17.9	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.4	1.2	1.5	1.2	1.4	1.6	1.6	1.7	1.2	1.2
pH	7.4	7.3	7.3	7.3	7.4	7.4	7.4	7.3	7.3	7.4	7.4
Eh(mv)	+395	+340	+305	+240	+105	+155	+165	+130	+100	+95	+95
Dissolved Oxygen (ml l ⁻¹)	6.35	2.38	0.28	0.58	0.19	0	0.19	0.52	0.70	0.65	0.49
Dissolved Oxygen (% saturation)	99	37	5	9	3	0	3	9	11	11	8
Hydrogen Sulfide (mg/l)	0.01	0.76	0.49	1.19	0.67	0.93	2.05	0.18	0.79	0.66	0.50
Percent Chlorophyll <u>a</u> (of total pigment)		71	72	67	72	72	56	49	39	28	24
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW)sed)		7.47	7.16	4.44	3.22	2.69	1.74	0.80	0.50	0.26	0.22

TABLE 11 Vertical distribution of environmental parameters at Sandy Hook, November 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	10.1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Salinity (0/00)	19.9	20.0	20.2	20.3	20.5	20.8	20.7	20.8	20.7	20.9	21.2
Median Grain Size (mm)*		0.92		0.73		0.76		0.61		0.55	
Percent Silt-Clay* (by wt.)		0.30		0.15		0.15		0.20		0.25	
Sorting* Percent*		1.81		1.73		1.70		1.49		1.53	
Interstitial Water (by wt.)		20.9		16.5		16.5		16.5		17.2	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.8	1.8	1.9	1.4	1.5	1.4	1.2	1.2	1.6	1.0
pH	7.8	7.8	7.7	7.6	7.6	7.5	7.6	7.7	7.7	7.7	7.7
Eh(mv)	+370	+315	+270	+220	+185	+180	+180	+140	+140	+125	+115
Dissolved Oxygen (ml l ⁻¹)	8.77	4.54	0.71	0.46	0.32	0	0.65	0.26	0.63	0.09	1.19
Dissolved Oxygen (% saturation)	126	64	10	6	5	0	10	4	9	2	17
Hydrogen Sulfide (mg/l)	0.01	0.42	0.23	0.92	0.65	0.87	0.64	0.62	0.37	0.73	0.35
Percent Chlorophyll <u>a</u> (of total pigment)		81	84	89	84	87	70	85	70	70	61
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW)sed)		10.48	7.98	6.21	4.93	3.79	2.05	1.84	1.13	0.72	0.47

TABLE 12 Vertical distribution of environmental parameters at Sandy Hook, December 1975. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	4.0	3.8	3.8	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Salinity (0/00)	19.3	19.7	20.7	20.3	20.6	20.6	20.4	21.2	21.5	21.2	21.5
Median Grain Size (mm)*		0.81		0.67		0.61		0.54		0.50	
Percent Silt-Clay* (by wt.)		0.35		0.15		0.20		0.30		0.20	
Sorting*		1.81		1.53		1.45		1.43		1.42	
Percent* Interstitial Water (by wt.)		19.6		16.7		16.7		16.9		17.4	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		2.8	1.7	2.2	2.2	1.3	2.2	1.5	1.7	1.1	0.7
pH	8.0	7.7	7.7	7.6	7.7	7.6	7.7	7.7	7.7	7.7	7.7
Eh(mv)	+400	+330	+265	+220	+205	+175	+150	+90	+70	+40	+55
Dissolved Oxygen (ml l ⁻¹)	8.85	2.04	0.44	0.36	0.42	0.39	0.45	0.78	0.43	0.27	0.72
Dissolved Oxygen (% saturation)	110	25	6	5	6	5	6	10	5	4	9
Hydrogen Sulfide (mg/l)	0.01	0.31	0.72	0.31	0.62	0.54	0.50	0.42	0.59	1.31	0.37
Percent Chlorophyll <u>a</u> (of total pigment)		86	90	91	75	81	77	74	68	55	42
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW)sed)		13.21	11.51	6.71	4.71	3.41	2.74	1.49	0.90	0.48	0.16

TABLE 13 Vertical distribution of environmental parameters at Sandy Hook, January 1976. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	1.8	1.0	1.0	1.0	1.2	1.2	1.2	1.2	1.2	1.3	1.5
Salinity (0/00)	18.3	20.2	22.0	22.5	23.0	23.7	23.2	23.3	23.1	23.7	23.9
Median Grain Size (mm)*		0.61		0.60		0.68		0.67		0.78	
Percent Silt-Clay* (by wt.)		0.25		0.15		0.25		0.2		0.15	
Sorting* Percent*		1.52		1.49		1.49		1.45		1.37	
Interstitial Water (by wt.)		20.2		16.9		16.2		16.3		16.2	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.9	1.7	0.9	1.4	1.2	1.0	1.2	1.1	1.1	0.8
pH	7.6	7.7	7.6	7.5	7.6	7.6	7.7	7.7	7.8	7.8	7.8
Eh(mv)	+360	+250	+190	+120	+ 90	+ 30	+ 30	+ 10	+ 40	+ 40	+ 80
Dissolved Oxygen (ml l ⁻¹)	9.81	4.35	0.99	0.19	0.60	0.46	0.34	0.64	0.51	0.79	0.73
Dissolved Oxygen (% saturation)	118	51	12	3	8	5	4	8	6	9	9
Hydrogen Sulfide (mg/l)	0.04	0.27	0.20	0.37	0.63	0.50	0.74	0.35	0.43	0.16	0.23
Percent Chlorophyll <u>a</u> (of total pigment)		77	86	94	79	73	75	53	56	31	30
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW) sed)		12.35	6.16	4.82	3.32	2.01	1.30	0.45	0.40	0.12	0.13

TABLE 14

Vertical distribution of environmental parameters at Sandy Hook, February 1976. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	7.9	7.8	7.5	7.2	7.2	7.0	7.0	7.0	6.9	6.9	6.7
Salinity (0/00)	17.9	17.7	18.3	18.8	20.7	20.6	20.9	21.4	21.3	21.7	21.1
Median Grain Size (mm)*		0.74		0.67		0.56		0.54		0.55	
Percent Silt-Clay* (by wt.)		0.25		0.25		0.35		0.35		0.35	
Sorting* Percent*		1.82		1.68		1.47		1.42		1.39	
Interstitial Water (by wt.)		19.7		16.3		16.1		16.0		16.2	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.7	1.8	2.3	1.5	1.4	1.3	1.4	1.9	1.1	1.0
pH	8.4	8.4	8.3	8.3	8.2	8.2	8.1	8.4	8.2	8.3	8.3
Eh(mv)	+330	+270	+230	+235	+200	+170	+130	+105	+ 65	+ 50	+ 40
Dissolved Oxygen (ml l ⁻¹)	12.38	6.89	0.42	0	0	0	0	0.29	0.16	0	0.71
Dissolved Oxygen (% saturation)	170	95	6	0	0	0	0	4	2	0	10
Hydrogen Sulfide (mg/l)	0.02	0.25	0.59	2.55	3.46	0.84	1.00	0.62	0.41	3.20	0.56
Percent Chlorophyll <u>a</u> (of total pigment)		96	81	87	80	86	82	71	69	64	62
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW) sed)		20.94	14.78	10.36	4.93	5.46	3.46	2.06	1.59	1.29	0.63

TABLE 15

Vertical distribution of environmental parameters at Sandy Hook, March 1976. All values represent the mean of two measurements. * Denotes variables measured at 2cm intervals instead of 1cm.

Environmental Parameter	Overlying Water	DEPTH (cm)									
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Water Temperature (°C)	8.5	8.5	8.3	8.2	8.0	8.0	7.8	7.6	7.5	7.3	7.1
Salinity (0/00)	18.7	18.2	18.9	19.3	18.9	19.6	19.3	19.6	19.6	19.5	19.5
Median Grain Size (mm)*		0.62		0.63		0.63		0.55		0.47	
Percent Silt-Clay* (by wt.)		0.20		0.35		0.20		0.35		0.30	
Sorting* Percent*		1.63		1.92		1.87		1.56		1.38	
Interstitial Water (by wt.)		20.6		17.1		15.8		16.1		18.4	
Organic Carbon Content (mg C gm ⁻¹ (DW) of sed)		1.9	1.5	1.6	1.2	1.3	1.3	1.4	1.3	1.1	1.2
pH	8.4	8.1	7.9	7.6	7.8	7.8	7.9	7.6	7.9	7.8	8.0
Eh(mv)	+385	+310	+210	+165	+150	+ 85	+ 68	+ 40	+ 5	+ 10	+ 20
Dissolved Oxygen (ml l ⁻¹)	9.49	3.17	0.79	0	0.17	0	0.13	0	0.12	0.26	0.75
Dissolved Oxygen (% saturation)	132	44	11	0	2	0	2	0	2	4	10
Hydrogen Sulfide (mg/l)	0.02	0.09	0.34	1.04	1.53	1.59	0.77	0.38	0.85	0.23	0.11
Percent Chlorophyll <u>a</u> (of total pigment)		71	83	87	67	69	48	57	58	57	37
Chlorophyll <u>a</u> (µg gm ⁻¹ (DW) sed)		8.07	12.46	10.25	3.78	2.28	0.88	0.92	0.82	0.48	0.22

personal communication).

Generally, the salinity of the interstitial water increased with increasing depth in the sediment. Although statistically significant differences occurred between the 0-1 cm layer and the rest of the core, these differences averaged less than 1.5‰. The slight increase of salinity with depth is not surprising since all interstitial water samples were taken at mean low water. During this stage of the tidal cycle, there is a greater fresh water influence expected in a tidal estuary. The overlying water and upper few cm in the sediment generally reflect this changing salinity regime to a greater extent than sediment in the lower layers.

3. Sediment Granulometry

a. Median grain size

The median grain size ranged from 0.43 mm to 0.92 mm throughout the year (Table 2). The overall mean for all depths was 0.61 mm and the sediment was classified as a medium-coarse sand (Wentworth 1922). The median grain size of the 0-2 cm layer (0.72 mm) was significantly greater than the rest of the core (0.59 mm), but these differences averaged less than 0.19 mm.

b. Percent silt-clay

Percent silt-clay ranged from 0.10% to 0.45% (Table 2), and the overall mean throughout the year averaged 0.28%. The relatively swift surface currents and lack of macrobenthic vegetation did not favor the deposition of silt-clay particles. There were no statistically significant seasonal or vertical differences in percent silt-clay.

c. Sorting coefficient

The overall mean sorting coefficient throughout the year was

1.51, corresponding to Trask's definition of a relatively well-sorted sediment (Trask 1932). No significant seasonal differences in sorting occurred, but there were significant vertical differences. The sediment sorting coefficient in the 0-2 cm layer (1.65) was significantly higher than the rest of the core (1.49). This difference generally reflects the greater amount of very coarse sand and granular fractions in the upper layers compared to the lower layers.

4. Interstitial Water Content

Interstitial water content ranged from 15.0% to 20.9% by weight (Table 2). No significant seasonal differences occurred, but the interstitial water content of the 0-2 cm layer was significantly greater (19.3%) than the 2-10 cm layers (16.9%).

5. Organic Carbon Content

Organic content (mg C gm^{-1} sediment) dry weight ranged from 0.1 to 3.4 throughout the year (Table 2); there were no clear seasonal patterns. Mean organic carbon content was 1.6 mg C gm^{-1} of sediment. The vertical distribution of organic carbon ranged from 1.9 in the 0-1 cm layer to 1.1 mg C gm^{-1} of sediment in the 9-10 cm layer (Table 2), and there were generally no significant vertical differences in organic carbon content.

6. pH

Throughout the year, pH ranged from 7.1 to 8.4. Although significant differences occurred between the monthly pH values, the range was small and no clear seasonal patterns emerged. Average pH values for each depth ranged from 7.7 to 7.9 and no significant differences were noted (Table 2).

7. Eh

The Eh in the overlying water ranged from +205 mv to +400 mv, which is generally indicative of a well-oxidized environment. Average Eh of

the sediment ranged from +5 mv to +340 mv (Table 2). Although significant differences occurred in Eh throughout the year, there were no clear seasonal patterns.

There were also significant vertical differences (Table 2) in the Eh profiles that exhibited the well-documented pattern of a decrease with depth (Tietjen 1969; Fenchel 1969; Jansson 1969; Coull 1970; Riedl and Ott 1970; Wieser et al. 1974). The Eh of the overlying water was significantly higher (+340 mv) than that of the sediment. Significant differences in Eh occurred between the 0-1 (+273 mv), 1-2 (+214 mv) and 2-3 (+180 mv) cm layers. In addition, the 3-6 cm layers (+140 mv) were significantly higher than the 6-10 cm layers (+84 mv). The greatest change in Eh occurred between the upper 2 cm and the lower layers. The position of the zone in which the greatest change in Eh occurs is defined as the redox potential discontinuity (RPD) and has been shown to have a profound influence on many environmental factors as well as the distribution of the fauna in the sediment (Fenchel 1969; Fenchel and Riedl 1970; Riedl and Ott 1970). The relationship of the RPD to the meiofauna and environmental factors is discussed later.

8. Dissolved oxygen content

The dissolved oxygen concentrations in $\text{ml O}_2 \text{ l}^{-1}$ were converted to percent saturation values (Murray and Riley 1970) to facilitate seasonal comparisons at different temperatures and salinities. The dissolved oxygen of the overlying water ranged from 99% ($6.4 \text{ ml O}_2 \text{ l}^{-1}$) to 326% ($15.4 \text{ ml O}_2 \text{ l}^{-1}$). Average dissolved oxygen of the interstitial water ranged from 0% to 99% throughout the year (Table 2). Although significant differences occurred occasionally in mean dissolved oxygen, there were no clear seasonal patterns.

Dissolved oxygen concentration decreased with depth; the dissolved oxygen concentrations of the overlying water and 0-1 cm sediment layer were significantly higher than the deeper layers. The dissolved oxygen profile throughout the year (Table 2) exhibited an oxygen minimum zone between 2-6 cm and a slight increase below 6 cm. The greatest change in mean dissolved oxygen was 46.0% and occurred between 0-1 cm and the 1-2 cm; this zone generally coincided with the zone of greatest Eh change.

9. Hydrogen sulfide

Hydrogen sulfide concentrations were measured from August 1975 to March 1976. The average H_2S concentration ($mg\ l^{-1}$) throughout this time period ranged from 0.36 to 1.26 (Table 1). There were no clear seasonal patterns, although some significant differences occurred between a few months. The H_2S concentration for all depths was $0.64\ mg\ l^{-1}$. Compared to concentrations of $300\ mg\ l^{-1}$ reported for sandy sediments elsewhere (Fenchel, 1969), H_2S concentrations at Sandy Hook were low.

The overlying water contained negligible quantities ($.01-.04\ mg\ l^{-1}$) of sulfide and the sulfide profile exhibited minimum values in the 0-2 cm layer ($0.37\ mg\ l^{-1}$); sulfide concentrations were maximal between 2 and 6 cm ($1.05\ mg\ l^{-1}$), and declined in the 6 to 10 cm layer ($0.51\ mg\ l^{-1}$). High sulfide concentrations in the 2-6 cm layers were correlated with low oxygen content in the same region.

10. Chlorophyll

Chlorophyll a concentrations ($\mu g\ gm^{-1}$ of sediment) and percent chlorophyll a were measured from June 1975 through March 1976. There were statistically significant seasonal and vertical differences in chlorophyll a concentration and percent chlorophyll a. Mean percent chlorophyll a ranged from 54% in August to 79% in February (Table 1).

This generally indicates a higher proportion of "healthy" plant materials in the winter months compared to a higher proportion of degraded plant pigments in the summer months. The mean throughout the summer period was 65%. Chlorophyll a concentration ($\mu\text{g gm}^{-1}$ sediment) ranged from 2.35 in August, to 6.65 in February and followed a pattern similar to the percent chlorophyll a (Table 1). The mean for all depths was 3.60 μg chlorophyll a gm^{-1} of sediment.

The chlorophyll values generally decreased with increasing depth in the sediment. The mean percent chlorophyll a throughout the sample period ranged from 81% in the 0-1 cm layer to 37% in the 9-10 cm layer (Table 2). Significant differences in mean percent chlorophyll a occurred between the upper 3 cm and the rest of the core. The weight of chlorophyll a $\mu\text{g gm}^{-1}$ of sediment followed a similar pattern and ranged from 10.04 $\mu\text{g gm}^{-1}$ in the 0-1 cm layer to 0.27 $\mu\text{g gm}^{-1}$ in the 9-10 cm layer (Table 2).

B. Vertical patterns of environmental parameters

Although some variations existed between monthly vertical profiles, there was a well defined relationship among the major environmental parameters. This relationship is shown in Fig. 4 for Eh, dissolved oxygen, hydrogen sulfide and chlorophyll a.

Eh and dissolved oxygen concentration generally decreased to a minimum between 2 and 6 cm and then increased slightly below this minimum. Eh and dissolved oxygen were positively correlated ($r = +0.86$) with each other and were negatively correlated to increasing depth in the sediment. Eh declined steadily to a minimum at 8-9 cm, with the greatest change (59 mv) occurring between the 0-1 and 1-2 cm layers. Dissolved oxygen showed a sharper vertical decrease with the greatest change also occur-

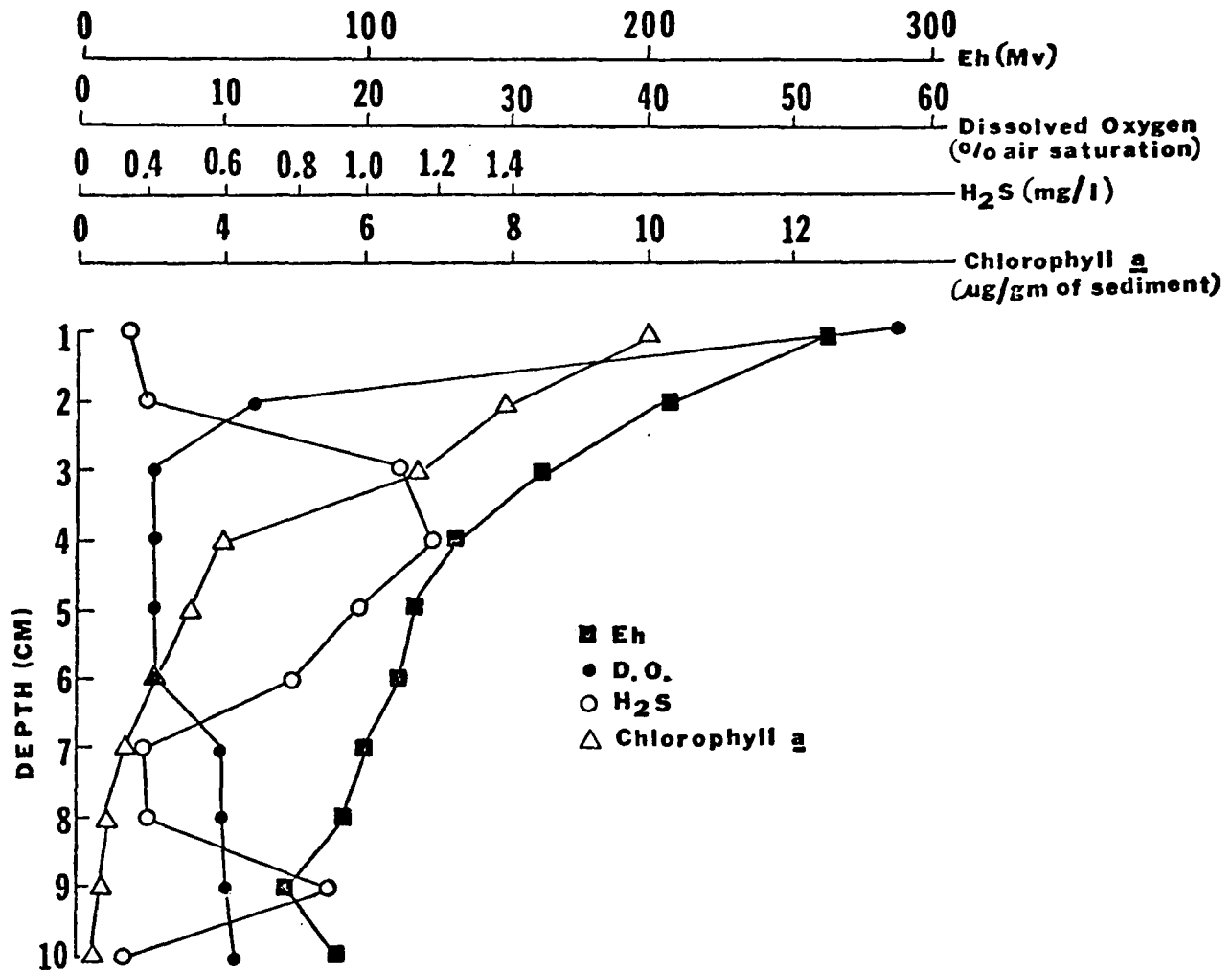


Fig. 4 Average vertical profile for Eh, dissolved oxygen, H₂S, and chlorophyll a at Sandy Hook from March 1975 to March 1976. Each point represents the mean of 26 samples.

ing between the 0-1 and 1-2 cm layers. An oxygen minimum zone between 2-6 cm corresponded quite closely to the zone of maximum hydrogen sulfide. Hydrogen sulfide concentrations above 3 cm and below 6 cm generally were between (0.40 and 0.80 mg l⁻¹).

In summary, the majority of environmental factors measured at this shallow sandy subtidal station did not exhibit significant clear seasonal differences. For example, there were no significant differences in the depth of the oxidized zone which remained relatively stable at 2 cm. The most significant difference in environmental parameters occurred with increasing depth in the sediment. There is generally a more oxidized zone down to a depth of 2 cm overlying a more reduced zone from 2-6 cm and a slightly less reduced zone from 6-10 cm. The most significant change in environmental factors occurs between the upper 2 cm and the rest of the sediment. Eh, dissolved oxygen, chlorophyll a were significantly higher and hydrogen sulfide significantly lower in the 0-2 cm layer than in the reduced zones at 2-6 cm and 6-10 cm. Eh and chlorophyll a are lower in the 6-10 cm zone than in the 2-6 cm zone and other parameters such as dissolved oxygen are higher in the 6-10 cm layers than in the 2-6 cm layers. Sulfide values decrease in the 6-10 cm layers after reaching their maximum values in the 2-6 cm layers.

C. The Meiofauna

Summaries of the temporal and vertical distribution of meiofauna data appears in Tables 16 and 17. Each value in Table 16 represents the mean of 20 analyses (two each for all depths for each month). The data in Table 17 represent the mean of 26 analyses (two for each depth for 13 months) throughout the year. The monthly vertical distributions

TABLE 16

Monthly totals, densities, yearly group means and abundance (%) Sandy Hook Bay, March 1975 through March 1976. Each monthly represents the mean of two cores 10 cm deep. Standard errors * Denotes other groups including Tardigrada, Nemertinea, Cladocera

Meiofauna (Individuals 10 cm ⁻²)	MONTH			
	MAR	APR	MAY	JUNE
Nematoda	2014 [±] 42	6449 [±] 877	2234 [±] 123	1992 [±] 326
Copepoda	112 [±] 19	224 [±] 21	440 [±] 123	753 [±] 203
Foraminifera	33 [±] 7	27 [±] 7	174 [±] 58	90 [±] 33
Polychaeta	80 [±] 45	19 [±] 7	56 [±] 13	250 [±] 21
Oligochaeta	12 [±] 0	34 [±] 10	47 [±] 10	102 [±] 38
Ostracoda	7 [±] 6	16 [±] 2	2 [±] 1	35 [±] 22
Nauplii	34 [±] 23	54 [±] 8	219 [±] 49	704 [±] 178
Others*	5 [±] 1	31 [±] 7	1 [±] 1	36 [±] 20
TOTALS (individuals 10 cm ⁻²)	2297	6854	3173	3962

early group means and abundance (%) of meiofauna groups in
 rough March 1976. Each monthly value (individuals 10 cm⁻²)
 res 10 cm deep. Standard errors of the mean are also given.
 ing Tardigrada, Nemertinea, Cladocera and Lamellibranchia.

MONTH					
MAY	JUNE	JULY	AUG	SEPT	OCT
2234 [±] 123	1992 [±] 326	1575 [±] 145	2779 [±] 314	1481 [±] 612	1321 [±] 222
440 [±] 123	753 [±] 203	458 [±] 137	775 [±] 147	1336 [±] 146	606 [±] 381
174 [±] 58	90 [±] 33	80 [±] 17	142 [±] 26	279 [±] 51	126 [±] 55
56 [±] 13	250 [±] 21	124 [±] 1	219 [±] 40	53 [±] 5	26 [±] 1
47 [±] 10	102 [±] 38	48 [±] 3	32 [±] 2	26 [±] 9	35 [±] 20
2 [±] 1	35 [±] 22	29 [±] 11	139 [±] 92	107 [±] 10	23 [±] 2
219 [±] 49	704 [±] 178	672 [±] 209	1723 [±] 407	1092 [±] 121	337 [±] 136
1 [±] 1	36 [±] 20	3 [±] 3	7 [±] 5	11 [±] 5	3 [±] 1
3173	3962	2989	5726	4385	2477

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	OCT	NOV	DEC	JAN	FEB	MAR
	1321 [±] 222	1897 [±] 62	2314 [±] 118	3501 [±] 882	2567 [±] 35	4523
	606 [±] 381	335 [±] 27	334 [±] 117	354 [±] 183	96 [±] 19	126 [±] 1
	126 [±] 55	194 [±] 92	201 [±] 26	178 [±] 17	83 [±] 3	40 [±] 1
	26 [±] 1	102 [±] 84	47 [±] 9	20 [±] 5	22 [±] 1	8 [±] 4
	35 [±] 20	56 [±] 50	36 [±] 3	32 [±] 2	27 [±] 2	30 [±] 9
	23 [±] 2	14 [±] 3	7 [±] 1	14 [±] 9	11 [±] 1	23 [±] 5
	337 [±] 136	311 [±] 45	271 [±] 47	165 [±] 13	90 [±] 9	53 [±] 2
	3 [±] 1	23 [±] 1	3 [±] 1	1 [±] 1	2 [±] 1	1 [±] 1
	2477	2932	3213	4265	2898	4804

	JAN	FEB	MAR	Average (individuals 10 cm ⁻²)	Percent Relative Abundance
118	3501 [±] 882	2567 [±] 35	4523 [±] 2318	2665	69.3
117	354 [±] 183	96 [±] 19	126 [±] 17	458	11.9
26	178 [±] 17	83 [±] 3	40 [±] 10	127	3.3
	20 [±] 5	22 [±] 1	8 [±] 4	72	1.9
	32 [±] 2	27 [±] 2	30 [±] 9	40	1.0
	14 [±] 9	11 [±] 1	23 [±] 5	33	.9
47	165 [±] 13	90 [±] 9	53 [±] 22	440	11.5
	1 [±] 1	2 [±] 1	1 [±] 1	10	.2
	4265	2898	4804	3844	

TABLE 17

Average vertical distribution of meiofauna at the Sandy Hook study station. Each value (individuals 10cm^{-2}) represents the mean of 26 samples throughout the year. The range and standard error of the mean for each value is also given. * Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia. ** Denotes less than an average of 1 10cm^{-2} .

Meiofauna Group	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	975 \pm 129 (209-1882)	805 \pm 187 (319-2729)	392 \pm 88 (164-1297)	175 \pm 32 (31-350)	113 \pm 18 (26-247)	65 \pm 9 (15-111)	50 \pm 6 (26-87)	38 \pm 5 (13-73)	31 \pm 6 (5-63)	23 \pm 4 (5-49)
Copepoda	395 \pm 102 (50-1237)	43 \pm 5 (10-76)	10 \pm 2 (0-28)	5 \pm 1 (0-8)	**	**				
Foraminifera	70 \pm 17 (11-223)	29 \pm 8 (0-82)	11 \pm 3 (0-33)	5 \pm 2 (0-16)	3 \pm 2 (0-21)	3 \pm 1 (0-15)	2 \pm .7 (0-9)	1 \pm .4 (0-4)	1 \pm .3 (0-4)	**
Polychaeta	38 \pm 15 (0-192)	22 \pm 6 (4-73)	8 \pm 3 (0-43)	2 \pm .5 (0-5)	1 \pm .5 (0-4)	**	**	**	**	**
Oligochaeta	12 \pm 4 (0-47)	14 \pm 4 (3-50)	8 \pm 2 (0-31)	3 \pm 1 (0-13)	1 \pm .5 (0-7)	1 \pm .5 (0-6)	**	**	**	**
Ostracoda	28 \pm 11 (0-137)	4 \pm 2 (0-23)	1 \pm .5 (0-4)	1 \pm .4 (0-4)	**		**			
Nauplii	352 \pm 124 (3-1455)	56 \pm 16 (6-222)	13 \pm 4 (0-40)	4 \pm 2 (0-27)	6 \pm 4 (0-58)	6 \pm 5 (0-68)	1 \pm .5 (0-6)	**	**	**
Others*	5 \pm 2 (0-29)	3 \pm 1 (0-17)	1 \pm .5 (0-8)	1 \pm 1 (0-10)	1 \pm 1 (0-9)					

TABLE 18

Vertical distribution of meiofauna at Sandy Hook, March 1975. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	796	749	226	58	49	34	30	37	19	16
Copepoda	50	49	7	3	1	0	1	1	0	0
Nauplii	3	6	2	9	4	5	1	1	2	1
Foraminifera	11	3	3	2	0	3	2	4	4	1
Polychaeta	11	21	43	3	0	1	1	0	0	0
Oligochaeta	2	6	0	1	0	2	1	0	0	0
Ostracoda	3	3	1	0	0	0	0	0	0	0
Others*	2	1	1	1	0	0	0	0	0	0

TABLE 19

Vertical distribution of meiofauna at Sandy Hook, April 1975. All values represent the mean of two samples and are expressed as individuals 10cm^2 .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	1882	2729	1297	350	86	26	36	15	14	14
Copepoda	124	76	16	8	0	0	0	0	0	0
Nauplii	14	18	10	6	5	0	0	0	0	1
Foraminifera	24	0	0	1	0	1	1	0	0	0
Polychaeta	3	11	5	0	0	0	0	0	0	0
Oligochaeta	5	16	10	3	0	0	0	0	0	0
Ostracoda	15	1	0	0	0	0	0	0	0	0
Others*	4	17	8	1	1	0	0	0	0	0

TABLE 20

Vertical distribution of meiofauna at Sandy Hook, May 1975. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	1214	731	164	35	26	15	26	13	5	5
Copepoda	378	47	10	1	1	1	1	0	1	0
Nauplii	179	22	12	2	2	1	1	0	0	0
Foraminifera	116	30	14	7	3	2	0	1	1	0
Polychaeta	42	11	3	0	0	0	0	0	0	0
Oligochaeta	21	23	2	1	0	0	0	0	0	0
Ostracoda	0	1	0	0	0	0	0	0	0	0
Others*	1	0	0	0	0	0	0	0	0	0

TABLE 21

Vertical distribution of meiofauna at Sandy Hook, June 1976. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	993	507	213	106	69	33	26	19	18	8
Copepoda	702	37	9	5	0	0	0	0	0	0
Nauplii	637	42	17	5	2	1	0	0	0	0
Foraminifera	47	30	9	1	2	1	0	0	0	0
Polychaeta	192	47	9	2	0	0	0	0	0	0
Oligochaeta	29	50	20	2	1	0	0	0	0	0
Ostracoda	27	1	3	4	0	0	0	0	0	0
Others*	29	4	0	3	0	0	0	0	0	0

TABLE 22

Vertical distribution of meiofauna at Sandy Hook, July 1975. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	510	408	224	118	68	62	61	49	49	26
Copepoda	419	29	7	0	0	0	1	1	0	1
Nauplii	565	98	5	3	1	0	0	0	0	0
Foraminifera	23	14	2	16	8	2	9	4	1	1
Polychaeta	63	42	14	1	3	0	0	1	0	0
Oligochaeta	0	3	31	11	1	0	1	1	0	0
Ostracoda	24	5	0	0	0	0	0	0	0	0
Others*	3	0	0	0	0	0	0	0	0	0

TABLE 23

Vertical distribution of meiofauna at Sandy Hook, August 1975. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	1080	830	328	121	99	75	62	73	63	48
Copepoda	722	39	12	1	0	0	0	0	0	1
Nauplii	1455	222	37	9	0	0	0	0	0	0
Foraminifera	97	16	20	4	1	3	1	0	0	0
Polychaeta	49	73	4	0	1	1	0	0	1	0
Oligochaeta	7	7	14	2	1	1	0	0	0	0
Ostracoda	137	0	0	0	1	0	1	0	0	0
Others*	6	0	0	0	1	0	0	0	0	0

TABLE 24

Vertical distribution of meiofauna at Sandy Hook, September 1975. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	528	602	178	31	27	31	26	28	17	13
Copepoda	1237	63	28	6	1	1	2	0	0	0
Nauplii	1010	71	11	0	0	0	0	1	0	0
Foraminifera	223	36	18	1	0	2	1	0	0	0
Polychaeta	42	8	4	0	0	0	0	0	0	0
Oligochaeta	9	12	5	0	1	0	0	0	0	0
Ostracoda	84	23	0	0	0	0	0	0	0	0
Others*	0	11	0	0	0	0	0	0	0	0

TABLE 25

Vertical distribution of meiofauna at Sandy Hook, October 1975. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	209	319	328	153	125	76	53	28	14	16
Copepoda	537	59	8	0	2	0	0	0	0	0
Nauplii	270	29	9	27	2	0	0	0	0	0
Foraminifera	112	11	1	0	1	0	0	1	0	0
Polychaeta	8	13	4	1	0	0	0	0	0	0
Oligochaeta	6	4	5	7	7	6	0	0	0	0
Ostracoda	8	8	4	3	0	0	0	0	0	0
Others*	10	5	0	0	0	0	0	0	0	0

TABLE 26

Vertical distribution of meiofauna at Sandy Hook, November 1975. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	752	352	297	142	136	75	65	34	32	16
Copepoda	294	27	7	6	0	0	0	1	0	0
Nauplii	206	72	25	3	3	2	0	0	0	0
Foraminifera	120	56	7	4	3	0	1	0	2	1
Polychaeta	65	32	1	4	0	0	0	0	0	0
Oligochaeta	47	35	2	1	1	0	0	0	0	0
Ostracoda	11	3	0	0	0	0	0	0	0	0
Others*	1	3	0	10	9	0	0	0	0	0

TABLE 27

Vertical distribution of meiofauna at Sandy Hook, December 1975. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	798	405	328	328	211	104	44	39	30	27
Copepoda	232	35	19	21	15	8	3	0	0	1
Nauplii	43	56	40	2	58	68	6	4	0	0
Foraminifera	37	77	33	14	21	15	1	2	1	0
Polychaeta	5	14	14	5	4	4	0	1	0	0
Oligochaeta	15	10	5	1	3	1	1	0	0	0
Ostracoda	6	1	0	0	0	0	0	0	0	0
Others*	2	1	1	0	0	0	0	0	0	0

TABLE 28

Vertical distribution of meiofauna at Sandy Hook, January 1976. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	1690	554	400	327	247	111	71	44	25	32
Copepoda	328	10	9	1	4	1	0	1	0	0
Nauplii	99	56	0	4	5	0	1	0	0	0
Foraminifera	64	82	22	4	3	1	2	0	0	0
Polychaeta	2	8	4	3	1	0	1	1	0	0
Oligochaeta	5	3	3	3	2	1	0	0	0	0
Ostracoda	13	1	0	0	0	0	0	0	0	0
Others*	0	1	0	0	0	0	0	0	0	0

TABLE 29

Vertical distribution of meiofauna at Sandy Hook, February 1976. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	1011	623	301	219	119	96	69	49	51	29
Copepoda	56	37	0	3	0	0	0	0	0	0
Nauplii	65	20	3	0	1	0	0	1	0	0
Foraminifera	25	15	17	13	1	3	4	2	2	1
Polychaeta	14	6	0	2	0	0	0	0	0	0
Oligochaeta	3	5	4	13	1	0	0	0	1	0
Ostracoda	11	0	0	0	0	0	0	0	0	0
Others*	2	0	0	0	0	0	0	0	0	0

TABLE 30

Vertical distribution of meiofauna at Sandy Hook, March 1976. All values represent the mean of two samples and are expressed as individuals 10cm^{-2} .

* Denotes other groups including Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia.

Meiofauna	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Nematoda	1220	1667	823	288	154	102	87	61	72	49
Copepoda	55	55	5	6	1	2	1	0	0	1
Nauplii	35	16	0	0	0	0	0	1	0	1
Foraminifera	18	6	0	4	3	4	1	2	1	1
Polychaeta	0	4	3	1	0	0	0	0	0	0
Oligochaeta	2	4	5	3	1	0	0	0	0	0
Ostracoda	18	3	0	2	0	0	0	0	0	0
Others*	1	0	0	0	0	0	0	0	0	0

of all meiofauna groups appear in Tables 18-30.

Population densities of meiofauna throughout the year ranged from 2297 10 cm^{-2} to 6854 10 cm^{-2} and averaged 3844 10 cm^{-2} (Table 16). The Nematoda were the most abundant taxon and averaged 69.3% of the total number of individuals. Copepoda were the second most abundant group, averaging 11.9%. The third through sixth most abundant taxa included the Foraminifera (3.2%), Polychaeta (1.9%), Oligochaeta (1.0%) and Ostracoda (0.9%). Other taxa (Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia) occurred in limited numbers and collectively averaged 0.2% of the total meiofauna. Nauplii averaged 11.5% of the total meiofauna.

The majority of meiofauna (74.2%) occurred in the upper 2 cm of sediment. By contrast, the meiofauna in the 2-6 cm layers averaged 22.0% of the total and the 6-10 cm layers averaged 3.8% of the total (Table 17). Significantly positive correlation coefficients with depth occurred between densities of Nematoda and Copepoda (0.69), Nematoda and Foraminifera (0.71) and Copepoda and Foraminifera (0.80).

1. Nematoda

The mean number of nematodes throughout the year averaged 2665 10 cm^{-2} and ranged from 1321 to 6449 10 cm^{-2} (Table 16). Generally, nematodes did not exhibit significant seasonal differences; densities in April 1975, August 1975, January 1975, and March 1976 were significantly higher than the rest of the year, however.

Densities of nematodes generally decreased with increasing depth in the sediment (Table 17) and the majority of nematodes (66.8%) occurred in the 0-2 cm layer. Significant difference in total numbers of nematodes occurred between the following sediment depths: 0-1 and

1-2 cm; 1-2 and 2-3 cm; 2-3 and 3-5 cm and 3-5 and 6-10 cm. The vertical distribution of nematodes was significantly positively correlated with Eh and chlorophyll a. A negative correlation of nematode densities with hydrogen sulfide and a positive correlation with dissolved oxygen were not significant. This can be explained by the fact that nematodes continually decreased with depth while dissolved oxygen decreased to a minimum between 2 and 6 cm and increased slightly below that depth; hydrogen sulfide was maximal between 2-6 cm and decreased below that depth. This resulted in either statistically non-significant positive correlations in the case of dissolved oxygen or statistically non-significant negative correlations in the case of hydrogen sulfide.

2. Copepoda

The mean number of copepods throughout the year averaged $458 \text{ } 10 \text{ cm}^{-2}$, and ranged from 96 to $1336 \text{ } 10 \text{ cm}^{-2}$ (Table 16). Although overlap existed, densities were significantly higher in the months of June, August, September and October than the rest of the year. There were highly significant differences in densities ($p < .001$) between the upper layers and the rest of the core; ninety-six percent of the copepods occurred in the 0-2 cm layer (Table 17). The vertical distribution of copepods was significantly positively correlated with dissolved oxygen ($r = +0.83$), Eh ($r = +0.76$) and chlorophyll a ($r = +0.76$). A negative correlation with hydrogen sulfide was not statistically significant ($r = -0.28$).

3. Nauplii

The mean number of nauplii throughout the year averaged $444 \text{ } 10 \text{ cm}^{-2}$ and ranged from 31 to $1723 \text{ } 10 \text{ cm}^{-2}$ (Table 16). Densities of nauplii

from June through September were significantly higher than the rest of the year. There were highly significant differences ($p < .001$) between the upper layers and the rest of the core: ninety-three percent of the nauplii occurred in the 0-2 cm layer (Table 17).

The vertical distribution of nauplii was significantly positively correlated with dissolved oxygen ($r = +0.86$), Eh ($r = +0.80$) and chlorophyll a ($r = +0.80$). Since a near perfect correlation ($r = +0.98$) existed between the occurrence of copepoda and nauplii, the nauplii are assumed to be those of harpacticoid copepods.

4. Foraminifera

The mean number of foraminifera throughout the year averaged $124 \text{ } 10 \text{ cm}^{-2}$ and ranged from 27 to $279 \text{ } 10 \text{ cm}^{-2}$ (Table 16). Foraminifera densities were significantly higher in May, September, November and December 1975 and January 1976 than during the rest of the year. Vertical distribution was similar to that of nauplii. There were highly significant differences ($p < .001$) between the upper and lower layers; 79.2% of the foraminifera occurred in the 0-2 cm layers (Table 17). The vertical distribution of foraminifera was significantly positively correlated with dissolved oxygen ($r = +0.76$), Eh ($r = +0.71$), and chlorophyll a ($r = +0.73$).

5. Polychaeta

The mean number of polychaetes throughout the year ranged from 8 to $250 \text{ } 10 \text{ cm}^{-2}$ and averaged $71 \text{ } 10 \text{ cm}^{-2}$ (Table 16). Densities in the period June through August were significantly higher than the rest of the year. Vertical distribution was similar to that of foraminifera and nauplii, with significantly greater densities in the upper layers compared to the rest of the core; 83.4% of the polychaetes occurred in

the 0-2 cm layers (Table 17). The vertical distribution of polychaetes was significantly positively correlated with dissolved oxygen ($r = +0.72$), Eh ($r = +0.65$), and chlorophyll a ($r = +0.70$).

6. Oligochaeta

Oligochaete density throughout the year averaged $40 \text{ } 10 \text{ cm}^{-2}$ and ranged from 12 to $102 \text{ } 10 \text{ cm}^{-2}$ (Table 16). Oligochaete densities in June were significantly higher than the rest of the year. Significant vertical differences occurred between the upper layers and the rest of the core; 66.7% of the oligochaetes occurred in the 0-2 cm layers (Table 17). The vertical distribution of oligochaetes was significantly positively correlated with dissolved oxygen ($r = +0.68$), Eh ($r = +0.63$), and chlorophyll a ($r = +0.64$).

7. Ostracoda

The mean number of ostracods throughout the year ranged from 2 to $139 \text{ } 10 \text{ cm}^{-2}$ and averaged $32 \text{ } 10 \text{ cm}^{-2}$ (Table 16). Ostracod densities in August and September were significantly higher than the rest of the year. Highly significant differences ($p < .001$) occurred between the upper and lower layers; 82.4% of the ostracods occurred in the 0-1 cm layer (Table 17). The vertical distribution of ostracods was significantly positively correlated to dissolved oxygen ($r = +0.85$), Eh ($r = +0.77$), and chlorophyll a ($r = +0.78$).

8. Other taxa

Other taxa including the Tardigrada, Nemertinea, Cladocera, Acarina and Lamellibranchia occurred in sparse numbers throughout the year and had a collective average of $9 \text{ } 10 \text{ cm}^{-2}$. Because these taxa occurred in so few numbers, seasonal or vertical fluctuations could not be considered statistically valid.

D. Seasonal distribution of nematode species

Sixty-seven species of nematodes belonging to 18 families were identified at the study station. Nematode abundances, frequencies of occurrence and feeding types (Wieser 1953; Boucher 1973) are listed in Table 31. The feeding type scheme is shown below:

<u>Feeding Type</u>	<u>Characteristics</u>
1A	with minute or no buccal cavity (selective deposit feeders)
1B	with a large unarmed buccal cavity (non-selective deposit feeders)
2A	buccal cavity provided with small armature (epigrowth feeders)
2B	buccal cavity with big and powerful armature (predators and omnivores)

The monthly distributions of nematode species are given in Tables 32-44. Eight species had mean annual abundances of at least 5% and ten had mean abundances of at least 1%. In order of decreasing abundance, the twenty most common species were Metachromadora obesa, Odontophora setosa, Neochromadora poecilosoma, Neochromadora tecta, Desmodora scandensis, Nudora lineata, Polysigma uniforme, Tripyloides gracilis, Anticoma littoris, Theristus flevensis, Theristus acer, Chromadorita sp, Enoplolaimus vulgaris, Desmodora polychaeta, Axonolaimus interrogativus, Cyatholaimus gracilis, Chromadorella venmeterae, Linhomoeus hirsutus, Eubostrichus parasitiferus and Chromadorina germanica. A relatively high degree of uniformity of species composition existed throughout the year with 45% of the total species occurring in at least six of the 13 months sampled. Ten (14%) of the species collected were found during all 13 months and an additional 22 (31%) were found in at least six months.

TABLE 31 Monthly and mean abundance, frequency of occurrence and feeding Sandy Hook Bay, March 1975 through March 1976. Frequency refer given species was found. Feeding types based on classification than 0.1%.

SPECIES	MAR	APR	MAY	JU
<u>Neochromadora poecilosoma</u> (DeMan)	10.7	1.9	44.7	17
<u>Necchromadora tecta</u> Gerlach	25.9	22.9	0.3	0
<u>Chromadorina germanica</u> (Butschli)				
<u>Chromadorita</u> sp.		0.4		0
<u>Chromadorella filiformis</u> (Bastian)	0.4			
<u>Chromadorella vanmeterae</u> Wieser and Hopper	0.5	0.5		1
<u>Spilophorella paradoxa</u> (DeMan)				
<u>Prochromadora</u> sp.				
<u>Euchromadora</u> sp.				
<u>Desmodora polychaeta</u> Allgen	0.7	*	0.3	5
<u>Desmodora scaldensis</u> DeMan	1.9	1.4	4.6	6
<u>Bradylaimus</u> sp.	0.8	0.9	*	
<u>Metachromadora obesa</u> Chitwood	17.4	8.1	9.8	27
<u>Polysigma uniforme</u> Cobb	3.3	2.8	3.3	3
<u>Eubostrichus parasitiferus</u> Chitwood	0.5	0.4	0.8	1
<u>Spirinia parasitifera</u> (Bastian)			*	
<u>Pseudonchus kosswigi</u> Murphy	0.2	*	*	
<u>Sigmophoranema rufum</u> (Cobb)	0.3			
<u>Chromaspirina pellucida</u> (Cobb)				
<u>Microlaimus honestus</u> DeMan			0.7	
<u>Microlaimus</u> sp.				
<u>Odontophora setosa</u> (Allgen)	4.6	5.4	10.6	11
<u>Axonolaimus</u> sp.				0
<u>Axonolaimus interrogativus</u> Wieser	1.3	0.8	1.2	2
<u>Monoposthia costata</u> (Bastian)	6.8	3.4		
<u>Nudora lineata</u> Cobb	9.9	15.5	6.4	0
<u>Bathylaimus</u> sp.			*	
<u>Tripylloides gracilis</u> (Ditlevsen)	6.5	16.7	0.8	
<u>Theristus flevensis</u> Stekhoven	0.5	0.2		
<u>Theristus acer</u> Bastian	2.9	5.9	0.1	6.6
<u>Theristus curvatus</u> Gerlach				
<u>Cylindrotheristus</u> sp.				*
<u>Mesotheristus setosus</u> (Butschli)				0.1

of occurrence and feeding types of nematode species collected at
 ch 1976. Frequency refers to the number of months in which a
 s based on classification from Wieser (1959a). * Denotes less

	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	1.9	44.7	17.4	7.2	8.4	1.1	3.6	0.8	6.7
9	22.9	0.3	0.3	0.5	0.5	0.3	2.3	6.4	2.2
	0.4		0.5					0.5	0.5
4			*					1.1	5.3
5	0.5		1.6	2.8	6.9	2.5	2.5	1.4	
						0.9		3.0	2.8
				0.5				0.5	1.8
					0.4		1.1		
7	*	0.3	5.6	2.9	2.9	2.1	3.4	5.6	0.7
9	1.4	4.6	6.0	9.5	18.1	41.7	5.4	3.3	0.7
3	0.9	*		2.3		0.5	0.4	0.8	0.9
4	8.1	9.8	27.1	27.1	17.3	33.0	14.3	19.9	3.5
3	2.8	3.3	3.3	10.0	5.3	7.5	13.8	8.1	6.8
5	0.4	0.8	1.6	0.9	0.5	2.8	1.6	0.7	0.6
		*							
2	*	*							
3									
					0.4				
		0.7			*	0.1	0.2	0.2	0.3
						0.1			
5	5.4	10.6	11.6	26.9	8.8	10.6	10.6	7.9	15.1
			0.9						
3	0.8	1.2	2.7				0.9	2.3	4.6
8	3.4			0.5	*		0.4		
9	15.5	6.4	0.9	0.4	0.2	0.6	4.3	7.9	6.2
		*							
5	16.7	0.8	*	0.9	0.4	0.1	0.2	3.7	8.8
5	0.2					0.3		1.6	11.1
9	5.9	0.1	6.6	0.8	3.2	0.9	1.9	7.7	3.9
							0.3		
			*	0.1	*		*		
			0.1		*				

NOV	DEC	JAN	FEB	MAR	X	FREQUENCY	FEEDING TYPE
0.8	6.7	2.2	8.8	4.1	9.0	13/13	2A
6.4	2.2	24.7	4.0	6.5	7.4	13/13	2A
0.5	0.5	1.3	1.6	3.8	0.6	5/13	2A
1.1	5.3		15.4	12.9	2.7	6/13	2A
1.4		0.2			0.2	4/13	2A
3.0	2.8	0.3	0.6	1.1	1.9	12/13	2A
0.5	0.5	0.3			0.2	4/13	2A
	1.8				0.2	2/13	2A
		1.1			0.2	3/13	2A
5.6	0.7	0.8	1.2	0.2	2.0	13/13	2A
3.3	0.7	0.9	1.4	0.3	7.3	13/13	2A
0.8	0.9		2.1	0.3	0.7	10/13	2A
19.9	3.5	2.6	8.9	3.8	14.3	13/13	2A
8.1	6.8	6.3	5.6	1.2	5.9	13/13	2A
0.7	0.6	0.1	0.3	*	0.8	13/13	2A
					*	1/13	2A
		0.1	*	*	*	6/13	2B
					*	1/13	2A
					*	1/13	2A
0.2	0.3	*	0.2	*	0.1	9/13	2A
					*	1/13	2A
7.9	15.1	9.8	9.3	4.9	10.5	13/13	2A
					*	1/13	1B
2.3	4.6	4.7	6.3	1.8	2.0	10/13	1B
		2.5	3.4	1.3	1.4	9/13	2A
7.9	6.2	10.7	3.3	11.8	6.0	13/13	2A
					*	1/13	2B
3.7	8.8	6.0	2.9	21.1	5.2	13/13	2A
1.6	11.1	15.9	5.3	9.8	3.4	8/13	2A
7.7	3.9		5.1	4.1	3.3	12/13	1B
					*	1/13	1B
			0.2		*	5/13	1B
		*			*	3/13	1B

<u>Bathylaimus sp.</u>			*	
<u>Tripyloides gracilis</u> (Ditlevsen)	6.5	16.7	0.8	*
<u>Theristus flevensis</u> Stekhoven	0.5	0.2		
<u>Theristus acer</u> Bastian	2.9	5.9	0.1	6.6
<u>Theristus curvatus</u> Gerlach				
<u>Cylindrotheristus sp.</u>				*
<u>Mesotheristus setosus</u> (Butschli)				0.1

Paramonhystera sp.

<u>Leptogastrella paranormandica</u> (Micoletzky)				
<u>Amphimonhystera anechma</u> (Southern)	*	*	*	1.6
<u>Monhystera sp.</u>				
<u>Anticomma litoris</u> Chitwood		0.6	4.2	7.5
<u>Enoplolaimus vulgaris</u> DeMan	2.9	2.9	4.8	0.5
<u>Enoplolaimus sp.</u>				
<u>Enoplus communis</u> (Bastian)				
<u>Chaetonema sp.</u>			*	
<u>Enoploides sp.</u>			*	
<u>Longicvatholaimus sp.</u>	*			
<u>Cyatholaimus gracilis</u> (Eberth)	*	7.5	2.3	
<u>Linhomoeus hirsutus</u> Bastian	0.3	0.5	*	1.3
<u>Linhomoeus sp.</u>				
<u>Metalinhomoeus typicus</u> DeMan		*	0.6	
<u>Paralinhomoeus tenuicaudatus</u> (Butschli)	*			
<u>Paralinhomoeus sp.</u>				0.5
<u>Oncholaimus paralanqrundensis</u> (Allgen)		0.3	2.4	
<u>Monocholaimus sp.</u>				
<u>Oncholaimoides rugosus</u> Chitwood				
<u>Viscosia carnleyensis</u> (Ditlevsen)				
<u>Viscosia paralinstowi</u> Chitwood				
<u>Comesoma stenocephalum</u> Filipjev	0.5	*	0.5	
<u>Sabatieria hilarula</u> DeMan				0.3
<u>Sabatieria parabyssalis</u> Wieser	0.3			
<u>Sabatieria chitwoodi</u> Wieser				
<u>Crenopharynx marioni</u> (Southern)		*	*	0.5
<u>Camacolaimus sp.</u>				*
<u>Leptolaimus sp.</u>		*		1.0
<u>Halichoanolaimus raritanensis</u> Hasbrouck		*		
<u>Latronema sp.</u>				
<u>Choniolaimus sp.</u>			1.2	
<u>Pareurystomina acuminata</u> (DeMan)	*			
<u>Siphonolaimus conicus</u> Chitwood	*			
<u>Dasynemoides setosus</u> Chitwood				

						07/13	2B
					*	1/13	2A
					*	1/13	2A
0.2	0.3	*	0.2	*	0.1	9/13	2A
					*	1/13	2A
7.9	15.1	9.8	9.3	4.9	10.5	13/13	2A
					*	1/13	1B
2.3	4.6	4.7	6.3	1.8	2.0	10/13	1B
		2.5	3.4	1.3	1.4	9/13	2A
7.9	6.2	10.7	3.3	11.8	6.0	13/13	2A
					*	1/13	2B
3.7	8.8	6.0	2.9	21.1	5.2	13/13	2A
1.6	11.1	15.9	5.3	9.8	3.4	8/13	2A
7.7	3.9		5.1	4.1	3.3	12/13	1B
					*	1/13	1B
			0.2		*	5/13	1B
		*			*	3/13	1B

				*	*	3/13	1A
					*	2/13	1A
0.2	*	*			0.4	11/13	1B
			0.4	*	*	2/13	1B
4.8	11.1	4.3	3.0	0.6	4.6	12/13	1A
2.9	2.8	1.4	4.0	3.5	2.5	11/13	1B
			2.4	2.5	0.4	4/13	2B
					*	1/13	1B
					*	1/13	1B
					*	1/13	2B
			0.3		0.2	5/13	2A
3.7	0.5	1.3		2.4	1.9	10/13	2A
0.3	0.2	0.3	0.4		0.9	12/13	2A
0.1			*		*	4/13	2A
	*	0.3			0.1	6/13	1B
			*		*	1/13	1B
					*	1/13	1B
0.9		*	0.4	0.9	0.5	11/13	2B
		*			*	1/13	2B
				*	*	3/13	2B
				0.2	0.1	3/13	2B
0.2					*	1/13	2B
2.4	1.3		1.1	0.1	0.5	10/13	1B
0.1					*	2/13	1B
		0.3			*	3/13	1B
				*	*	2/13	1B
1.0	0.6	1.4		0.2	0.5	10/13	1A
		*			*	3/13	2B
			0.4	0.5	0.2	6/13	2A
0.2	*		*		*	6/13	2B
					*	1/13	2B
	0.3				0.1	2/13	2B
	*	*	*		0.1	7/13	2B
		*	0.4	*	0.1	8/13	2B
					*	1/13	2A

TABLE 32

Percent distribution of nematode species at Sandy Hook, March 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	54.8 (15.5)	42.0 (13.5)	2.3 (1.9)		0.9 (4.3)					
<u>Neochromadora tecta</u>	52.1 (36.0)	43.1 (33.8)	4.9 (9.4)							
<u>Chromadorella filiformis</u>	100 (1.0)									
<u>Chromadorella vanmeterae</u>					18.2 (4.3)	45.5 (12.0)		36.4 (7.7)		
<u>Desmodora polychaeta</u>						14.7 (4.0)	28.6 (8.3)	14.2 (3.8)	21.4 (9.1)	21.4 (11.8)
<u>Desmodora scaldensis</u>				4.9 (2.5)	17.1 (13.0)	7.3 (8.0)	21.9 (20.8)	24.3 (19.2)	12.2 (18.2)	12.2 (17.6)
<u>Bradylaimus sp.</u>							12.5 (4.2)	37.5 (11.5)	18.8 (9.1)	31.3 (17.6)
<u>Metachromadora obesa</u>	6.4 (3.1)	30.5 (16.2)	41.5 (52.8)	10.9 (50.0)	4.8 (30.4)	2.2 (20.0)	0.6 (4.2)	1.7 (11.5)	0.8 (9.1)	0.6 (5.9)
<u>Polysigma uniforme</u>		29.9 (2.7)		14.9 (12.5)	7.5 (8.7)	14.9 (24.0)	10.4 (16.7)	5.9 (7.7)	4.5 (9.1)	11.9 (29.9)
<u>Eubostriechus parasitiferus</u>							18.2 (4.2)	18.2 (3.8)	45.5 (18.2)	18.2 (5.9)
<u>Pseudonchus kosswigi</u>									100 (18.2)	
<u>Sigmophoranema rufum</u>			100 (1.9)							
<u>Odontophora setosa</u>	8.4 (1.0)	35.8 (5.4)	32.6 (11.3)	10.5 (12.5)	5.3 (8.7)	5.3 (12.0)		2.1 (3.8)		
<u>Axonolaimus interrogativus</u>	28.6 (1.0)	25.0 (1.4)	39.3 (3.8)		7.1 (4.3)					
<u>Monoposthia costata</u>	27.9 (5.2)	67.9 (13.5)	4.3 (1.9)							
<u>Nudora lineata</u>	71.7 (19.6)	16.6 (5.1)	10.7 (3.1)					0.9		

<u>Bradylaimus sp.</u>				(2.5)	(13.0)	(8.0)	(20.8)	(19.2)	(18.2)	(17.6)
							12.5	37.5	18.8	31.3
							(4.2)	(11.5)	(9.1)	(17.6)
<u>Metachromadora obesa</u>	6.4	30.5	41.5	10.9	4.8	2.2	0.6	1.7	0.8	0.6
	(3.1)	(16.2)	(52.8)	(50.0)	(30.4)	(20.0)	(4.2)	(11.5)	(9.1)	(5.9)
<u>Polysigma uniforme</u>		29.9		14.9	7.5	14.9	10.4	5.9	4.5	11.9
		(2.7)		(12.5)	(8.7)	(24.0)	(16.7)	(7.7)	(9.1)	(29.9)
<u>Eubostrichus parasitiferus</u>							18.2	18.2	45.5	18.2
							(4.2)	(3.8)	(18.2)	(5.9)
<u>Pseudonchus kosswigi</u>									100	
									(18.2)	
<u>Sigmophoranema rufum</u>			100							
			(1.9)							
<u>Odontophora setosa</u>	8.4	35.8	32.6	10.5	5.3	5.3		2.1		
	(1.0)	(5.4)	(11.3)	(12.5)	(8.7)	(12.0)		(3.8)		
<u>Axonolaimus interrogativus</u>	28.6	25.0	39.3							
	(1.0)	(1.4)	(3.8)							
<u>Monoposthia costata</u>	27.9	67.9	4.3							
	(5.2)	(13.5)	(1.9)							
<u>Nudora lineata</u>	71.7	16.6	10.7					0.9		
	(18.6)	(5.4)	(7.5)					(3.8)		
<u>Tripyloides gracilis</u>	69.9	25.6	4.5							
	(12.4)	(5.4)	(1.9)							
<u>Theristus flevensis</u>				80.0	20.0					
				(10.0)	(4.3)					
<u>Theristus acer</u>		11.9	18.6	3.4	16.9	5.1	20.3	20.3		3.4
		(1.4)	(3.8)	(2.5)	(17.4)	(8.0)	(29.2)	(23.1)		(5.9)
<u>Amphimonhystera anechma</u>					100					
					(4.3)					
<u>Enoplolaimus vulgaris</u>	75.4	11.5	9.8	3.3						
	(6.2)	(1.4)	(1.9)	(2.5)						
<u>Cyatholaimus gracilis</u>								100		
								(4.2)		
<u>Linhomoeus hirsutus</u>						33.3	33.3			33.3
						(4.0)	(4.2)			(5.9)
<u>Paralinhomoeus tenuicaudatus</u>						100				
						(4.0)				
<u>Oncholaimus paralangrunensis</u>			100							
			(1.9)							
<u>Comesoma stenocephalum</u>				36.3			18.2	18.2	27.3	
				(5.0)			(4.2)	(3.8)	(9.1)	
<u>Pareurystomina acuminata</u>				100						
				(2.5)						
<u>Siphonolaimus conicus</u>						100				

<u>Monoposthia costata</u>	27.9 (5.2)	67.9 (13.5)	4.3 (1.9)						
<u>Nudora lineata</u>	71.7 (18.6)	16.6 (5.4)	10.7 (7.5)				0.9 (3.8)		
<u>Tripyloides gracilis</u>	69.9 (12.4)	25.6 (5.4)	4.5 (1.9)						

<u>Theristus flevensis</u>				80.0 (10.0)	20.0 (4.3)				
<u>Theristus acer</u>		11.9 (1.4)	18.6 (3.8)	3.4 (2.5)	16.9 (17.4)	5.1 (8.0)	20.3 (29.2)	20.3 (23.1)	3.4 (5.9)
<u>Amphimonhystera anechma</u>					100 (4.3)				
<u>Enoplolaimus vulgaris</u>	75.4 (6.2)	11.5 (1.4)	9.8 (1.9)	3.3 (2.5)					
<u>Cyatholaimus gracilis</u>							100 (4.2)		
<u>Linhomoeus hirsutus</u>						33.3 (4.0)	33.3 (4.2)		33.3 (5.9)
<u>Paralinhomoeus tenuicaudatus</u>						100 (4.0)			
<u>Oncholaimus paralangrunensis</u>			100 (1.9)						
<u>Comesoma stenocephalum</u>				36.3 (5.0)			18.2 (4.2)	18.2 (3.8)	27.3 (9.1)
<u>Pareurystomina acuminata</u>				100 (2.5)					
<u>Siphonolaimus conicus</u>							100 (4.0)		

TABLE 33

Percent distribution of nematode species at Sandy Hook, April 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	39.0 (2.5)	28.0 (1.4)	32.2 (3.1)			0.7 (3.4)				
<u>Neochromadora tecta</u>	14.6 (10.8)	44.9 (32.1)	37.3 (40.2)	2.0 (6.4)			0.4 (27.6)			0.3 (33.2)
<u>Chromadorita sp.</u>	60.0 (0.8)		40.0 (0.8)							
<u>Chromadorella vanmeterae</u>		63.6 (0.7)	36.4 (0.8)							
<u>Desmodora polychaeta</u>					66.6 (2.6)	33.3 (3.4)				
<u>Desmodora scaldensis</u>				50.5 (12.2)	30.3 (36.8)	4.0 (13.8)	7.1 (27.8)	1.0 (8.3)	3.0 (30.0)	4.0 (26.7)
<u>Bradyaimus sp.</u>			74.6 (3.1)	20.6 (3.1)	4.8 (3.9)					
<u>Metachromadora obesa</u>	57.3 (15.0)	42.3 (8.6)							0.3 (20.0)	
<u>Polysigma uniforme</u>		61.8 (4.3)	17.2 (2.3)	16.2 (8.1)	0.9 (2.6)	3.4 (24.1)				0.5 (10.0)
<u>Eubostrichus parasitiferus</u>			85.7 (1.6)		3.5 (1.3)	3.5 (3.4)	3.5 (5.6)	3.5 (8.3)		
<u>Pseudonchus kosswigi</u>				100 (1.0)						
<u>Odontophora setosa</u>	4.6 (0.8)	37.5 (5.0)	45.2 (11.6)	10.7 (10.2)	1.5 (7.9)	0.3 (3.4)				0.3 (6.7)
<u>Axonolaimus interrogativus</u>	63.2 (1.7)		21.1 (0.8)	14.0 (2.0)				1.8 (5.6)		
<u>Monoposthia costata</u>	23.2 (2.5)	76.7 (6.4)								
<u>Nudora lineata</u>	39.9 (20.0)	47.9 (18.6)	10.5 (7.8)	1.1 (3.1)			0.3 (11.1)	0.2 (16.7)		0.1 (6.7)
<u>Tripyloides gracilis</u>	46.6 (25.0)	41.1 (17.1)	10.7 (8.5)	1.7 (5.1)						
<u>Theristus flevensis</u>				61.5		38.5				

<u>Nudora lineata</u>	(20.0)	(18.6)	(7.8)	(3.1)		(11.1)	(16.7)		(6.7)
<u>Tripyloides gracilis</u>	46.6	41.1	10.7	1.7					
	(25.0)	(17.1)	(8.5)	(5.1)					
<u>Theristus flevensis</u>				61.5		38.5			
				(2.0)		(17.2)			
<u>Theristus acer</u>	8.4	9.5	38.5	35.0	5.3	0.5	0.9	0.7	0.5
	(1.7)	(1.4)	(10.9)	(36.7)	(28.9)	(6.9)	(16.7)	(25.0)	(20.0)
<u>Amphimonhystera anechma</u>									
<u>Anticoma littoris</u>			58.5	41.5					
			(1.6)	(4.1)					
<u>Enoplolaimus vulgaris</u>	43.6	39.9	16.4						
	(4.2)	(2.9)	(2.3)						
<u>Enoplolaimus sp.</u>								100	
								(8.3)	
<u>Longicyatholaimus sp.</u>						100			
						(3.4)			
<u>Cyatholaimus gracilis</u>	58.6	32.8	8.4		0.2				
	(14.2)	(7.9)	(3.0)		(1.3)				
<u>Linhomoeus hirsutus</u>			70.6	11.8	8.8	5.9	2.9		
			(1.6)	(1.0)	(3.9)	(6.9)	(5.6)		
<u>Metalinhomoeus typicus</u>								100	
								(8.3)	
<u>Oncholaimus paralangrunensis</u>	100								
	(0.8)								
<u>Comesoma stenocephalum</u>				57.1	14.3	28.6			
				(1.0)	(1.3)	(6.9)			
<u>Crenopharynx marioni</u>				80.0	20.0				
				(1.0)	(1.3)				
<u>Leptolaimus sp.</u>								50.0	50.0
								(8.3)	(6.7)
<u>Halichoanolaimus raritanensis</u>				80.0	20.0				
				(1.0)	(1.3)				

TABLE 34 Percent distribution of nematode species at Sandy Hook, May 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	44.1 (38.4)	53.1 (60.0)	2.3 (23.7)	0.1 (4.2)	0.3 (9.7)		0.1 (5.3)			
<u>Neochromadora tecta</u>				16.7 (4.2)	33.3 (6.5)	16.7 (14.3)	33.3 (10.5)			
<u>Desmodora polychaeta</u>			16.7 (1.3)	33.3 (8.3)	33.3 (6.5)			16.7 (14.3)		
<u>Desmodora scaldensis</u>	13.9 (1.2)	64.8 (7.5)	14.8 (15.7)	2.8 (12.5)	2.8 (9.7)		0.9 (5.3)			
<u>Bradylaimus sp.</u>				100 (4.2)						
<u>Metachromadora obesa</u>	91.3 (17.4)	5.2 (1.3)	1.3 (2.6)	1.3 (4.1)	0.4 (3.2)	0.4 (14.3)				
<u>Polysigma uniforme</u>	19.5 (1.2)	61.0 (5.0)	11.7 (9.2)	3.9 (12.5)	3.9 (9.7)					
<u>Eubostriechus parasitiferus</u>	75.0 (1.2)		15.0 (2.6)	10.0 (8.3)						
<u>Spirinia parasitifera</u>			100 (1.3)							
<u>Pseudonchus kosswigi</u>									50.0 (14.3)	50.0 (11.1)
<u>Microilaimus honestus</u>	93.8 (1.2)									6.3 (11.1)
<u>Odontophora setosa</u>	50.6 (10.5)	32.7 (8.8)	10.4 (25.0)	2.4 (25.0)	3.2 (29.0)	0.4 (14.3)	0.4 (5.3)			
<u>Axonolaimus interrogativus</u>	100 (2.4)									
<u>Nudora lineata</u>	74.8 (9.3)	7.9 (1.3)	1.9 (2.6)	1.9 (4.1)	0.7 (3.2)		3.3 (26.3)	1.9 (42.9)	3.9 (66.6)	3.3 (83.0)
<u>Bathylaimus sp.</u>			100 (1.3)							
<u>Tripyloides gracilis</u>			5.6 (1.3)		27.8 (16.1)	5.6 (14.3)	44.4 (42.0)	5.6 (14.3)	5.6 (11.1)	5.6 (17.0)

<u>Bradyaimus sp.</u>				100 (4.2)					
<u>Metachromadora obesa</u>	91.3 (17.4)	5.2 (1.3)	1.3 (2.6)	1.3 (4.1)	0.4 (3.2)	0.4 (14.3)			
<u>Polysigma uniforme</u>	19.5 (1.2)	61.0 (5.0)	11.7 (9.2)	3.9 (12.5)	3.9 (9.7)				
<u>Eubostrichus parasitiferus</u>	75.0 (1.2)		15.0 (2.6)	10.0 (8.3)					
<u>Spirinia parasitifera</u>			100 (1.3)						
<u>Pseudonchus kosswigi</u>							50.0 (14.3)	50.0 (11.1)	
<u>Microaimus honestus</u>	93.8 (1.2)							6.3 (11.1)	
<u>Odontophora setosa</u>	50.6 (10.5)	32.7 (8.8)	10.4 (25.0)	2.4 (25.0)	3.2 (29.0)	0.4 (14.3)	0.4 (5.3)		
<u>Axonolaimus interrogativus</u>	100 (2.4)								
<u>Nudora lineata</u>	74.8 (9.3)	7.9 (1.3)	1.9 (2.6)	1.9 (4.1)	0.7 (3.2)		3.3 (26.3)	1.9 (42.9)	3.9 (66.6)
<u>Bathylaimus sp.</u>			100 (1.3)						
<u>Tripyloides gracilis</u>			5.6 (1.3)		27.8 (16.1)	5.6 (14.3)	44.4 (42.0)	5.6 (14.3)	5.6 (11.1)
<u>Theristus acer</u>			33.3 (1.3)			33.3 (14.3)		33.3 (14.3)	
<u>Amphimonhystera anechma</u>					50.0 (3.2)	50.0 (14.3)			
<u>Anticoma littoris</u>	57.6 (4.7)	33.3 (3.5)	7.1 (6.6)		1.0 (3.2)	1.0 (14.3)			
<u>Enoplolaimus vulgaris</u>	37.2 (3.5)	61.9 (7.5)	0.9 (1.3)						
<u>Chaetonema sp.</u>				100 (14.1)					
<u>Enoplodes sp.</u>							100 (5.3)		
<u>Cyatholaimus gracilis</u>	77.8 (3.5)	22.2 (1.3)							
<u>Linhomoeus hirsutus</u>			100 (1.3)						
<u>Metalinhomoeus typicus</u>		92.3 (1.3)			7.7 (3.2)				
<u>Oncholaimus paralanguensis</u>	75.0	21.4	1.8	1.8					

<u>Tripyloides gracilis</u>		(1.3) 5.6 (1.3)		27.8 (16.1)	5.6 (14.3)	44.4 (42.0)	5.6 (14.3)	5.6 (11.1)	5.6 (17.0)
<u>Theristus acer</u>		33.3 (1.3)			33.3 (14.3)		33.3 (14.3)		
<u>Amphimonhystera anechme</u>				50.0 (3.2)	50.0 (14.3)				
<u>Anticoma littoris</u>	57.6 (4.7)	33.3 (3.5)	7.1 (6.6)	1.0 (3.2)	1.0 (14.3)				
<u>Enoplolaimus vulgaris</u>	37.2 (3.5)	61.9 (7.5)	0.9 (1.3)						
<u>Chaetonema sp.</u>				100 (14.1)					
<u>Enoploides sp.</u>						100 (5.3)			
<u>Cyatholaimus gracilis</u>	77.8 (3.5)	22.2 (1.3)							
<u>Linhomoeus hirsutus</u>			100 (1.3)						
<u>Metalinhomoeus typicus</u>		92.3 (1.3)		7.7 (3.2)					
<u>Oncholaimus paralanquensis</u>	75.0 (3.5)	21.4 (1.3)	1.8 (1.3)	1.8 (4.1)					
<u>Comesoma stenocephalum</u>		100 (1.3)							
<u>Crenopharynx marioni</u>			50.0 (1.3)	50.0 (4.2)					
<u>Choniolaimus sp.</u>	100 (2.3)								

TABLE 35 Percent distribution of nematode species at Sandy Hook, June 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	50.6 (16.9)	44.0 (33.0)	3.7 (7.4)	1.5 (3.7)		0.2 (3.0)				
<u>Neochromadora tecta</u>			100 (3.7)							
<u>Chromadorita sp.</u>		100 (2.0)								
<u>Chromadorella filiformis</u>									100 (5.3)	
<u>Chromadorella vanmeterae</u>	57.9 (1.5)	42.1 (3.0)								
<u>Desmodora polychaeta</u>	16.9 (1.5)		50.0 (33.3)	16.2 (14.8)	6.2 (7.0)	3.8 (13.0)	1.5 (9.5)	5.4 (31.8)		
<u>Desmodora scaldensis</u>	49.6 (6.2)	31.2 (8.0)	5.7 (3.7)		5.7 (7.0)	1.4 (5.0)	2.1 (14.3)	3.5 (22.7)		0.7 (11.1)
<u>Metachromadora obesa</u>	87.9 (46.2)	6.9 (8.0)	3.5 (11.1)		0.6 (3.0)	0.3 (5.0)	0.2 (4.8)	0.3 (9.0)	0.2 (5.3)	0.2 (11.1)
<u>Polysigma uniforme</u>	43.6 (3.1)	20.5 (3.0)	10.3 (3.7)	12.8 (7.4)		2.6 (5.0)	6.4 (23.8)	1.3 (4.5)	2.6 (10.5)	
<u>Eubostrichus parasitiferus</u>	57.9 (1.5)		21.1 (3.7)		10.5 (3.0)	2.6 (3.0)		2.6 (4.5)	5.3 (10.5)	
<u>Odontophora setosa</u>	25.8 (6.2)	40.2 (20.0)	8.1 (11.1)	7.7 (14.8)	9.9 (23.0)	4.1 (29.0)	1.8 (23.8)	1.1 (13.6)	1.1 (15.8)	
<u>Axonolaimus sp.</u>	100 (1.5)									
<u>Axonolaimus interrogativus</u>	90.6 (4.6)			9.4 (3.7)						
<u>Monoposthia costata</u>						100 (5.0)				
<u>Nudora lineata</u>					38.1 (7.0)	14.3 (8.0)			28.6 (31.6)	19.0 (44.1)
<u>Tripylloides gracilis</u>						50.0 (3.0)		50.0 (4.5)		
<u>Theristus acer</u>			14.3 (11.1)	42.9 (48.1)	35.7 (47.0)	4.5 (18.0)	1.3 (9.5)	0.6 (4.5)		0.6 (11.1)

			(11.1)	(48.1)	(47.0)	(18.0)	(9.5)	(4.5)	(11.1)
<u>Cylindrotheristus sp.</u>							50.0 (4.8)		50.0 (5.3)
<u>Mesotheristus setosus</u>						33.3 (3.0)	66.6 (9.5)		
<u>Amphimonhystera anechma</u>	57.9 (1.5)	28.9 (2.0)						2.6 (4.5)	7.9 (15.8)
<u>Anticoma littoris</u>	40.2 (6.2)	47.1 (15.0)	4.6 (3.7)	5.7 (7.4)	2.3 (3.0)				2.6 (11.1)
<u>Enoplolaimus vulgaris</u>		100 (2.0)							
<u>Linhomoeus sp.</u>	73.3 (1.5)		26.7 (3.7)						
<u>Paralinhomoeus sp.</u>		100 (2.0)							
<u>Sabatieria hilarula</u>			100 (3.7)						
<u>Crenopharynx marioni</u>		100 (2.0)							
<u>Camacolaimus sp.</u>									100 (11.1)
<u>Leptolaimus sp.</u>	100 (1.5)								

TABLE 36 Percent distribution of nematode species at Sandy Hook, July 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	39.4 (10.0)	35.5 (17.9)	14.4 (8.8)	8.6 (7.7)			0.9 (1.2)	0.9 (1.4)		
<u>Neochromadora tecta</u>		71.4 (2.6)						14.2 (1.5)	14.2 (1.4)	
<u>Chromadorella vanmeterae</u>	51.2 (5.0)	24.3 (5.1)	24.3 (5.9)							
<u>Prochromadora sp.</u>	100 (1.7)									
<u>Desmodora polychaeta</u>			23.8 (5.9)	30.9 (11.5)	16.6 (5.7)	19.0 (7.7)	2.3 (1.2)		2.3 (1.4)	4.7 (3.7)
<u>Desmodora scaldensis</u>	25.0 (8.3)	11.7 (7.7)	7.3 (5.9)	9.5 (11.5)	7.3 (8.6)	11.0 (14.1)	11.7 (16.0)	6.6 (11.5)	3.6 (5.6)	5.8 (18.5)
<u>Bradylaimus sp.</u>		30.3 (5.1)	30.3 (5.9)	12.1 (3.8)	9.0 (2.9)	3.0 (1.3)	12.1 (3.7)		3.0 (1.4)	
<u>Metachromadora obesa</u>	85.8 (51.7)	6.4 (7.7)	4.0 (5.9)			.4 (1.3)	1.6 (3.7)	.8 (2.9)	.8 (2.8)	
<u>Polysigma uniforme</u>	4.8 (1.7)	44.0 (30.8)	17.5 (14.7)	11.9 (15.4)	9.1 (11.4)	10.5 (14.1)	.6 (1.2)	.6 (1.4)	.6 (1.4)	
<u>Eubostrichus parasitiferus</u>	50.0 (1.7)				21.4 (2.9)	7.1 (1.3)	7.0 (1.2)	14.2 (2.9)		
<u>Odontophora setosa</u>		5.4 (10.2)	7.8 (17.6)	3.3 (11.5)	16.6 (54.3)	14.5 (53.8)	17.7 (66.7)	13.8 (66.6)	14.3 (62.5)	6.2 (57.4)
<u>Mosoposthia costata</u>	100 (1.7)									
<u>Nudora lineata</u>						50.0 (2.6)		16.6 (1.4)		33.3 (3.7)
<u>Tripyloides gracilis</u>								28.5 (4.3)	71.4 (11.1)	
<u>Theristus acer</u>						9.0 (1.3)	27.2 (2.5)	9.0 (1.4)		54.5 (14.8)
<u>Cylindrotheristus sp.</u>										100 (1.9)
<u>Amphimonhystera anechma</u>				75.0 (7.7)					25.0 (2.8)	

<u>Bradylaimus sp.</u>	(8.3)	(7.7)	(5.9)	(11.5)	(8.6)	(14.1)	(16.0)	(11.5)	(5.6)	(18.5)
	30.3	30.3	12.1	9.0	3.0	12.1			3.0	
	(5.1)	(5.9)	(3.8)	(2.9)	(1.3)	(3.7)			(1.4)	
<u>Metachromadora obesa</u>	85.8	6.4	4.0			.4	1.6	.8	.8	
	(51.7)	(7.7)	(5.9)			(1.3)	(3.7)	(2.9)	(2.8)	
<u>Polysigma uniforme</u>	4.8	44.0	17.5	11.9	9.1	10.5	.6	.6	.6	
	(1.7)	(30.8)	(14.7)	(15.4)	(11.4)	(14.1)	(1.2)	(1.4)	(1.4)	
<u>Eubostrichus parasitiferus</u>	50.0				21.4	7.1	7.0	14.2		
	(1.7)				(2.9)	(1.3)	(1.2)	(2.9)		
<u>Odontophora setosa</u>		5.4	7.8	3.3	16.6	14.5	17.7	13.8	14.3	6.2
		(10.2)	(17.6)	(11.5)	(54.3)	(53.8)	(66.7)	(66.6)	(62.5)	(57.4)
<u>Mosoposthia costata</u>	100									
	(1.7)									
<u>Nudora lineata</u>						50.0		16.6		33.3
						(2.6)		(1.4)		(3.7)
<u>Tripyloides gracilis</u>								28.5	71.4	
								(4.3)	(11.1)	
<u>Theristus acer</u>						9.0	27.2	9.0		54.5
						(1.3)	(2.5)	(1.4)		(14.8)
<u>Cylindrotheristus sp.</u>										100
										(1.9)
<u>Amphimonhystera anechma</u>				75.0					25.0	
				(7.7)					(2.8)	
<u>Anticoma littoris</u>		12.5	31.3	37.5	12.5	1.2	3.7		1.2	
		(5.1)	(14.7)	(26.9)	(8.6)	(1.3)	(2.5)		(1.4)	
<u>Cyatholaimus gracilis</u>	84.3	11.2		4.4						
	(18.3)	(5.1)		(3.8)						
<u>Linhomoeus hirsutus</u>									100	
									(5.6)	
<u>Metalinhomoeus</u>								100		
								(1.5)		
<u>Onchilaimus paralangrunensis</u>					75.0	25.0				
					(2.9)	(1.3)				
<u>Viscosia carnleyensis</u>		50.0	50.0							
		(2.6)	(2.9)							
<u>Comesoma stenocephalum</u>			83.3						16.6	
			(2.9)						(1.4)	
<u>Sabatieria chitwood</u>			76.9		23.0					
			(5.9)		(2.9)					
<u>Pareurystomina acuminata</u>			100							
			(2.9)							
<u>Siphonolaimus conicus</u>									66.6	33.3
									(2.9)	(1.4)

<u>Cylindrotheristus sp.</u>					(1.3)	(2.5)	(1.4)	(14.6)
<u>Amphimonhystera anechma</u>				75.0 (7.7)				100 (1.9)
							25.0 (2.8)	
<u>Anticoma littoris</u>		12.5 (5.1)	31.3 (14.7)	37.5 (26.9)	12.5 (8.6)	1.2 (1.3)	3.7 (2.5)	1.2 (1.4)
<u>Cyatholaimus gracilis</u>	84.3 (18.3)	11.2 (5.1)		4.4 (3.8)				
<u>Linhomoeus hirsutus</u>								100 (5.6)
<u>Metalinhomoeus</u>							100 (1.5)	
<u>Onchilaimus paralangrunensis</u>					75.0 (2.9)	25.0 (1.3)		
<u>Viscosia carnleyensis</u>		50.0 (2.6)	50.0 (2.9)					
<u>Comesoma stenocephalum</u>			83.3 (2.9)					16.6 (1.4)
<u>Sabatieria chitwood</u>			76.9 (5.9)		23.0 (2.9)			
<u>Pareurystomina acuminata</u>			100 (2.9)					
<u>Siphonolaimus conicus</u>							66.6 (2.9)	33.3 (1.4)

TABLE 37

Percent distribution of nematode species at Sandy Hook, August 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	31.7 (7.1)	60.5 (14.0)	2.9 (3.2)		1.5 (4.1)	0.5 (1.9)	1.5 (3.6)	1.5 (3.6)		
<u>Neochromadora tecta</u>		75.0 (1.0)			8.3 (1.4)			8.3 (1.8)		8.3 (3.6)
<u>Chromadorella vanmeterae</u>	21.9 (4.1)	73.4 (14.0)	3.6 (3.2)				0.6 (1.9)			0.6 (1.8)
<u>Euchromadora sp.</u>	100 (1.1)									
<u>Desmodora polychaeta</u>	12.7 (1.1)	50.7 (4.0)	14.0 (4.8)	4.2 (2.8)	4.2 (4.1)		1.4 (1.9)	4.2 (5.4)	7.0 (6.7)	1.4 (3.6)
<u>Desmodora scaldensis</u>	14.6 (7.1)	63.9 (32.0)	10.1 (22.6)	5.2 (22.2)	2.0 (12.2)	1.4 (11.1)	0.9 (7.5)	1.1 (7.1)	0.4 (3.3)	0.2 (3.6)
<u>Metachromadora obesa</u>	86.3 (75.1)	9.9 (9.1)	1.5 (6.5)	0.7 (5.6)	0.4 (4.1)	0.2 (3.7)	0.4 (5.6)	0.4 (3.6)	0.2 (3.3)	
<u>Polysigma uniforme</u>	21.7 (3.1)	41.1 (6.0)	4.7 (3.2)	8.5 (11.1)	11.6 (20.3)	3.9 (9.3)	1.6 (3.8)	5.4 (12.5)		1.6 (3.6)
<u>Fuobstrichus parasitiferus</u>		69.2 (1.0)	30.8 (1.6)							
<u>Chromaspirina pellucida</u>		100 (1.0)								
<u>Microlaimus honestus</u>						100 (3.7)				
<u>Odontophora setosa</u>		45.6 (11.0)	21.9 (24.2)	5.1 (11.1)	6.0 (17.6)	4.7 (18.5)	3.7 (16.9)	6.0 (19.6)	4.2 (13.3)	2.8 (18.2)
<u>Monoposthia costata</u>										100 (1.8)
<u>Nudora lineata</u>			8.0 (1.6)					2.0 (1.8)		
<u>Tripyloides gracilis</u>		100 (1.0)								
<u>Theristus acer</u>	11.4 (1.1)	11.4 (1.0)	7.6 (3.2)			5.0 (7.4)	5.0 (7.5)	11.4 (14.3)	40.5 (46.7)	7.6 (16.3)
<u>Cylindrotheristus sp.</u>								100 (1.8)		
<u>Mesotheristus setosus</u>								100 (1.8)		

<u>Desmodora polychaeta</u>	12.7 (1.1)	50.7 (4.0)	14.0 (4.8)	4.2 (2.8)	4.2 (4.1)		1.4 (1.9)	4.2 (5.4)	7.0 (6.7)	1.4 (3.6)
<u>Desmodora scaldensis</u>	14.6 (7.1)	63.9 (32.0)	10.1 (22.6)	5.2 (22.2)	2.0 (12.2)	1.4 (11.1)	0.9 (7.5)	1.1 (7.1)	0.4 (3.3)	0.2 (3.6)
<u>Metachromadora obesa</u>	86.3 (75.1)	9.9 (9.1)	1.5 (6.5)	0.7 (5.6)	0.4 (4.1)	0.2 (3.7)	0.4 (5.6)	0.4 (3.6)	0.2 (3.3)	
<u>Polysigma uniforme</u>	21.7 (3.1)	41.1 (6.0)	4.7 (3.2)	8.5 (11.1)	11.6 (20.3)	3.9 (9.3)	1.6 (3.8)	5.4 (12.5)		1.6 (3.6)
<u>Fuostriechus parasitiferus</u>		69.2 (1.0)	30.8 (1.6)							
<u>Chromaspirina pellucida</u>		100 (1.0)								
<u>Microlaimus honestus</u>						100 (3.7)				
<u>Odontophora setosa</u>		45.6 (11.0)	21.9 (24.2)	5.1 (11.1)	6.0 (17.6)	4.7 (18.5)	3.7 (16.9)	6.0 (19.6)	4.2 (13.3)	2.8 (18.2)
<u>Monoposthia costata</u>										100 (1.8)
<u>Nudora lineata</u>			8.0 (1.6)					2.0 (1.8)		
<u>Tripyloides gracilis</u>		100 (1.0)								
<u>Theristus acer</u>	11.4 (1.1)	11.4 (1.0)	7.6 (3.2)			5.0 (7.4)	5.0 (7.5)	11.4 (14.3)	40.5 (46.7)	7.6 (16.3)
<u>Cylindrotheristus sp.</u>								100 (1.8)		
<u>Mesotheristus setosus</u>								100 (1.8)		
<u>Paramonhystera sp.</u>				100 (2.8)						
<u>Leptogastrella paranormandica</u>				50.0 (2.8)		16.7 (1.9)				33.3 (5.5)
<u>Amphimonhystera anechma</u>			66.6 (1.6)						33.3 (3.3)	
<u>Anticoma littoris</u>			12.6 (9.7)	17.2 (25.0)	11.3 (22.9)	12.6 (35.2)	16.6 (45.3)	9.9 (23.2)	10.5 (23.3)	9.3 (4.0)
<u>Longicyatholaimus sp.</u>			79.4 (3.0)	11.8 (1.6)	8.8 (2.8)					
<u>Linhomoeus hirsutus</u>			66.7 (8.1)	12.5 (2.8)	12.5 (4.1)	4.2 (1.9)		4.2 (1.8)		
<u>Linhomoeus sp.</u>				100 (2.8)						
<u>Paralinhomoeus tenuicaudatus</u>						100 (2.7)				
<u>Oncholaimus paralanqrunicus</u>							100			

Mesotheristus setosus(1.8)
100
(1.8)Paramonhystera sp.100
(2.8)Leptogastrella paranormandica50.0
(2.8)16.7
(1.9)33.3
(5.5)Amphimonhystera anechma66.6
(1.6)33.3
(3.3)Anticoma littoris12.6
(9.7)17.2
(25.0)11.3
(22.9)12.6
(35.2)16.6
(45.3)9.9
(23.2)10.5
(23.3)9.3
(4.0)Longicyatholaimus sp.79.4
(3.0)11.8
(1.6)8.8
(2.8)Linhomoeus hirsutus66.7
(8.1)12.5
(2.8)12.5
(4.1)4.2
(1.9)4.2
(1.8)Linhomoeus sp.100
(2.8)Paralinhomoeus tenuicaudatus100
(2.7)Oncholaimus paralangrunensis100
(3.8)Oncholaimoides rugosus100
(4.1)Comesoma stenocephalum42.9
(2.8)28.6
(2.7)28.6
(3.7)Crenopharynx marioni69.2
(1.0)30.8
(1.6)100
(1.9)Halichoanolaimus raritanensis85.7
(3.2)14.3
(1.9)Pareurystomina acuminata100
(5.6)Siphonolaimus conicus100
(1.8)Dasynemoides setosus100
(1.8)

TABLE 38 Percent distribution of nematode species at Sandy Hook, September 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10 cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	43.4 (1.5)	56.6 (1.3)								
<u>Neochromadora tecta</u>					3.3 (7.1)			16.6 (3.2)	33.3 (8.3)	16.6 (6.2)
<u>Chromadorella vanmeterae</u>	75.0 (6.2)	25.0 (1.3)								
<u>Spilophorella paradoxa</u>	100 (3.1)									
<u>Desmodora polychaeta</u>	23.2 (1.5)	30.2 (1.3)	30.2 (5.2)	2.3 (2.9)		9.3 (11.1)		2.3 (3.2)		2.3 (6.2)
<u>Desmodora scaldensis</u>	12.6 (16.9)	71.3 (62.7)	10.8 (36.4)	1.2 (29.4)	2.2 (57.1)	0.5 (11.1)	0.9 (27.6)	0.5 (12.9)		0.1 (6.2)
<u>Bradylaimus sp.</u>				20.0 (5.9)	10.0 (3.6)	40.0 (11.1)		10.0 (3.2)	20.0 (8.3)	
<u>Metachromadora obesa</u>	97.3 (44.6)		1.0 (1.3)		0.3 (3.6)	1.3 (11.1)				
<u>Polysigma uniforme</u>	57.4 (18.8)	17.4 (2.7)	17.4 (10.4)	0.6 (2.9)	0.6 (3.6)		1.2 (6.8)	2.5 (12.9)	1.9 (12.5)	0.6 (6.2)
<u>Eubostrichus parasitiferus</u>		65.0 (4.0)	16.6 (3.9)	15.0 (26.4)			3.3 (6.8)			
<u>Pseudonchus kosswigi</u>							33.3 (6.8)	50.0 (9.7)	16.6 (4.2)	
<u>Microlaimus honestus</u>							50.0 (3.4)	50.0 (3.2)		
<u>Microlaimus sp.</u>			33.3 (0.4)				33.3 (3.4)	33.3 (3.2)		
<u>Odontophora setosa</u>	22.6 (7.7)	53.4 (12.0)	14.9 (12.9)	1.8 (11.8)		3.6 (22.2)	1.8 (13.8)	1.4 (9.7)	0.5 (4.2)	
<u>Nudora lineata</u>					7.6 (3.6)	30.7 (11.1)	7.6 (3.4)		30.7 (16.6)	23.0 (18.8)
<u>Tripyloides gracilis</u>							33.3 (3.4)		33.3 (4.2)	33.3 (6.2)
<u>Theristus acer</u>				11.1 (5.9)	11.1 (7.1)		16.6 (10.3)	27.7 (16.1)	16.6 (12.5)	16.6 (18.8)

<u>Tripyloides gracilis</u>					(3.6)	(11.1)	(3.4)	(16.6)	(18.8)
							33.3	33.3	33.3
							(3.4)	(4.2)	(6.2)
<u>Theristus acer</u>				11.1	11.1		16.6	27.7	16.6
				(5.9)	(7.1)		(10.3)	(16.1)	(12.5)
								(18.8)	
<u>Amphimonhystera anechma</u>	76.4				11.7			5.8	5.8
	(1.3)				(7.1)			(3.2)	(6.2)
<u>Anticoma littoris</u>	51.1	38.2			0.7		2.3	3.0	3.1
	(6.7)	(19.5)			(3.6)		(10.3)	(12.9)	(16.6)
									(12.5)
<u>Enoplolaimus vulgaris</u>				16.6	16.6		16.6	16.6	16.6
				(2.9)	(3.6)		(3.4)	(3.2)	(4.2)
									(6.2)
<u>Enoplolaimus sp.</u>	100								
	(1.5)								
<u>Enoplus communis</u>	76.9	23.1							
	(1.5)	(1.3)							
<u>Longicyatholaimus sp.</u>									100
									(4.2)
<u>Cyatholaimus gracilis</u>				100					
				(5.9)					
<u>Linhomoeus hirsutus</u>	14.3	55.7	18.6	2.8		5.7		2.8	
	(1.5)	(4.0)	(5.2)	(5.9)		(11.1)		(6.4)	
<u>Paralinhomoeus tenuicaudatus</u>						100			
						(11.1)			
<u>Oncholaimus paralangrunensis</u>	92.9								7.1
	(1.3)								(6.2)
<u>Crenopharynx marioni</u>	100								
	(1.3)								
<u>Leptolaimus sp.</u>									100
									(4.2)
<u>Pareurystonina acuminata</u>	100								
	(3.9)								
<u>Siphonolaimus conicus</u>							100		
							(3.4)		

TABLE 39 Percent distribution of nematode species at Sandy Hook, October 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	41.5 (12.1)	31.7 (6.6)	14.6 (1.5)	7.3 (2.0)		4.9 (3.2)				
<u>Neochromadora tecta</u>		15.3 (3.3)	23.0 (1.5)		30.7 (7.1)	7.6 (1.6)	15.3 (8.2)	7.6 (7.1)		
<u>Chromadorella vanmeterae</u>		25.0 (3.3)	32.1 (3.1)	25.0 (5.0)	3.5 (1.1)	7.1 (1.6)	7.1 (3.3)			
<u>Euchromadora sp.</u>	25.0 (2.1)		75.0 (3.0)							
<u>Desmodora polychaeta</u>			20.4 (3.1)	15.9 (5.0)	15.9 (5.9)	11.3 (6.3)	18.1 (14.8)	4.5 (7.1)		13.6 (26.1)
<u>Desmodora scaldensis</u>		54.0 (15.0)	24.5 (4.6)		9.8 (4.8)	3.2 (3.2)	4.9 (4.9)	1.6 (3.6)		1.6 (4.3)
<u>Bradylaimus sp.</u>					25.0 (1.1)	50.0 (1.6)		25.0 (3.6)		
<u>Metachromadora obesa</u>	12.4 (20.1)	17.3 (18.3)	29.8 (23.1)	12.9 (20.0)	10.7 (22.6)	10.2 (30.2)	1.8 (8.2)	3.1 (25.0)	0.4 (6.0)	0.9 (8.7)
<u>Polysigma uniforme</u>	6.3 (7.1)	10.8 (8.3)	21.0 (10.8)	25.4 (27.0)	10.1 (14.3)	5.0 (11.1)	9.5 (27.9)	2.5 (14.3)	3.8 (38.0)	5.1 (34.7)
<u>Eubostrichus parasitiferus</u>		22.2 (1.7)	33.3 (1.5)		5.6 (1.1)	33.3 (7.9)		5.6 (3.6)		
<u>Microlaimus honestus</u>							50.0 (1.6)	50.0 (3.6)		
<u>Odontophora setosa</u>	14.1 (12.1)	21.6 (11.6)	27.5 (10.8)	20.0 (16.0)	7.5 (8.3)	5.0 (7.9)	3.3 (8.2)	0.8 (3.6)		
<u>Axonolaimus interrogativus</u>	63.6 (5.0)	36.3 (1.7)								
<u>Monoposthia costata</u>		100 (1.7)								
<u>Nudora lineata</u>		8.1 (1.7)	12.2 (1.5)	20.4 (7.0)	28.5 (13.1)	10.2 (6.3)	6.1 (4.9)	4.0 (7.1)	8.1 (25.0)	2.0 (4.3)
<u>Tripyloides gracilis</u>					50.0 (1.1)			50.0 (3.6)		
<u>Theristus acer</u>		52.3 (5.0)		14.2 (2.0)	4.7 (1.1)	9.5 (3.2)	4.7 (1.6)		9.5 (2.2)	4.7 (1.2)

<u>Polysigma uniforme</u>	6.3 (7.1)	10.8 (8.3)	21.0 (10.8)	25.4 (27.0)	10.1 (14.3)	5.0 (11.1)	9.5 (27.9)	2.5 (14.3)	3.8 (38.0)	5.1 (34.7)
<u>Eubostrichus parasitiferus</u>		22.2 (1.7)	33.3 (1.5)		5.6 (1.1)	33.3 (7.9)		5.6 (3.6)		
<u>Microlaimus honestus</u>							50.0 (1.6)	50.0 (3.6)		
<u>Odontophora setosa</u>	14.1 (12.1)	21.6 (11.6)	27.5 (10.8)	20.0 (16.0)	7.5 (8.3)	5.0 (7.9)	3.3 (8.2)	0.8 (3.6)		
<u>Axonolaimus interrogativus</u>	63.6 (5.0)	36.3 (1.7)								
<u>Monoposthia costata</u>		100 (1.7)								
<u>Nudora lineata</u>		8.1 (1.7)	12.2 (1.5)	20.4 (7.0)	28.5 (13.1)	10.2 (6.3)	6.1 (4.9)	4.0 (7.1)	8.1 (25.0)	2.0 (4.3)
<u>Tripyloides gracilis</u>					50.0 (1.1)			50.0 (3.6)		
<u>Theristus acer</u>		52.3 (5.0)		14.2 (2.0)	4.7 (1.1)	9.5 (3.2)	4.7 (1.6)		9.5 (13.0)	4.7 (4.3)
<u>Theristus curvatus</u>								33.3 (3.6)	33.3 (6.0)	33.3 (4.3)
<u>Cylindrotheristus sp.</u>										100 (4.3)
<u>Paramonhystera sp.</u>			100 (1.5)							
<u>Leptogastrella paranormandica</u>						66.6 (1.6)	33.3 (1.6)			
<u>Amphimonhystera anechma</u>				33.3 (2.0)	11.1 (1.1)	22.2 (3.2)	22.2 (3.3)		11.1 (6.0)	
<u>Anticoma littoris</u>	10.4 (5.1)		49.2 (10.8)	14.9 (7.0)	8.9 (4.8)	5.9 (4.8)	5.9 (6.6)	2.9 (7.1)		1.4 (4.3)
<u>Enoplolaimus vulgaris</u>	59.2 (34.1)	27.1 (10.0)	7.4 (1.5)		1.2 (1.1)	2.4 (1.6)	2.4 (3.3)			
<u>Longicyatholaimus sp.</u>					50.0 (1.1)					50.0 (4.3)
<u>Cyatholaimus gracilis</u>		100 (1.7)								
<u>Linhomoeus hirsutus</u>		10.3 (1.7)	69.2 (9.2)	7.7 (2.0)	5.1 (2.4)	5.1 (3.2)		2.6 (3.6)		
<u>Linhomoeus sp.</u>			100 (1.5)							
<u>Metalinhomoeus typicus</u>			100 (1.5)							
<u>Paralinhomoeus tenuicaudatus</u>			100							

<u>Theristus curvatus</u>							33.3 (3.6)	33.3 (6.0)	33.3 (4.3) 100 (4.3)
<u>Cylindrotheristus sp.</u>									
<u>Paramonhystera sp.</u>		100 (1.5)							
<u>Leptogastrella paranormandica</u>					66.6 (1.6)	33.3 (1.6)			
<u>Amphimonhystera anechma</u>			33.3 (2.0)	11.1 (1.1)	22.2 (3.2)	22.2 (3.3)		11.1 (6.0)	
<u>Anticoma littoris</u>	10.4 (5.1)	49.2 (10.8)	14.9 (7.0)	8.9 (4.8)	5.9 (4.8)	5.9 (6.6)	2.9 (7.1)		1.4 (4.3)
<u>Enoplolaimus vulgaris</u>	59.2 (34.1)	27.1 (10.0)	7.4 (1.5)	1.2 (1.1)	2.4 (1.6)	2.4 (3.3)			
<u>Longicyatholaimus sp.</u>				50.0 (1.1)					50.0 (4.3)
<u>Cyatholaimus gracilis</u>		100 (1.7)							
<u>Linhomoeus hirsutus</u>		10.3 (1.7)	69.2 (9.2)	7.7 (2.0)	5.1 (2.4)	5.1 (3.2)	2.6 (3.6)		
<u>Linhomoeus sp.</u>			100 (1.5)						
<u>Metalinhomoeus typicus</u>			100 (1.5)						
<u>Paralinhomoeus tenuicaudatus</u>			100 (1.7)						
<u>Oncholaimus paralanqrunicus</u>		36.3 (1.7)	54.5 (1.5)			9.2 (1.1)			
<u>Oncholaimoides rugosus</u>		40.0 (1.7)				20.0 (2.4)	20.0 (1.6)	10.0 (1.6)	10.0 (3.6)
<u>Viscosia carnleyensis</u>	33.3 (2.1)		66.6 (1.5)						
<u>Comesoma stenocephalum</u>						100 (3.6)			
<u>Crenopharynx marioni</u>		56.2 (3.0)	43.7 (5.0)						
<u>Camacolaimus sp.</u>		100 (1.7)							
<u>Leptolaimus sp.</u>			100 (1.5)						
<u>Halichoanolaimus raritanensis</u>						100 (1.1)			

<u>Enopliolaimus vulgaris</u>	33.4 (34.1)	27.0 (10.0)	7.0 (1.5)		17.0 (1.1)	11.0 (1.6)	11.0 (3.3)		
<u>Longicyatholaimus sp.</u>					50.0 (1.1)				50.0 (4.3)
<u>Cyatholaimus gracilis</u>		100 (1.7)							
<u>Linhomoeus hirsutus</u>		10.3 (1.7)	69.2 (9.2)	7.7 (2.0)	5.1 (2.4)	5.1 (3.2)		2.6 (3.6)	
<u>Linhomoeus sp.</u>			100 (1.5)						
<u>Metalinhomoeus typicus</u>			100 (1.5)						
<u>Paralinhomoeus tenuicaudatus</u>			100 (1.7)						
<u>Oncholaimus paralanqrnensis</u>			36.3 (1.7)	54.5 (1.5)		9.2 (1.1)			
<u>Oncholaimoides rugosus</u>			40.0 (1.7)			20.0 (2.4)	20.0 (1.6)	10.0 (1.6)	10.0 (3.6)
<u>Viscosia carnleyensis</u>	33.3 (2.1)		66.6 (1.5)						
<u>Comesoma stenocephalum</u>						100 (3.6)			
<u>Crenopharynx marioni</u>			56.2 (3.0)	43.7 (5.0)					
<u>Camacolaimus sp.</u>		100 (1.7)							
<u>Leptolaimus sp.</u>			100 (1.5)						
<u>Halichoanolaimus raritanensis</u>						100 (1.1)			
<u>Latronema sp.</u>		100 (1.7)							
<u>Siphonolaimus conicus</u>			87.5 (2.4)					12.5 (6.0)	

TABLE 40 Percent distribution of nematode species at Sandy Hook, November 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	56.3 (1.3)		43.7 (2.3)							
<u>Neochromadora tecta</u>	100 (18.0)									
<u>Chromadorina germanica</u>	100 (1.3)									
<u>Chromadorita sp.</u>	42.9 (1.3)	57.1 (3.4)								
<u>Chromadorella filiformis</u>	100 (3.8)									
<u>Chromadorella vanmeterae</u>		81.3 (13.6)	11.9 (2.3)	6.8 (2.8)						
<u>Spilophorella paradoxa</u>	100 (1.3)									
<u>Desmodora polychaeta</u>		32.7 (10.2)	18.2 (6.8)	18.2 (13.9)	13.6 (8.2)	4.5 (6.1)	5.5 (8.1)	4.5 (10.0)	2.7 (6.1)	
<u>Desmodora scaldensis</u>		9.2 (1.7)	10.8 (2.3)	24.6 (11.1)	33.8 (12.2)	7.7 (6.1)	3.1 (2.7)	3.1 (4.0)	4.6 (6.1)	3.1 (8.3)
<u>Bradylaimus sp.</u>					46.6 (4.1)	6.6 (1.2)	26.6 (5.4)		20.0 (6.1)	
<u>Metachromadora obesa</u>	41.5 (23.0)	16.9 (18.6)	5.1 (6.8)	5.1 (13.9)	10.5 (22.4)	7.7 (34.1)	8.2 (40.5)	1.8 (14.0)	2.6 (22.4)	0.5 (8.3)
<u>Polysigma uniforme</u>		7.5 (3.4)	20.8 (11.4)	12.6 (13.9)	25.8 (22.4)	7.5 (13.4)	6.9 (13.5)	8.8 (30.0)	7.5 (28.6)	2.5 (16.7)
<u>Eubostrichus parasitiferus</u>			50.0 (2.3)					14.3 (4.0)	21.4 (6.1)	14.3 (8.3)
<u>Microlaimus honestus</u>							66.6 (2.7)	33.3 (2.0)		
<u>Odontophora setosa</u>	23.4 (5.1)	23.4 (10.1)	30.5 (15.9)	10.4 (11.1)	7.1 (6.1)	1.3 (2.4)	1.3 (2.7)	0.6 (2.0)	0.6 (2.0)	1.3 (8.3)
<u>Axonolaimus interrogativus</u>	100 (6.4)									
<u>Nudora lineata</u>	87.7 (19.2)	3.9 (1.7)	4.5 (2.3)	2.6 (2.8)		0.6 (1.2)			0.6 (2.0)	

<u>Axonolaimus interrogativus</u>	100 (6.4)									
<u>Nudora lineata</u>	87.7 (19.2)	3.9 (1.7)	4.5 (2.3)	2.6 (2.8)		0.6 (1.2)			0.6 (2.0)	
<u>Tripylloides gracilis</u>	49.3 (5.1)	49.3 (10.2)						1.4 (2.0)		
<u>Theristus flevensis</u>			22.6 (2.3)	51.6 (11.1)		22.6 (7.3)			3.2 (2.0)	
<u>Theristus acer</u>		15.9 (6.8)	26.5 (13.6)	7.9 (8.3)	17.2 (14.3)	9.3 (15.9)	7.3 (13.5)	8.6 (26.0)	3.9 (14.2)	3.3 (25.0)
<u>Amphimonhystera anechma</u>						33.3 (1.2)	66.6 (2.7)			
<u>Anticoma littoris</u>		25.5 (6.8)	42.3 (13.6)	12.8 (8.3)	7.4 (4.1)	7.4 (7.3)	2.1 (2.7)	2.1 (4.0)		
<u>Enoplolaimus sp.</u>	46.6 (3.8)	53.4 (8.5)								
<u>Cyatholaimus gracilis</u>	86.3 (9.1)	8.2 (1.6)			5.5 (2.2)					8.9 (0.1)
<u>Linhomoeus hirsutus</u>							33.3 (2.7)			66.6 (16.7)
<u>Linhomoeus sp.</u>						50.0 (1.2)			50.0 (2.0)	
<u>Oncholaimus paralangrunensis</u>	50.0 (1.3)	33.3 (1.7)						11.1 (2.7)	5.6 (2.0)	
<u>Viscosia paralinstowi</u>					100 (2.0)					
<u>Comesoma stenocephalum</u>		12.8 (1.7)	70.2 (11.4)	8.5 (2.8)	8.5 (2.0)					
<u>Sabatiera hilarula</u>						50.0 (1.2)			50.0 (2.0)	
<u>Crenopharynx marioni</u>				100 (6.8)						
<u>Halichoanolaimus raritanensis</u>						33.3 (1.2)				

TABLE 41 Percent distribution of nematode species at Sandy Hook, December 1975. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	78.7 (15.8)	20.7 (10.0)					0.6 (2.1)			
<u>Neochromadora tecta</u>	79.2 (5.2)	20.8 (3.3)								
<u>Chromadorina germanica</u>		100 (3.3)								
<u>Chromadorita sp.</u>	82.3 (13.2)	17.7 (6.7)								
<u>Chromadorella venmeterae</u>		15.9 (3.3)		27.5 (6.3)	44.9 (9.8)	10.1 (5.4)		1.4 (1.6)		
<u>Spilophorella paradoxa</u>	100 (1.3)									
<u>Prochromadora sp.</u>	24.4 (1.3)	75.6 (10.0)								
<u>Desmodora polychaeta</u>						18.8 (1.8)	6.3 (2.1)	25.0 (8.2)	31.3 (13.2)	18.8 (8.6)
<u>Desmodora scaldensis</u>						12.5 (1.8)	18.8 (6.4)	25.0 (8.2)	12.5 (5.3)	31.3 (14.3)
<u>Bradyaimus sp.</u>			40.9 (2.6)			31.8 (5.4)	9.0 (4.3)	9.0 (3.3)	9.0 (5.3)	
<u>Metachromadora obesa</u>		12.8 (3.3)		5.8 (1.6)	36.2 (9.8)	11.6 (7.1)	6.9 (12.8)	8.1 (11.5)	12.8 (28.9)	5.8 (14.3)
<u>Polysigma uniforme</u>		6.6 (3.3)	5.4 (2.6)	5.4 (3.2)	36.7 (19.5)	19.3 (23.2)	6.6 (23.4)	8.4 (27.9)	4.8 (21.1)	6.6 (31.4)
<u>Eubostrichus parasitiferus</u>				69.2 (2.6)			15.4 (4.3)	15.4 (4.9)		
<u>Microlaimus honestus</u>						42.9 (1.8)	14.3 (2.1)	42.9 (6.6)		
<u>Odontophora setosa</u>	14.6 (6.6)	9.2 (10.0)	30.8 (31.6)	21.6 (26.9)	18.6 (21.9)	3.2 (8.9)	1.6 (12.8)	0.3 (1.6)		
<u>Axonolaimus interrogativus</u>	47.8 (6.6)	20.4 (6.7)	25.7 (7.9)	4.4 (1.6)			0.9 (2.1)			0.9 (2.9)
<u>Nudora lineata</u>	70.9 (13.2)	7.3 (3.3)	5.9 (2.6)	5.9 (3.2)	9.9 (4.9)					

	10.7 (13.2)	1.3 (3.3)	5.9 (2.6)	5.9 (3.2)	9.9 (4.9)					
<u>Tripyloides gracilis</u>	89.4 (23.7)	10.6 (6.7)								
<u>Theristus flevensis</u>			31.6 (23.7)	27.6 (25.4)	30.9 (26.8)	8.1 (16.1)	1.1 (6.4)		0.7 (5.3)	
<u>Theristus acer</u>	11.6 (1.3)	48.4 (13.3)				15.8 (10.7)	7.4 (14.9)	4.2 (8.2)	3.2 (7.9)	9.5 (25.7)
<u>Amphimonhystera anechma</u>								100 (1.6)		
<u>Anticoma littoris</u>	11.8 (3.9)	20.9 (16.7)	27.9 (21.0)	25.7 (23.8)	8.5 (7.3)	2.6 (5.4)	0.7 (4.3)	1.1 (6.6)	0.4 (2.6)	
<u>Enoplolaimus vulgaris</u>	79.4 (6.6)		13.2 (2.6)	7.4 (1.6)						
<u>Cyatholaimus gracilis</u>	100 (1.3)									
<u>Linhomoeus hirsutus</u>						100 (3.6)				
<u>Metalinhomoeus typicus</u>								100 (1.6)		
<u>Comesoma stenocephalum</u>				45.2 (4.8)		38.7 (8.9)	3.2 (2.1)	9.7 (6.6)		3.2 (2.9)
<u>Sabatieria chitwood</u>									100 (7.9)	
<u>Crenopharynx marioni</u>		64.3 (2.6)	35.7 (1.6)							
<u>Halichoanolaimus raritanensis</u>								100 (1.6)		
<u>Pareurystomina acuminata</u>									100 (2.6)	

<u>Chromadorella vanmeterae</u>			100 (1.8)						
<u>Spilophorella paradoxa</u>			100 (1.8)						
<u>Euchromadora sp.</u>			22.9 (1.8)	20.8 (2.0)	45.8 (5.8)	10.4 (2.9)			
<u>Desmodora polychaeta</u>					29.4 (1.4)	29.4 (2.9)	11.8 (1.9)	11.8 (8.0)	17.6 (12.0)
<u>Desmodora scaldensis</u>			27.5 (1.8)		27.5 (2.9)	17.5 (4.3)	15.0 (6.9)	7.5 (3.6)	2.5 (4.0)
<u>Metachromadora obesa</u>	10.5 (1.6)		17.5 (4.0)		23.7 (7.2)	17.5 (13.0)	12.3 (17.2)	10.5 (21.4)	3.5 (16.0)
<u>Polysigma uniforme</u>	16.5 (6.3)	24.5 (10.9)	33.7 (18.0)	5.9 (4.3)	5.5 (10.1)	6.9 (24.1)	3.7 (17.9)	0.7 (8.0)	2.6 (28.0)
<u>Eubostrichus parasitiferus</u>						40.0 (1.4)	20.0 (1.8)	20.0 (4.0)	20.0 (4.0)
<u>Pseudonchus kosswigi</u>					100 (1.4)				
<u>Microlaimus honestus</u>									100 (4.0)
<u>Odontophora setosa</u>		26.9 (15.9)	44.4 (30.9)	19.2 (16.0)	7.7 (8.7)	1.6 (4.3)		0.2 (1.8)	
<u>Axonolaimus interrogativus</u>	41.3 (4.7)	44.2 (12.7)	5.3 (1.8)	4.9 (2.0)	2.4 (1.4)		1.5 (3.4)		
<u>Monoposthia costata</u>	78.7 (4.7)	21.3 (3.2)							
<u>Nudora lineata</u>	48.5 (12.5)	26.9 (17.5)	14.3 (10.9)	8.8 (8.0)		0.4 (1.4)		0.6 (5.4)	0.2 (4.0)
<u>Tripyloides gracilis</u>	97.3 (14.1)				1.9 (1.4)	0.8 (1.4)			
<u>Theristus flevensis</u>		9.8 (9.5)	19.4 (21.8)	17.8 (24.0)	32.9 (60.9)	10.7 (49.8)	4.3 (37.9)	3.0 (37.5)	1.4 (40.0)
<u>Mesotheristus setosus</u>									0.6 (16.0)
<u>Amphimonhystera anechma</u>									100 (4.0)
<u>Anticoma littoris</u>	30.1 (3.1)	24.2 (6.3)	11.8 (3.6)	27.4 (10.0)	2.7 (1.4)		1.6 (3.4)	1.1 (3.6)	0.5 (4.0)
<u>Enoplolaimus vulgaris</u>	46.0 (1.6)	19.0 (1.6)	34.9 (3.6)						0.5 (4.0)
<u>Cyatholaimus gracilis</u>	100 (3.1)								
<u>Linhomoeus hirsutus</u>			100 (1.8)						

Monoposthia costata10.7
(4.7) 21.3
(3.2)

<u>Nudora lineata</u>	48.5 (12.5)	26.9 (17.5)	14.3 (10.9)	8.8 (8.0)		0.4 (1.4)	0.6 (5.4)	0.2 (4.0)	0.2 (4.0)
<u>Tripyloides gracilis</u>	97.3 (14.1)				1.9 (1.4)	0.8 (1.4)			
<u>Theristus flevensis</u>		9.8 (9.5)	19.4 (21.8)	17.8 (24.0)	32.9 (60.9)	10.7 (49.8)	4.3 (37.9)	3.0 (37.5)	1.4 (40.0)
<u>Mesotheristus setosus</u>									0.6 (16.0)
<u>Amphimonhystera anechma</u>									100 (4.0)
<u>Anticoma littoris</u>	30.1 (3.1)	24.2 (6.3)	11.8 (3.6)	27.4 (10.0)	2.7 (1.4)		1.6 (3.4)	1.1 (3.6)	0.5 (4.0)
<u>Enoplolaimus vulgaris</u>	46.0 (1.6)	19.0 (1.6)	34.9 (3.6)						0.5 (4.0)
<u>Cyatholaimus gracilis</u>	100 (3.1)								
<u>Linhomoeus hirsutus</u>			100 (1.8)						
<u>Metalinhomoeus typicus</u>						38.5 (2.9)	46.1 (6.9)	7.7 (1.8)	7.7 (4.0)
<u>Oncholaimus paralangrunensis</u>								100 (1.8)	
<u>Mononcholaimus sp.</u>									100 (4.0)
<u>Sabatieria parabyssalis</u>		85.7 (1.6)				14.3 (1.4)			
<u>Crenopharynx marioni</u>		38.9 (5.2)	18.6 (1.8)	33.9 (4.0)	8.5 (1.4)				
<u>Camacolaimus sp.</u>						100 (1.4)			
<u>Choniolaimus sp.</u>			100 (1.8)						
<u>Pareurystomina acuminata</u>						100 (1.4)			
<u>Siphonolaimus conicus</u>						100 (1.4)			

TABLE 43

Percent distribution of nematode species at Sandy Hook, February 1976. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	91.3 (24.5)	8.7 (2.5)								
<u>Neochromadora tecta</u>	67.0 (8.2)	19.0 (2.5)	5.0 (1.5)	9.0 (4.2)						
<u>Chromadorina germanica</u>	100 (4.9)									
<u>Chromadorita sp.</u>	59.2 (27.8)	34.8 (17.3)	4.9 (6.1)	0.8 (1.4)	0.2 (1.2)					
<u>Chromadorella vanmeterae</u>		56.2 (1.2)		37.5 (2.8)	6.2 (1.2)					
<u>Desmodora polychaeta</u>				9.3 (1.4)	21.8 (5.9)	15.6 (5.6)	15.6 (8.0)	9.3 (6.7)	9.3 (5.9)	18.7 (22.2)
<u>Desmodora scaldensis</u>			25.0 (3.0)	8.3 (1.4)	13.8 (4.8)	11.1 (4.2)	13.8 (8.0)	16.6 (13.3)	11.1 (7.5)	
<u>Bradylaimus sp.</u>			17.0 (3.0)	22.6 (5.6)	1.9 (1.2)	11.3 (7.0)	17.0 (14.5)	17.0 (20.0)	9.4 (9.4)	3.8 (7.4)
<u>Metachromadora obesa</u>	12.1 (3.3)	25.6 (7.4)	12.6 (9.2)	11.2 (11.1)	2.3 (4.8)	5.8 (14.0)	8.5 (30.6)	5.8 (28.9)	10.3 (43.3)	5.4 (44.4)
<u>Polysigma uniforme</u>		20.7 (3.7)	23.5 (10.7)	12.9 (8.3)	17.8 (22.6)	12.8 (19.7)	5.7 (12.9)	2.1 (6.7)	2.8 (7.5)	1.4 (7.4)
<u>Eubostrichus parasitiferus</u>				0.1 (2.8)	11.1 (1.2)	33.3 (2.8)	22.2 (3.2)		11.1 (1.9)	22.2 (7.4)
<u>Pseudonchus kosswigi</u>									100 (1.9)	
<u>Microlaimus honestus</u>								80.0 (8.9)	20.0 (1.9)	
<u>Odontophora setosa</u>		53.2 (16.0)	30.7 (23.0)	10.8 (11.1)	1.7 (3.6)	2.2 (5.6)		1.3 (6.7)		
<u>Axonolaimus interrogativus</u>	33.7 (6.5)	48.4 (9.8)	17.8 (9.2)							
<u>Monoposthia costata</u>	77.6 (8.1)	22.4 (2.5)								
<u>Nudora lineata</u>	48.1 (4.9)	34.9 (3.7)	16.9 (4.6)							

<u>Desmodora scaldensis</u>			25.0 (3.0)	8.3 (1.4)	13.8 (4.8)	11.1 (4.2)	13.8 (8.0)	16.6 (13.3)	11.1 (7.5)	(22.2)
<u>Bradylaimus sp.</u>			17.0 (3.0)	22.6 (5.6)	1.9 (1.2)	11.3 (7.0)	17.0 (14.5)	17.0 (20.0)	9.4 (9.4)	3.8 (7.4)
<u>Metachromadora obesa</u>	12.1 (3.3)	25.6 (7.4)	12.6 (9.2)	11.2 (11.1)	2.3 (4.8)	5.8 (14.0)	8.5 (30.6)	5.8 (28.9)	10.3 (43.3)	5.4 (44.4)
<u>Polysigma uniforme</u>		20.7 (3.7)	23.5 (10.7)	12.9 (8.3)	17.8 (22.6)	12.8 (19.7)	5.7 (12.9)	2.1 (6.7)	2.8 (7.5)	1.4 (7.4)
<u>Eubostrichus parasitiferus</u>				0.1 (2.8)	11.1 (1.2)	33.3 (2.8)	22.2 (3.2)		11.1 (1.9)	22.2 (7.4)
<u>Pseudonchus kosswigi</u>									100 (1.9)	
<u>Microlaimus honestus</u>								80.0 (8.9)	20.0 (1.9)	
<u>Odontophora setosa</u>		53.2 (16.0)	30.7 (23.0)	10.8 (11.1)	1.7 (3.6)	2.2 (5.6)		1.3 (6.7)		
<u>Axonolaimus interrogativus</u>	33.7 (6.5)	48.4 (9.8)	17.8 (9.2)							
<u>Monoposthia costata</u>	77.6 (8.1)	22.4 (2.5)								
<u>Nudora lineata</u>	48.1 (4.9)	34.9 (3.7)	16.9 (4.6)							
<u>Tripyloides gracilis</u>	36.4 (3.3)	51.3 (4.9)	12.1 (3.0)							
<u>Theristus flevensis</u>			3.7 (1.5)	25.3 (15.3)	29.9 (35.7)	24.6 (36.6)	9.0 (19.4)	2.2 (6.7)	5.2 (13.2)	
<u>Theristus acer</u>	21.0 (3.3)	7.0 (1.2)	19.5 (9.2)	45.3 (26.4)	5.4 (5.9)	0.8 (1.4)				0.8 (3.7)
<u>Cylindrotheristus sp.</u>			100 (1.5)							
<u>Monhystera sp.</u>			100 (3.1)							
<u>Anticoma littoris</u>	17.3 (1.6)	50.7 (4.9)	18.7 (4.6)	4.0 (1.4)	9.3 (5.9)					
<u>Enoplolaimus vulgaris</u>		94.0 (12.3)	4.9 (1.5)		1.1 (1.2)					
<u>Enoplolaimus sp.</u>	44.2 (3.3)	47.5 (3.7)	8.2 (1.5)							
<u>Longicyatholaimus sp.</u>		100 (1.2)								
<u>Linhomoeus hirsutus</u>		81.8 (1.2)							18.2 (3.8)	
<u>Linhomoeus sp.</u>									50.0	50.0

<u>Tripyloides gracilis</u>	36.4 (3.3)	51.3 (4.9)	12.1 (3.0)							
<u>Theristus flevensis</u>			3.7 (1.5)	25.3 (15.3)	29.9 (35.7)	24.6 (36.6)	9.0 (19.4)	2.2 (6.7)	5.2 (13.2)	
<u>Theristus acer</u>	21.0 (3.3)	7.0 (1.2)	19.5 (9.2)	45.3 (26.4)	5.4 (5.9)	0.8 (1.4)				0.8 (3.7)
<u>Cylindrotheristus sp.</u>			100 (1.5)							
<u>Monhystera sp.</u>			100 (3.1)							
<u>Anticoma littoris</u>	17.3 (1.6)	50.7 (4.9)	18.7 (4.6)	4.0 (1.4)	9.3 (5.9)					
<u>Enoplolaimus vulgaris</u>		94.0 (12.3)	4.9 (1.5)		1.1 (1.2)					
<u>Enoplolaimus sp.</u>	44.2 (3.3)	47.5 (3.7)	8.2 (1.5)							
<u>Longicyatholaimus sp.</u>		100 (1.2)								
<u>Linhomoeus hirsutus</u>		81.8 (1.2)							18.2 (3.8)	
<u>Linhomoeus sp.</u>									50.0 (1.9)	50.0 (3.7)
<u>Paralinhomoeus tenuicaudatus</u>						100 (1.6)				
<u>Oncholaimus paralangrunensis</u>		81.8 (1.2)			9.1 (1.2)				9.1 (1.9)	
<u>Comesoma stenocephalum</u>		32.1 (1.2)	17.9 (1.5)	32.1 (4.2)	3.6 (1.2)	10.7 (2.8)				3.6 (3.7)
<u>Leptolaimus sp.</u>		90.0 (1.2)							10.0 (2.3)	
<u>Halichoanolaimus raritanensis</u>					100 (1.2)					
<u>Pareurystomina acuminata</u>					50.0 (1.2)				50.0 (1.6)	
<u>Siphonolaimus conicus</u>			45.5 (1.5)	54.5 (2.8)						

TABLE 44 Percent distribution of nematode species at Sandy Hook, March 1976. The numbers outside parentheses refer to the percent distribution of each species throughout the core to a depth of 10cm, numbers inside the parentheses refer to the relative percent abundance in each layer.

SPECIES	DEPTH (cm)									
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
<u>Neochromadora poecilosoma</u>	7.2 (1.1)	70.9 (7.8)	21.9 (4.8)							
<u>Neochromadora tecta</u>	33.1 (8.1)	29.7 (5.2)	37.2 (13.0)							
<u>Chromadorina germanica</u>		100 (10.3)								
<u>Chromadorella vanmeterae</u>	58.3 (2.3)		20.8 (1.2)	6.9 (1.4)		2.8 (1.2)	8.3 (4.0)		2.8 (1.3)	
<u>Desmodora polychaeta</u>						14.3 (1.2)	28.6 (2.7)	7.1 (1.3)	35.7 (3.9)	14.3 (2.6)
<u>Desmodora scaldensis</u>						22.2 (2.4)	44.4 (5.3)	5.6 (1.3)		27.8 (6.4)
<u>Bradylaimus sp.</u>				52.6 (2.8)	21.1 (1.7)	10.5 (1.2)		5.3 (1.3)		10.5 (2.6)
<u>Metachromadora obesa</u>	16.3 (2.3)	38.4 (3.9)	29.1 (5.9)	7.8 (5.6)		2.3 (3.7)	2.3 (4.0)	1.6 (3.8)	1.9 (3.9)	0.4 (1.3)
<u>Poysigma uniforme</u>				6.0 (1.4)		21.7 (11.1)	12.0 (6.7)	18.1 (15.4)	19.2 (13.2)	27.9 (23.1)
<u>Eubostrichus parasitiferus</u>							100 (1.3)			
<u>Pseudonchus kosswigi</u>										100 (1.3)
<u>Microlaimus honestus</u>								100 (1.3)		
<u>Odontophora setosa</u>		9.9 (1.3)	54.9 (14.3)	20.5 (19.4)	9.9 (13.3)	2.4 (4.9)		0.9 (2.6)	0.9 (2.6)	0.3 (1.3)
<u>Axonolaimus interrogativus</u>		54.5 (2.6)	38.4 (3.6)	4.1 (1.4)		1.7 (1.2)			1.7 (1.3)	
<u>Monoposthia costata</u>	23.3 (1.1)	76.7 (2.6)								
<u>Nudora lineata</u>	21.1 (9.3)	73.8 (23.4)	3.9 (2.4)	1.2 (2.8)		0.2 (1.2)				
<u>Tripyloides gracilis</u>	63.6 (50.0)	27.6 (15.6)	8.5 (9.5)		0.3 (1.6)	0.1 (1.7)				

<u>Desmodora scaldensis</u>						(1.2)	(2.7)	(1.3)	(3.9)	(2.6)
						22.2	44.4	5.6		27.8
						(2.4)	(5.3)	(1.3)		(6.4)
<u>Bradyaimus sp.</u>			52.6	21.1		10.5		5.3		10.5
			(2.8)	(1.7)		(1.2)		(1.3)		(2.6)
<u>Metachromadora obesa</u>	16.3	38.4	29.1			2.3	2.3	1.6	1.9	0.4
	(2.3)	(3.9)	(5.9)			(3.7)	(4.0)	(3.8)	(3.9)	(1.3)
<u>Polysigma uniforme</u>						6.0	21.7	12.0	18.1	19.2
						(1.4)	(11.1)	(6.7)	(15.4)	(13.2)
<u>Eubostrichus parasitiferus</u>								100		(23.1)
								(1.3)		
<u>Pseudonchus kosswigi</u>										100
										(1.3)
<u>Microlaimus honestus</u>								100		
								(1.3)		
<u>Odontophora setosa</u>		9.9	54.9	20.5	9.9	2.4		0.9	0.9	0.3
		(1.3)	(14.3)	(19.4)	(13.3)	(4.9)		(2.6)	(2.6)	(1.3)
<u>Axonolaimus interrogativus</u>		54.5	38.4	4.1		1.7			1.7	
		(2.6)	(3.6)	(1.4)		(1.2)			(1.3)	
<u>Monoposthia costata</u>	23.3	76.7								
	(1.1)	(2.6)								
<u>Nudora lineata</u>	21.1	73.8	3.9	1.2		0.2				
	(9.3)	(23.4)	(2.4)	(2.8)		(1.2)				
<u>Tripyloides gracilis</u>	63.6	27.6	8.5		0.3	0.1				
	(50.0)	(15.6)	(9.5)		(1.6)	(1.7)				
<u>Theristus flevensis</u>			6.9	24.9	22.6	10.8	10.1	9.0	10.7	4.9
			(3.6)	(47.2)	(60.0)	(44.4)	(46.7)	(60.3)	(57.9)	(39.2)
<u>Theristus acer</u>		12.0	22.2	8.7	18.2	13.8	13.8	3.3	5.0	2.9
		(1.3)	(4.8)	(6.9)	(20.0)	(23.5)	(26.7)	(8.9)	(11.8)	(10.3)
<u>Monhystera sp.</u>					100					
					(1.7)					
<u>Anticoma littoris</u>			37.5	37.5		5.0		2.5	5.0	12.5
			(1.2)	(4.2)		(1.2)		(1.3)	(1.3)	(6.4)
<u>Enoplolaimus vulgaris</u>		27.2	68.2	4.1						0.4
		(2.6)	(13.0)	(2.8)						(1.3)
<u>Enoplolaimus sp.</u>	24.9	75.0	10.1							
	(2.3)	(0.1)	(11.9)							
<u>Cyatholaimus gracilis</u>		100								
		(6.5)								
<u>Oncholaimus paralangrunensis</u>		51.6	48.4							
		(1.3)	(2.4)							
<u>Oncholaimoides rugosus</u>									100	
									(1.3)	
<u>Viscosia carnleyensis</u>			100							
			(1.2)							

<u>Nudora lineata</u>	21.1 (9.3)	73.8 (23.4)	3.9 (2.4)	1.2 (2.8)		0.2 (1.2)				
<u>Tripyloides gracilis</u>	63.6 (50.0)	27.6 (15.6)	8.5 (9.5)		0.3 (1.6)	0.1 (1.7)				
<u>Theristus flevensis</u>			6.9 (3.6)	24.9 (47.2)	22.6 (60.0)	10.8 (44.4)	10.1 (46.7)	9.0 (60.3)	10.7 (57.9)	4.9 (39.2)
<u>Theristus acer</u>		12.0 (1.3)	22.2 (4.8)	8.7 (6.9)	18.2 (20.0)	13.8 (23.5)	13.8 (26.7)	3.3 (8.9)	5.0 (11.8)	2.9 (10.3)
<u>Monhystera sp.</u>					100 (1.7)					
<u>Anticoma littoris</u>			37.5 (1.2)	37.5 (4.2)		5.0 (1.2)		2.5 (1.3)	5.0 (1.3)	12.5 (6.4)
<u>Enoplolaimus vulgaris</u>		27.2 (2.6)	68.2 (13.0)	4.1 (2.8)						0.4 (1.3)
<u>Enoplolaimus sp.</u>	24.9 (2.3)	75.0 (0.1)	10.1 (11.9)							
<u>Cyatholaimus gracilis</u>		100 (6.5)								
<u>Oncholaimus paralangrunensis</u>		51.6 (1.3)	48.4 (2.4)							
<u>Oncholaimoides rugosus</u>									100 (1.3)	
<u>Viscosia carnleyensis</u>			100 (1.2)							
<u>Comesoma stenocephalum</u>						40.0 (2.7)	10.0 (1.3)	20.0 (1.3)		30.0 (3.8)
<u>Sabatieria hilarula</u>						100 (1.2)				
<u>Sabatieria chitwoodi</u>								100 (1.3)		
<u>Crenopharynx marioni</u>				83.3 (2.8)		16.7 (1.2)				
<u>Leptolaimus sp.</u>		100 (1.3)								
<u>Siphonolaimus conicus</u>						100 (1.7)				

Although most species did not exhibit distinct temporal variations in abundance, a number of species did. Figures 5 and 6 illustrate the relative abundances of Tripyloides gracilis, Nudora lineata, Neochromadora tecta, Desmodora scaldensis, Neochromadora poecilosoma, Theristus flevensis and Chromadorita sp. throughout the year. Tripyloides gracilis, Neochromadora tecta and Nudora lineata occurred in low abundance during summer and early fall but were significantly more abundant during winter and early spring (Fig. 5). Desmodora scaldensis attained its maximum abundance in late summer and early fall (Fig. 5). Theristus flevensis and Chromadorita sp. exhibited significant peaks in abundance during the winter while Neochromadora poecilosoma peaked in late spring and early summer (Fig. 6).

1. Nematode families and feeding types

The percent distribution of nematode families is listed in Table 45. The Chromadoridae, Desmodoridae, Axonolaimidae and Monoposthidae collectively comprised 69.9% of all the nematodes identified. No significant temporal fluctuations occurred in the distribution of any of the nematode families.

In addition to family designation, nematodes were also grouped according to their feeding types (Wieser 1953; Boucher 1973). Epigrowth feeders were the dominant trophic type, averaging 83.7% of the total number of individuals present. Selective deposit feeders, non-selective deposit feeders and predator/omnivores comprised 5.2%, 9.4% and 1.6% respectively. The average numbers of species belonging to each trophic type at any given sampling time were: epigrowth feeders, 19 species; selective deposit feeders, 2 species; non-selective deposit feeders, 7 species; and predator/ omnivores, 4 species. Variation in

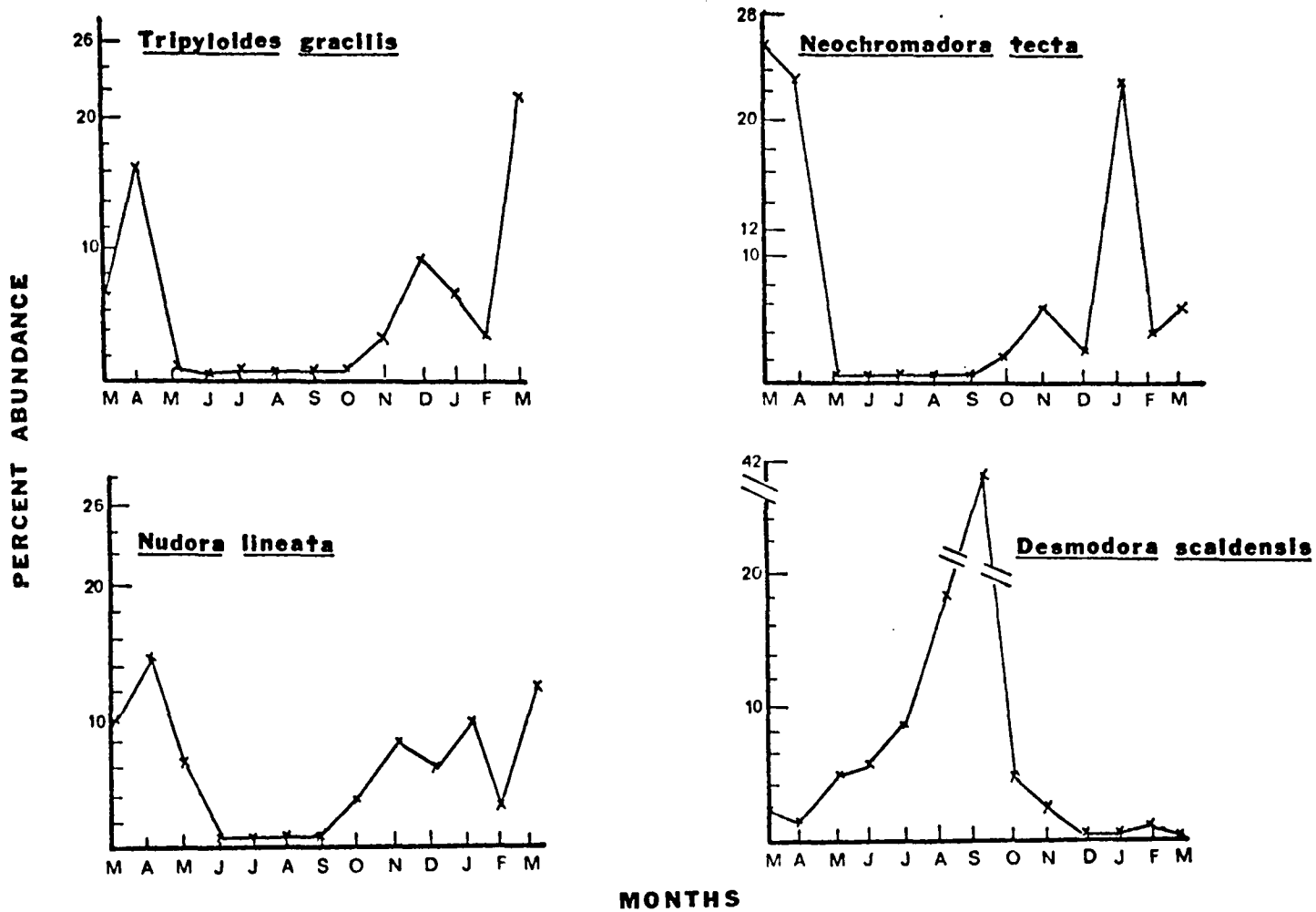


Fig. 5 Percent abundance of *Tripylodes gracilis*, *Nudora lineata*, *Neochromadora tecta* and *Desmodora scaldensis* from March 1975 through March 1976.

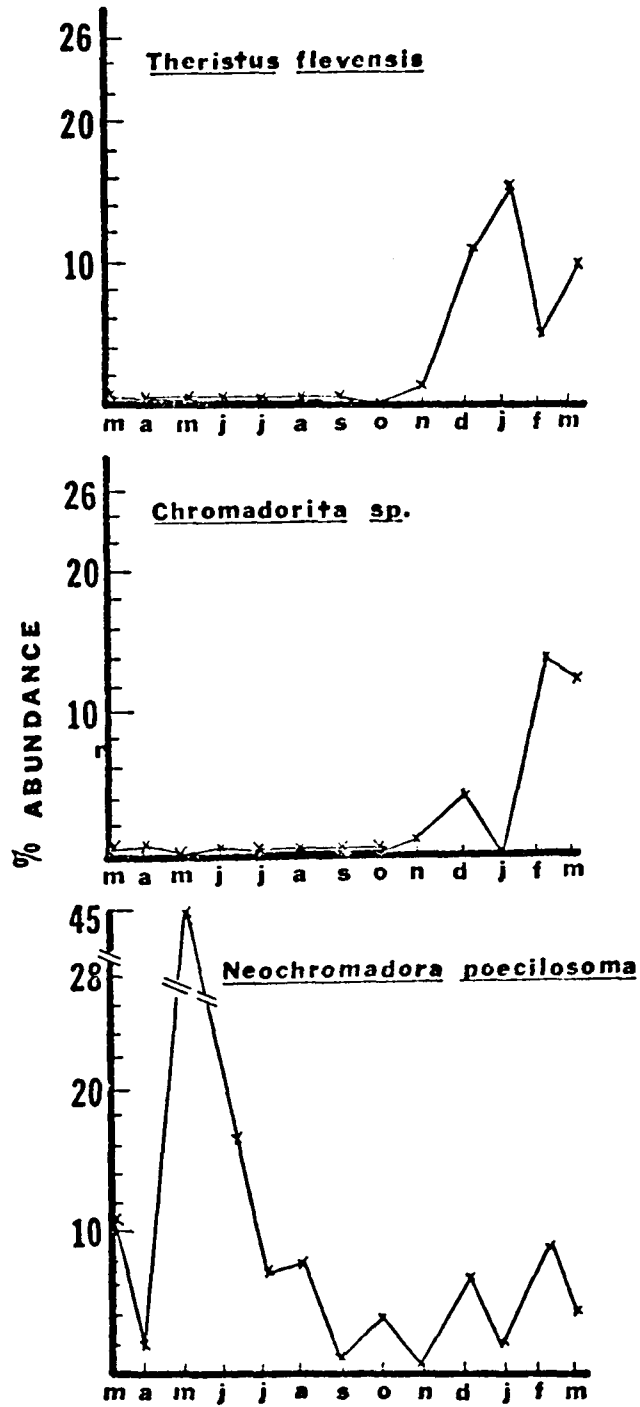


Fig. 6 Percent abundance of Theristus flevenis, Chromadorita sp. and Neochromadora poecilosoma from March 1975 through March 1976.

TABLE 45 Average percent distribution of nematode families at Sandy Hook. Percentages are based on the total number of nematode individuals in each family throughout the year in two cores 10 cm deep. * Denotes less than 0.1%.

FAMILY	PERCENT DISTRIBUTION
Chromadoridae	24.8
Desmodoridae	24.2
Axonolaimidae	10.9
Monoposthidae	10.0
Tripyloidae	8.9
Monhysteridae	8.7
Anticomidae	3.6
Enoplidae	3.2
Cyatholaimidae	2.8
Linhomoeidae	0.7
Oncholaimidae	0.6
Comesomatidae	0.5
Phanodermatidae	0.4
Leptolaimidae	0.2
Choniolaimidae	0.2
Enchelidiidae	*
Siphonolaimidae	*
Ceramonematidae	*

the relative proportion of feeding types throughout the year are illustrated in Figure 7. Although minor fluctuations in the percentages of feeding types occurred, there were no distinct seasonal patterns.

E. Vertical distribution of nematode species

The general vertical distribution of nematode species is shown in Figure 8. Faunal affinities among layers of sediment were examined using the Czekanowski Similarity Coefficient (Field and McFarlane 1968). An affinity dendrogram (Fig. 8) was constructed using a matrix of coefficients indicating faunal similarities between different sediment layers. Two major vertical clusters of species were present throughout the year. First, there was a very high similarity among the sediment layers below 3 cm. The 3-6 cm layer was most closely linked with the 6-10 cm layer and helps to form the first major cluster. Theristus acer, Theristus flevensis, Desmodora polychaeta, Comesoma stenocephalum, Pseudonchus kosswigi, Halichoanolaimus raritanensis, Pareurystomina acuminata and Siphonolaimus conicus were the species most responsible for the high similarity of sediment layers below 3 cm and the close link between the 3-6 and 6-10 layers.

The 0-2 cm layer formed the second major cluster of species. The species that comprise the second cluster included Neochromadora poecilosoma, Nudora lineata, Cyatholaimus gracilis, Metachromadora obesa, Neochromadora tecta, Chromadorita sp., Tripyloides gracilis, Chromadorella vanmeterae, Axonolaimus interrogativus and Enoplolaimus vulgaris. The 2-3 cm layer was more closely linked with the deeper sediment layers than the 0-2 cm layers; for example, Anticoma littorlis and Pareurystomina acuminata occurred in considerable numbers in the 2-3 cm layer as well as below 3 cm. Thus, the 2-3 cm layer might represent a zone of

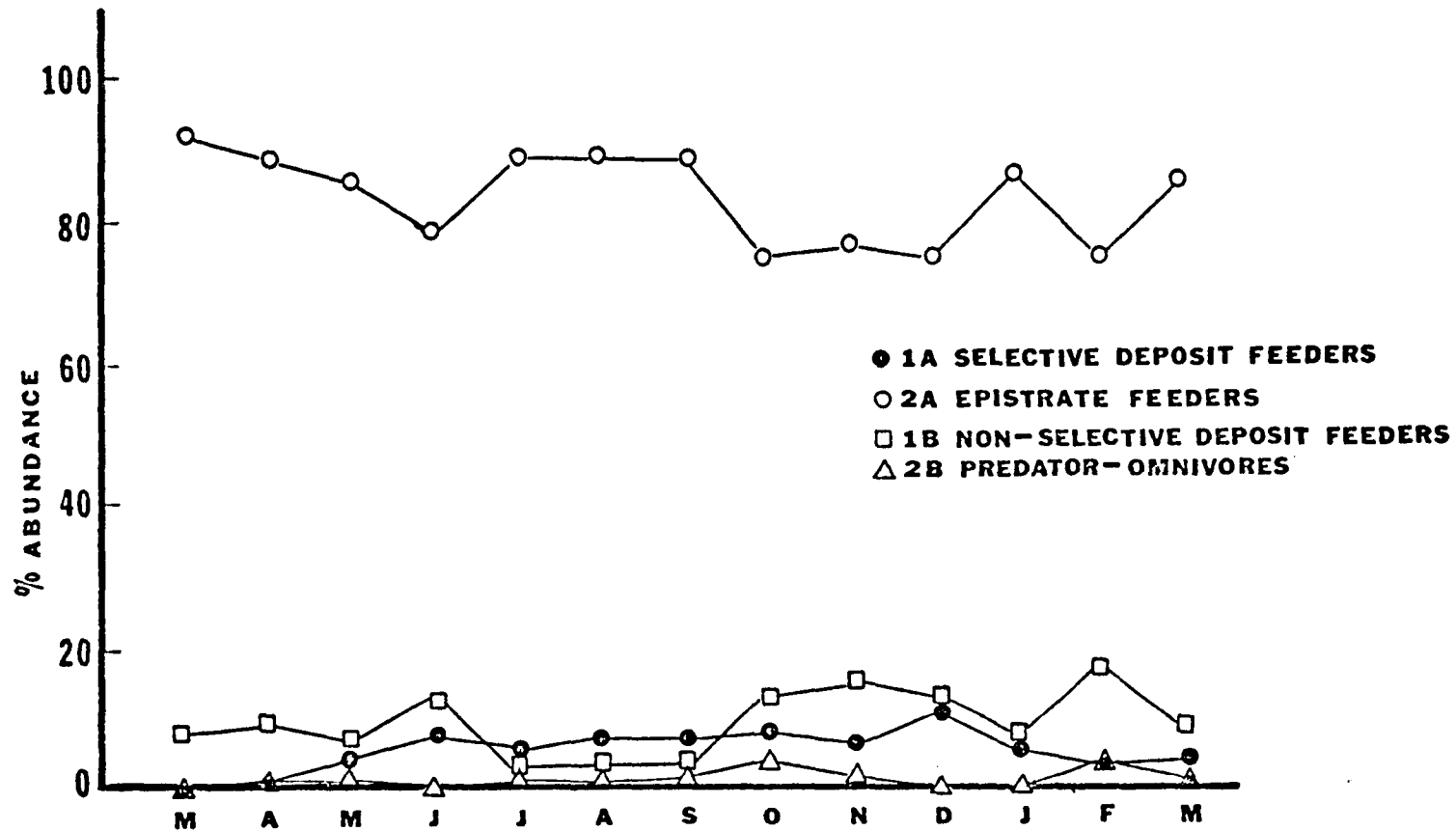


Fig. 7 Percent abundance of nematode feeding types at Sandy Hook from March 1975 through March 1976. Epistrate feeders (2A), predator/omnivores (2B), non-selective deposit feeders (1B) and selective deposit feeders (1A).

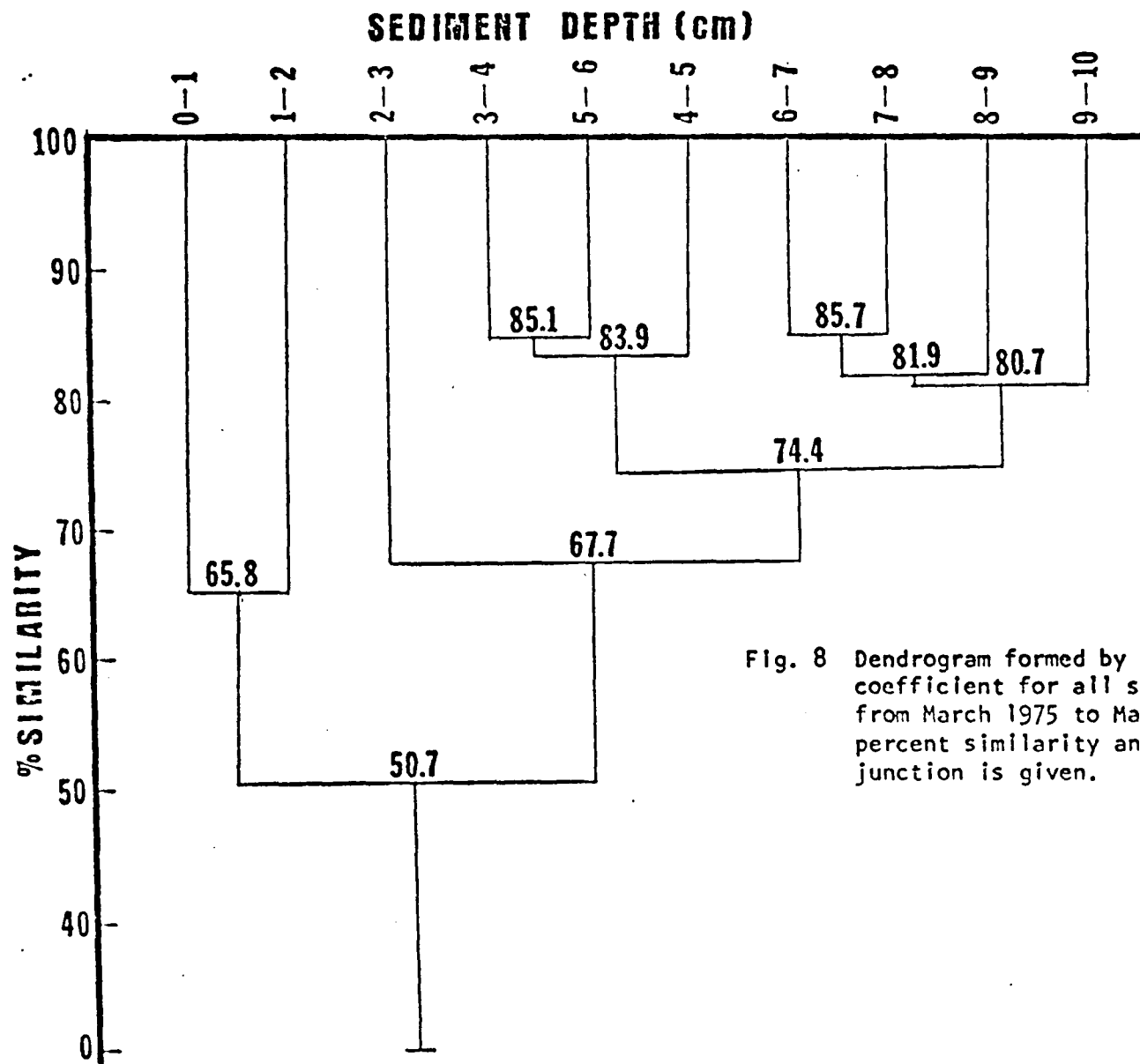


Fig. 8 Dendrogram formed by the Czekanowski similarity coefficient for all sediment layers sampled from March 1975 to March 1976. The scale is in percent similarity and the value of each junction is given.

transition between the 0-2 cm cluster of species and the 3-10 cm cluster of species.

The surface cluster (0-2 cm) is dominated by species which, on the basis of buccal morphology, are classed as epigrowth feeders. The average vertical distribution of epigrowth feeders and other feeding types is given in Fig. 9. Although most epigrowth feeders (Neochromadora poecilosoma, Nudora lineata, Cyatholaimus gracilis, Metachromadora obesa, Neochromadora tecta, Chromadorita sp., Tripyloides gracilis, Chromadorella vanmeterae) had their centers of distribution in the 0-2 cm layer, some species (Polysigma uniforme, Desmodora scaldensis, and Desmodora polychaeta) were more evenly distributed throughout the sediment (Fig. 10).

Selective deposit feeders had their centers of distribution primarily in the 2-4 cm layers (Fig. 9). Examples are, Anticoma littoris and Crenopharynx marioni (Fig. 11). Non-selective deposit feeders were evenly distributed throughout the core (Fig. 9). Some non-selective deposit feeders occurred primarily in the 0-2 cm layers (Axonolaimus interrogativus); some in the lower layers (Theristus flevensis) and some were more evenly distributed throughout the sediment (Theristus acer, Odontophora setosa, and Comesoma stenocephalum) (Fig. 11). Predator/omnivores showed a pattern similar to the non-selective deposit feeders (Fig. 9) with some most abundant in the upper layers (Enoplolaimus vulgaris and Oncholaimus paralangrunensis) while some were primarily distributed in the lower layers (Pseudonchus kosswigi, Halichoanolaimus raritanensis, Siphonolaimus conicus and Pareurystomina acuminata) (Fig. 12).

The vertical patterns of nematode feeding type can be related to

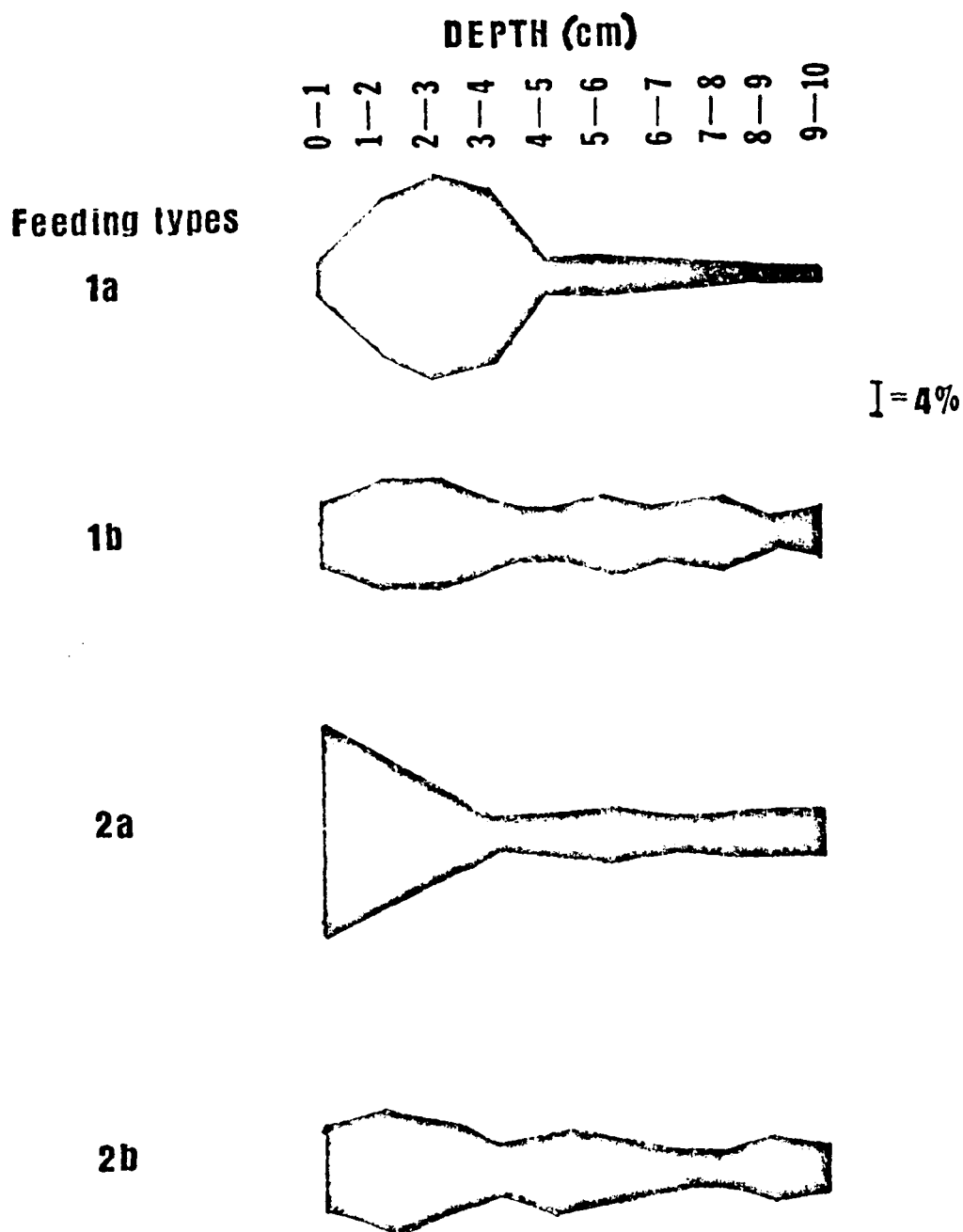


Fig. 9 Vertical relative percent abundance for each nematode feeding type at Sandy Hook with depth from March 1975 through March 1976. 1A: selective deposit feeder 1B: non-selective deposit feeder 2A: epistrate feeder 2B: predator/omnivore.

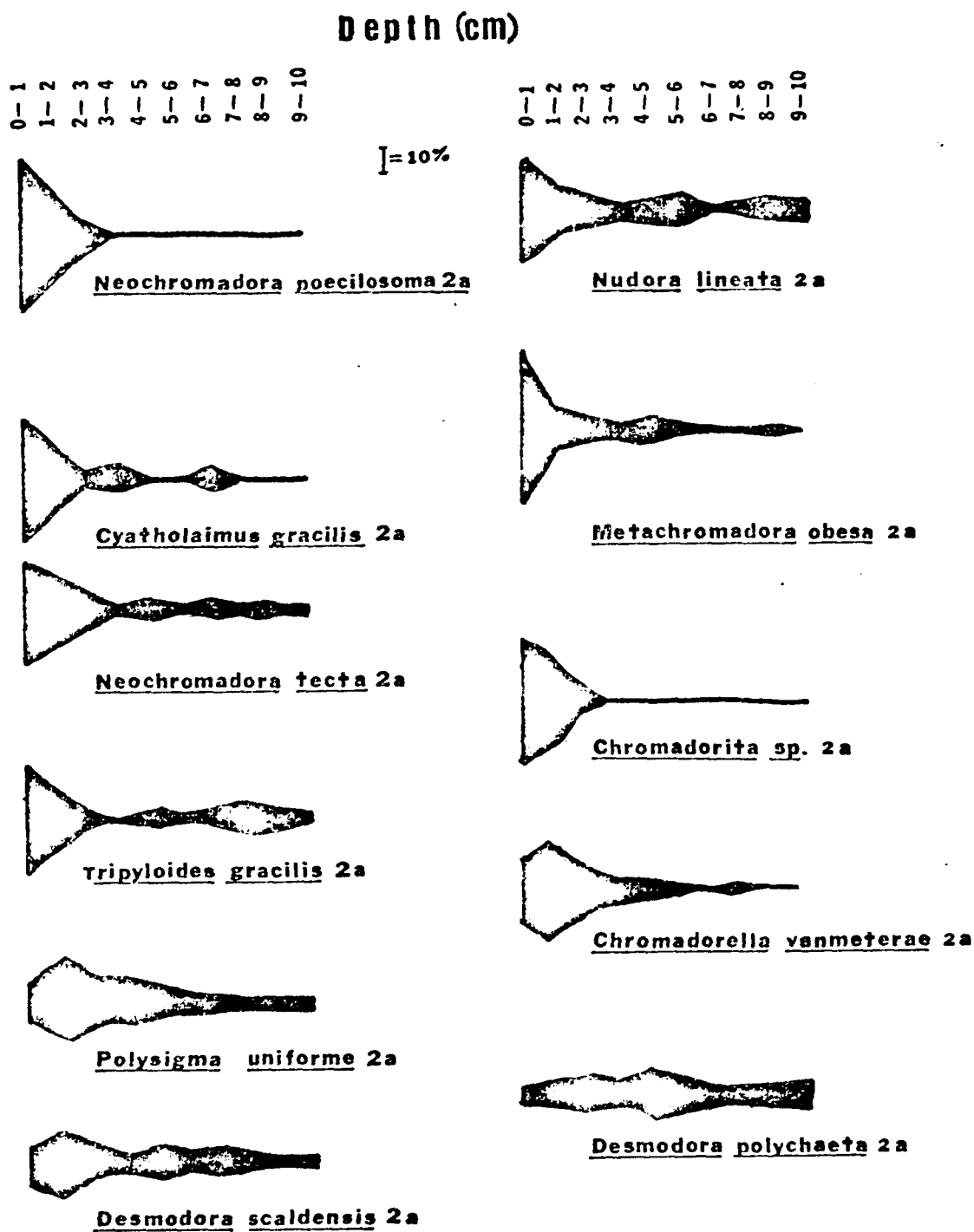


Fig. 10 Distribution and vertical mean relative abundance of nematode species from March 1975 through March 1976. 2A: epistrate feeders.

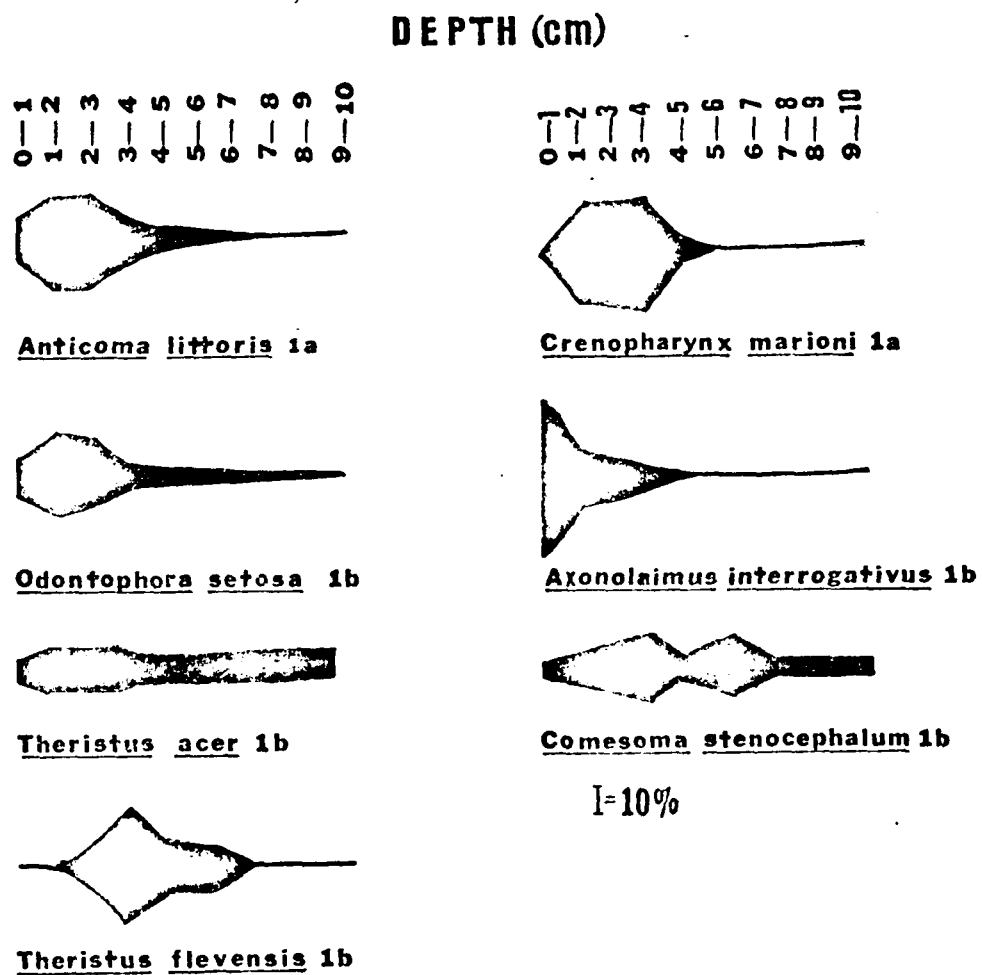


Fig. 11 Distribution and vertical mean relative abundance of nematode species from March 1975 through March 1976. 1A: selective deposit feeders 1B: non-selective deposit feeders.

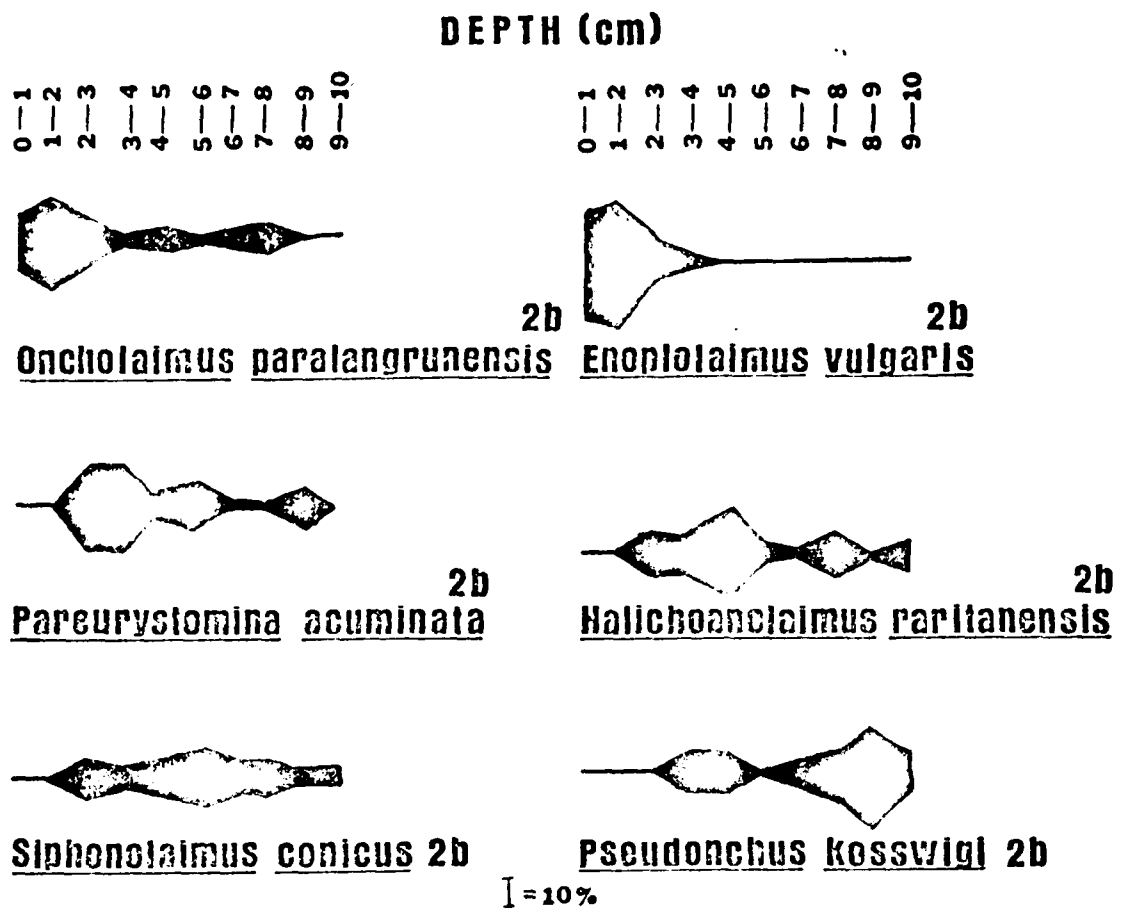


Fig. 12 Distribution and vertical mean relative abundance of nematode species from March 1975 through March 1976. 2b: predator/omnivore.

the distribution of major environmental parameters. For example, epigrowth feeders that primarily occurred in the upper layers of sediment (Metachromadora obesa, Nudora lineata, Tripyloides gracilis, Neochromadora tecta, Neochromadora poecilosoma and Chromadorita sp.) were significantly positively correlated with dissolved oxygen, Eh, and chlorophyll a.

The selective deposit feeders (Anticoma littoris and Crenopharynx marioni) that occurred primarily in the 2-4 cm layers were significantly negatively correlated with dissolved oxygen, Eh, and chlorophyll a and positively correlated with hydrogen sulfide.

Non-selective deposit feeders and predator/omnivores were evenly distributed throughout the core (Figs. 11 and 12) and exhibited a wide range of correlations with environmental parameters. Some species of non-selective deposit feeders (Axonolaimus interrogativus) and predator/omnivores (Enoplolaimus vulgaris) were significantly positively correlated with dissolved oxygen, Eh, chlorophyll a and negatively correlated with hydrogen sulfide. However, other non-selective deposit feeders (Comesoma stenocephalum, Theristus flevensis, Theristus acer) and predator/omnivores (Pareurystomina acuminata and Halichoanolaimus raritanensis) were significantly negatively correlated with dissolved oxygen, Eh, chlorophyll a and positively correlated with hydrogen sulfide.

As expected, significant negative correlations existed between nematodes found primarily in the 0-2 cm layers (Metachromadora obesa, Nudora lineata, Tripyloides gracilis, Neochromadora tecta, Neochromadora poecilosoma, Chromadorita sp., Axonolaimus interrogativus and Enoplolaimus vulgaris) and those found primarily in the deeper more reduced layers (Anticoma littoris, Crenopharynx marioni, Theristus

flevensis, Pareurystomina acuminata, Halichoanolaimus raritanensis, Siphonolaimus conicus and Pseudonchus kosswigi). Thus, a number of nematode species were able to coexist in a medium coarse sandy environment by living primarily in either a more highly oxidized zone or a more reduced zone. However, the large number of nematodes that were present within a given zone might be able to coexist because of their ability to partition the environment temporally, spatially or biochemically and will be discussed in greater detail later.

In summary, nematodes were the most abundant meiofauna taxon at the study station. They did not in general exhibit significant seasonal differences, but nematode densities in April, August, January and March were significantly higher than during the rest of the year. Nematode species exhibited a high degree of uniformity; almost half of the species were found at least six of the 13 months sampled. Highly significant differences were noted in the vertical distribution of nematode species; the majority of nematodes were found in the upper 2 cm of sediment. Two vertical clusters of species occurred: a surface (0-2 cm) cluster occurring in a more highly oxidized zone, and a deep cluster (3-10 cm) occurring in a more reduced zone. A possible transition zone existed in the region of 2-3 cm. Nematode species in the 0-2 cm layer were primarily epigrowth feeders and their presence was significantly positively correlated with dissolved oxygen, Eh and chlorophyll a; and negatively correlated with hydrogen sulfide. Selective deposit feeders occurred primarily in the 2-4 cm layers and had significant negative correlations with dissolved oxygen, Eh, and chlorophyll a, and positive correlations with hydrogen sulfide. Non-selective deposit feeders and predator/omnivores occurred throughout the sediment and exhibited a wide range of correlations with the measured environmental parameters.

Discussion

Environmental Parameters

Temperature, Salinity and pH

The patterns of seasonal and vertical distribution of temperature, salinity and pH at the Sandy Hook Bay station were similar to those observed elsewhere (McIntyre 1964; Salvat 1967; Johnson 1967; Jansson 1967b; Tietjen 1969; Fenchel 1969; Coull 1970; Wieser *et al.* 1974 and Wieser and Schiemer 1977). Since the distribution of temperature, salinity and pH did not depart from what was expected, there will be no detailed discussion of these parameters.

Eh

Eh decreased with depth at Sandy Hook but maintained positive values throughout the sediment. Similar changes in Eh with depth were observed by Tietjen (1969) in New England and Wieser (1974) in Bermuda. Fenchel (1969) and Jansson (1967a), however, found more marked changes in Eh with depth and negative values commonly occurred at depths greater than 5 cm. Although the RPD (redox potential discontinuity) at the Sandy Hook Bay station was not as sharply delineated as it was at Helsingor Beach (Jansson 1967a), Niva Bay (Fenchel 1969) or the shores of North Carolina (Ott and Schiemer 1973), the greatest change in Eh generally occurs between the upper 2 cm and the rest of the sediment. The differences between Eh profiles in various areas may be partially explained by differences in local conditions. The lack of macrobenthic vegetation, low organic matter and constant high levels of oxygen in the upper layers of sediment at Sandy Hook caused the Eh to decrease more gradually with depth and also caused the RPD to remain at the same depth 1-2 cm throughout the year. No significant temporal

fluctuations were observed in Eh. This was expected since there were no distinct seasonal patterns in the two major factors (organic content and oxygen concentration) which govern Eh profiles.

Dissolved Oxygen Content

A distinct oxygen profile persisted throughout the year with the zone of highest oxygen content occurring in the upper 2 cm. Oxygen decreased from the upper 2 cm to an oxygen minimum zone between 2-6 cm; below 6 cm the oxygen content increased slightly.

The oxygen minimum may be due to increased anaerobic processes in the 2-6 cm zone, wherein the reduction of $\text{SO}_4^{=}$ and NO_3^- to H_2S and NO_2^- by anaerobic bacteria takes place. Below 6 cm these anaerobic processes may occur at decreased levels of activity. Interestingly, Brafield (1964) found small amounts of oxygen (about 3% saturation) occurring in the "black layers". Occurrence of oxygen in the blackish H_2S -smelling sediments has also been reported by other authors (Bruce 1928; Halberg 1968). A similar situation existed in the present study with less than 5% saturation of dissolved oxygen in the most reduced zones between 2 and 6 cm. However, when H_2S exceeded 2.5 mg/l, oxygen was always totally absent. Thramdrup (1935) also found oxygen to be totally absent when H_2S levels exceeded approximately 3 mg/l. Unfortunately, no data on oxygen profiles are available for subtidal areas, but data from tidal and atidal beaches (Ganapati and Rao 1962; Ruttner - Kolisko 1962; Brafield 1964, 1965 and Jansson 1966 a, b) agree with the vertical oxygen profiles at Sandy Hook.

Chlorophyll a

A number of studies have been conducted of sedimentary pigments in estuaries (Vallentyne 1955; Gorham 1960; Marshall 1967; Tietjen 1968,

1969, 1970; Riznyk and Phinney 1972) and most of these studies have shown that the amount of sedimentary pigment in the sediment decreases with depth. This can generally be attributed to the decreased light intensity at lower sediment depths (Yentsch 1965). Chlorophyll a at Sandy Hook also decreased with depth. The 0-2 cm layer had significantly higher chlorophyll a concentrations than the 2-6 cm layers; similar distributions were observed between the 0-2 and 3-5 cm layers by Tietjen (1969) in New England. The range in chlorophyll a (2.6 - 6.7 $\mu\text{g/gm}$ (DW) of sediment) and percent viable chlorophyll a (54 - 79%) remained relatively narrow throughout the year. Chlorophyll a concentrations, for example, were more constant at Sandy Hook Bay compared to what Tietjen (1969) found at a study station (South Shoals) of similar sediment type in New England. Chlorophyll values similar to those at Sandy Hook were also found by other workers (Steele and Baird 1968; Tietjen 1969; Riznyk and Phinney 1972) in shallow sediments.

The high percentage of viable chlorophyll a in the 0-2 cm layer throughout the year indicates that most of the chlorophyll a is in a non-degraded form with the major fraction probably in actively growing algae. The relatively swift surface currents and lack of macrobenthic vegetation did not allow for the accumulation of dead material in large quantities at the Sandy Hook station. In other areas, such as the Pettaquamscutt East and North Shoals Stations of Tietjen (1969) in New England, the increased amounts of macrobenthic vegetation may bring in additional pigment-bearing materials at certain times of the year causing substantial increases in chlorophyll.

Organic Carbon Content

The average organic carbon content at Sandy Hook was very low

(0.1 - 3.4 mg C/gm (DW) of sediment) and did not exhibit any changes with depth or with season. In an area resembling Sandy Hook, (Trunk Island, Bermuda), Coull (1970) reported a range of organic carbon (0.14 - 1.04 mg C/gm (DW) of sediment) similar to that found here. Tietjen (1969) and Fenchel (1969), however, reported organic carbon values that were an order of magnitude greater than Sandy Hook. The low and constant organic carbon at Sandy Hook was not surprising since the study station was not adjacent to any marshes and lacked significant amounts of macrobenthic vegetation.

Sediment Granulometry (median grain size, sorting and percent silt-clay) and Interstitial Water Content

Statistically significant vertical differences occurred in some of the mechanical properties (median grain size and sorting) of the sediment as well as in interstitial water content; however, these statistical differences may be of questionable biological importance in explaining the distribution of the meiofauna. For example, median grain size did not vary from a medium coarse sand (0.43 - 0.92 mm); sorting coefficient always indicated a well sorted sediment (1.36 - 1.92) and vertical changes in percent interstitial water content (16.1 - 20.6%) were small compared to what others have found (Jansson 1969; Coull 1970). Jansson (1969) observed that median grain size was "not a significant factor governing the distribution of meiofauna unless large differences occurred." Although Jansson does not include examples of so-called "large differences", these may be exemplified by a sediment changing from a fine sand (0.125 - 0.250 mm) to a mud (0.004 - 0.062), or from a very coarse sand (1.0 - 2.0 mm) to a fine sand (0.125 - 0.250 mm). Similarly, sorting has been shown to have a significant

effect on the distribution of meiofauna only when differences are large. At certain times of the year in Baileys Bay, Bermuda, Coull (1970) found that sediment in the 0-2 cm layer would change from a well-sorted coarse grain to a poorly sorted fine grain with increased silt-clay content. Coull (1970) was able to relate these large differences in sorting to changes in the distribution of the meiofauna. Changes in interstitial water content have also been shown to not affect the distribution of meiofauna unless large differences occur. For example, Coull (1970) found that only in cases where there was a 40% reduction in interstitial water between the 0-2 and 2-5 cm layers was navigation impossible for certain groups.

The Meiofauna

The densities and relative abundances of nematodes, copepods, polychaetes and oligochaetes found at Sandy Hook were similar to those found in other shallow (< 20 m) subtidal, sandy areas (Tietjen 1969; Coull 1970; McIntyre and Murison 1973; Lasserre et al., 1976). Nematodes were the only taxon identified to species; a detailed discussion of temporal and vertical distributions of nematodes in relation to environmental variables will be given later. A brief discussion of the seasonal and vertical distribution of other taxa is given immediately below.

Temporal Distribution of Meiofauna (excluding Nematoda)

The Copepoda, Ostracoda, Oligochaeta and Polychaeta occurred in significantly higher densities during the period of June - September compared to rest of year. Peak abundancies in summer have also been shown in other studies for Copepoda (McIntyre and Murison 1973; Lasserre et al., 1976); Ostracoda (Smidt 1951; Tietjen 1969; DeBovee

and Soyer 1974); Oligochaeta (Jansson 1966a, 1967; Lasserre 1967, 1971b, 1976; Giere 1973); and Polychaeta (Phelps 1964; Tietjen 1969; Lasserre et al., 1976). Peak abundances for Foraminifera at the Sandy Hook Bay station occurred in May, September, November, December and January, but populations fluctuated widely throughout the year.

Coull (1970) related the peak of copepod abundances in September in Bermuda to increases in phytoplankton and sedimentary carbon. In other studies of copepods, Muus (1967) and Barnett (1970) have stressed the importance of temperature in controlling copepod reproduction. Distinct seasonal changes in copepod densities have been shown by Harris (1972 a, b) in Whitsand Bay, Cornwall. Most species had distinct reproductive periods with the majority of species breeding at times of highest water temperature. Harris (1972 d) concluded that temperature is probably the most important environmental factor affecting copepod reproduction on the beach. Coull and Vernberg (1975) have also found significant reproductive peaks of harpacticoid copepods at North Inlet, South Carolina and Coull speculated (personal communication) that copepod reproductive rates are linked very closely to water temperature. Since water temperature was one of the few environmental factors to exhibit distinct fluctuations at Sandy Hook, it seems reasonable to suggest that reproductive peaks of copepods were mediated by temperature changes.

Tietjen (1969) related increased ostracod densities in late summer in New England to increased levels of sedimentary carbon. However, seasonal differences in organic detritus were not found at Sandy Hook and cannot explain the increase in ostracods during this period. In addition, there were low densities of ostracods compared to copepods at

Sandy Hook. Tietjen (1969) also noted a similar situation in his New England study with the lowest densities of ostracods occurring at stations with lower organic content. Assuming that ostracods are deposit feeders, the low organic carbon values at Sandy Hook could help to explain the low relative percent abundance of ostracods compared to more silty sediments with higher organic carbon content (Wieser, 1959 b, 1960; McIntyre, 1964). As previously mentioned, water temperature was one of the few environmental parameters to exhibit significant seasonal changes. Because little is known of the reproduction of ostracods at various temperatures, the influence of temperature on ostracod temporal fluctuations remains speculative. However, Heip (1976) studied the life cycle of a dominant brackish water ostracod, Cyprideis torosa, and found that reproduction in some cases appears to be related to elevations in water temperature.

Significant peaks in summer for oligochaetes and polychaetes have been related in other studies (Phelps, 1964; Jansson, 1966a, 1967a; Lasserre, 1967, 1976; Tietjen, 1969; Giere, 1973) to elevations in water temperature. Significant increases in the densities of polychaetes and oligochaetes have also been shown during periods of increased water temperature at Sandy Hook. Tietjen (1969) has found that significant correlations of polychaete abundance with water temperature were in agreement with polychaete reproduction and larvae development known to occur for most New England species at elevated summer temperatures.

Vertical Distribution of Meiofauna (excluding Nematoda)

Eighty four percent of the densities of individuals of all taxa excluding Nematoda occurred in the 0-2 cm layer. The vertical distributions of these taxa were significantly positively correlated with

dissolved oxygen, Eh and chlorophyll and negatively correlated with hydrogen sulfide.

Significant vertical decreases in densities have also been shown in other studies for Copepoda, Foraminifera, Polychaeta, Oligochaeta and Ostracoda (Tietjen 1969; Coull 1970; Boucher 1972; Harris 1972 a, b, c, d; Giere, 1973). Because the greatest densities of individuals from most taxa occur in the upper 2 cm at Sandy Hook and other areas, the implication is that these organisms require an oxidizing environment and/or cannot tolerate high sulfide concentrations. Lasserre and Renaud-Mornant (1973) give evidence for this. Under laboratory conditions, Polychaeta, Oligochaeta and Copepoda showed high sensitivities to hydrogen sulfide (7 mg/l) and low tolerances to very low dissolved oxygen concentrations (0.5 ml/l). Dissolved oxygen at Sandy Hook in the 2-6 cm zone averaged 0.20 ml/l throughout the year and sulfide averaged 1.05 mg/l. Thus, restriction of polychaetes, oligochaetes and copepods primarily to the upper 2 cm can perhaps be explained by their high sensitivity to low oxygen and elevated sulfide concentrations. Additional evidence for the oxyphilic nature of most of the meiofauna taxa was also found by Moore (1931) and Tietjen (1966) who observed the death of ostracods and copepods under anoxic conditions. Giere (1973) also found vertical decreases in oligochaete population density as oxygen diffusion rate decreased.

The vertical distribution of potential food resources is another factor that could influence the distribution of meiofauna. Since it has been suggested that many meiofauna can use benthic diatoms as a food resource (McIntyre et al. 1970; Coull 1970; Giere 1973), zones of higher productivity such as the 0-2 cm layer might provide a greater

variety of food. Thus, in addition to oxygen and sulfide, the increased abundance of meiofauna in the upper layers may be related to their food requirements. In certain groups such as the Spionidae distribution near the surface may be necessary for feeding purposes.

The Nematoda

Average densities of the Nematoda found at Sandy Hook ($2665 \text{ } 10 \text{ cm}^{-2}$) agreed well with densities reported from similar areas (Hopper and Meyers 1967; Tietjen 1969, 1977; Coull 1970; McIntyre and Murison 1973 and Lasserre *et al.*, 1976). Significant peaks in nematode densities at Sandy Hook occurred in April and August, 1975 and January and March, 1976. To assess whether these increased densities were indicative of any long-term seasonal differences, mean densities among spring (March, April and May), summer (June, July and August), fall (September, October and November), and winter (December, January and February) were compared. The average densities for these seasons were 3565, 2113, 1466 and 2794 10 cm^{-2} , respectively. Because there were no significant differences in nematode densities among the four seasons, distinct seasonal differences in nematode abundances could not be demonstrated. Average water temperatures for these seasons were 19.9°C , 25.2°C , 14.5°C , and 4.0°C , respectively.

The absence of significant seasonal differences in nematode densities has also been observed by McIntyre (1964) off the Scottish Coast and in the North Sea; Warwick and Buchanan (1971) off the Northumberland Coast; Lorenzen (1974) and Juario (1975) in the German Bight. In contrast, Hopper and Meyers (1967) in Biscayne Bay, Florida; Tietjen (1969) in the Pettaquamscutt and Niantic estuaries, New England; Coull (1970) in Bermuda, and Elmgren (1973) in the Baltic Sea have shown that

total nematode populations exhibit temporal fluctuations. The former studies were all conducted in deeper waters (> 25 m) where annual variations in many major environmental parameters are expected to be less. With the exception of Elmgren (1973), the later studies were conducted in shallower water where changes in environmental factors are expected to be greater. The lack of significant seasonal changes in nematode densities at Sandy Hook is interesting in light of the above studies and will be discussed later in conjunction with temporal changes in species composition.

Family and Species Composition

As previously indicated, 67 species belonging to 18 families were identified at Sandy Hook. No significant seasonal differences in the distribution of nematode families occurred throughout the year (Table 45). The Chromadoridae and Desmodoridae were the most abundant families at Sandy Hook comprising 24.8% and 24.2%, respectively, of the total number of nematodes identified. The Chromadoridae and Desmodoridae also represented the most abundant nematode families in the sandy sediments of Pettaquamscutt and Niantic estuaries in New England (Tietjen 1969), Liverpool Bay (Ward 1973), the German Bight (Lorenzen 1974) and Long Island Sound (Tietjen 1977). Other families (Comesomatidae and Linhomoeidae) characteristic of more muddy sediments (Wieser 1960; Warwick and Buchanan 1970; Boucher 1973; Vitiello 1974; Ward 1973; Juario 1975; Tietjen 1977) were found in very low abundances (0.5 - 0.7%) throughout the year at Sandy Hook.

Species that either dominated the nematode fauna at Sandy Hook (Metachromadora obesa, Nudora lineata, Neochromadora poecilosoma, Neochromadora tecta, Polysigma uniforme and Anticoma littoris) or occurred

in slightly lower relative abundances (Chromadorina germanica, Monoposthia costata, Halichoanolaimus raritanensis, and Eubostrichus parasitiferus) were also found to characterize the sandy sediments in other areas (Wieser 1960; Tietjen 1969, 1977; Warwick 1971; Warwick and Buchanan 1970; Lorenzen 1974). For example, the most abundant species at Sandy Hook, Metachromadora obesa accounted for 14.3% of the total nematodes and was also very abundant in the sandy sediments of the Niantic River New England (Tietjen 1969) where it accounted for 12.1% of the total nematodes present. Another abundant species at Sandy Hook, Nudora lineata (6.0%), was the most abundant species (24.9%) at Tietjen's South Shoal station. Neochromadora tecta was restricted to fine or medium coarse sand in the Exe estuary (Warwick 1971), Long Island Sound (Tietjen 1977) and New England (Tietjen 1969). Similarly, Neochromadora poecilosoma was more abundant in sands than in muds in Buzzards Bay (Wieser 1960), and was also found in coarse or fine sands in the Helgoland Bight (Lorenzen 1974) and in New England (Tietjen 1969). Anticoma litoris was one of the dominant nematodes at Sandy Hook and Wieser (1960) also found this species to be the most abundant nematode at station "P" (well-sorted sand with low silt-clay) in Buzzards Bay. Other species such as Polysigma uniforme, Halichoanolaimus raritanensis and Eubostrichus parasitiferus were found in sandy sediments in either New England (Tietjen 1969) or in Long Island Sound (Tietjen 1977). Chromadorina germanica and Monoposthia costata were found in coarse sands in the Exe estuary (Warwick 1971) and in Buzzards Bay (Wieser 1960). Thus, the species dominating the nematode fauna at Sandy Hook have been found to predominate in sands of other geographic areas.

A few discrepancies in the distribution of some genera and species

between various areas deserve mention. Many authors (Wieser 1960; Warwick and Buchanan 1970; Ward 1973; Lorenzen 1974; Vitiello 1974; Tietjen 1977) have found that the genus Sabatieria has a preference for muds. However, three species of Sabatieria (Sabatieria hilarula, Sabatieria parabyssalis and Sabatieria chitwoodii) were found in the sandy sediments of Sandy Hook. Sabatieria hilarula has also been found in the more sandy sediments in Buzzards Bay (Wieser 1960), New England (Tietjen 1969), Northumberland (Warwick and Buchanan 1970), the Exe estuary (Warwick 1971), the Helgoland Bight (Lorenzen 1974) and Long Island Sound (Tietjen 1977). Thus, it appears that even within a genus known for its preference for muds, species preferring a more sandy environment may be found. Some nematode species found at Sandy Hook (Viscosia carnleyensis, Microlaimus honestus and Tripyloides gracilis) seem to exhibit more eurytopic than stenotopic distributions in other areas. Viscosia carnleyensis was found in the coarse sandy sediment in New England (Tietjen, 1969) and in both medium coarse sands and muddy sands in Long Island Sound (Tietjen 1977). Microlaimus honestus was found in muddy sands in the Exe estuary (Warwick 1971), fine sands in Northumberland (Warwick and Buchanan 1970) and in fine sands, muddy sands and muds in Helgoland Bight (Lorenzen 1974). Tripyloides gracilis was another nematode species that was found in a variety of sediment types. Tietjen (1969) found Tripyloides gracilis abundant in sandy sediments of New England. In Long Island Sound, however, Tietjen (1977) found that Tripyloides gracilis was more common in mud than in sand. In addition, Wieser (1960) and Warwick (1971) found Tripyloides gracilis more abundant in muddy than sandy sediments. There is a need for much more biological information on nematode species before reasons for

differences in distribution patterns of Viscosia carnleyensis, Micro-
laimus honestus and Tripyloides gracilis and other species can be
given.

Temporal Changes In Nematode Species Composition

As indicated earlier, the majority of nematode species at Sandy Hook did not exhibit significant temporal changes in abundance. A partial explanation for this can be found in the distribution of trophic types present.

Epigrowth feeders dominated nematodes at Sandy Hook, averaging 83.7% of the nematode fauna; no temporal changes in the abundance of epigrowth feeders (Fig. 7) occurred. Tietjen (1969), however, found that epigrowth feeders reached peak abundances during the spring and summer and attributed this to increased benthic primary productivity. Although no data on benthic primary productivity or microflora densities are available, the relatively small seasonal range in chlorophyll a (4.0 - 11.2 $\mu\text{g/gm}$ (DW) of sediment) and the high percentage (78%) of viable chlorophyll a in the upper 5 cm of sediment suggests the possibility of uniform benthic primary productivity throughout the year and, in addition, infers that most of the pigment was in actively growing algae. If this is true, the epigrowth feeders have a potentially abundant and uniform distribution of food available throughout the year which enables them to maintain their continuous dominance. The significantly greater amounts of viable chlorophyll a that occurred in the winter compared to the summer were not accompanied by increased abundances of epigrowth feeders perhaps because of the differential ingestion and utilization of algae by these nematodes. For example, (Tietjen and Lee 1977a) have found that some epigrowth feeders may ingest only a

fraction ($\approx 2\%$) of the number of algal cells available to them and may utilize an even smaller percentage (Tietjen et al. 1970; Tietjen and Lee 1973, 1977 a).

Deposit feeders and predator/omnivores were present in low, uniform numbers throughout the year (Fig. 7). Temporal fluctuations in deposit feeders and predator/omnivores, however, were observed by Tietjen (1969) in New England, that coincided with elevated levels of sedimentary organic carbon. The relatively low and seasonally uniform distribution of organic carbon at Sandy Hook probably was responsible for the lack of seasonal differences in deposit feeders and predator/omnivore densities there. For example, organic carbon averaged 1.6 mg C/gm (DW) of sediment at Sandy Hook and deposit feeders and predator/omnivores accounted for 15.2% of all the nematodes. Organic content in other areas of similar grain size such as Pettaquamscutt West (Tietjen 1969) averaged 14.7 mg/gm (DW) of sediment and deposit feeders and predator/omnivores accounted for a much larger percentage (40.5%) of the total nematodes.

In addition to feeding types, the reproductive cycles of some nematode species may help to explain the lack of temporal fluctuations in nematode densities. Field observations on the reproductive cycle for some of the nematodes at Sandy Hook indicate that the cycle may not be entirely restricted to one season. For example, gravid females, males and juveniles of Metachromadora obesa, Odontophora setosa, Theristus acer, Polysigma uniforme and Anticoma litoris were encountered throughout the year. Metachromadora obesa was also shown to occur in high densities throughout the year at South Shoals in New England (Tietjen 1969). Similarly, Odontophora setosa was found to be abundant

throughout the year at Sandy Hook and in the shallow waters of the western Baltic (Brenning 1973). Species of Theristus have also been found to be abundant throughout the year at Sandy Hook and at Banyuls Bay (Boucher 1972) and in the German Bight (Lorenzen 1974). This infers that many of the species found at Sandy Hook are capable of continuous reproduction. Asynchronous life cycles and continuous breeding have also been observed by Warwick and Buchanan (1970) and Juario (1975). The ability to occur in high densities and reproduce throughout the year may be a factor contributing to the cosmopolitan distribution patterns of some nematode species. In addition, nematodes that reproduce throughout the year have to be adapted to exploit available food at all temperatures and may not undergo temporal fluctuations.

Some species, however, did undergo temporal changes in abundance (Figs. 5 and 6). Some species were abundant in spring (Tripyloides gracilis, Neochromadora tecta and Nudora lineata); some in summer (Desmodora scaldensis and Neochromadora poecilosoma) and some in winter (Neochromadora tecta, Tripyloides gracilis, Nudora lineata, Chromadorita sp. and Theristus flevensis). Peak abundances of Neochromadora tecta were observed by Tietjen (1969) in winter at one station and in spring at three of the four stations he studied. Peaks in abundance during the spring and winter for Tripyloides gracilis and Nudora lineata were also observed by Tietjen. Other species such as Neochromadora poecilosoma occurred in so few numbers in other studies that seasonal comparisons between areas is not possible.

Although a constant source of benthic chlorophyll a at Sandy Hook suggests that benthic primary productivity throughout the year may also be constant, changes in algal species composition have been observed in

shoal benthic areas over relatively short periods of time (Lee et al., 1975b; Riznyk and Phinney 1972). Unfortunately, the feeding habits and nutritional requirements of marine nematodes are only known for but a few species (Chitwood and Murphy 1964; Tietjen et al. 1970; Tietjen and Lee 1973, 1977a). Tietjen and Lee (1977a) found that Chromadora macrolaimoides, Rhabditis marina, Chromadorina germanica and Monhystera denticulata are selective in their ingestion of algae and bacteria. If the species at Sandy Hook which exhibited clear seasonal patterns are as selective in their feeding habits as those species studied by Tietjen and Lee, qualitative and quantitative temporal variations in benthic microflora distribution could bring about temporal variations in the distribution of some nematode species. In addition, the growth characteristics of nematodes may differ on different species of algae (Tietjen, personal communication). Thus, it is possible that blooms of algae at certain times of the year might trigger rapid increases in the abundances of some species of nematodes, as has been suggested for benthic foraminifera (Lee 1974). The specialist feeding nature of the foraminifera has been observed by Muller (1975). He found that some species of foraminifera are highly selective feeders. Of the 28 species of diatoms and chlorophytes tested, only four or five were consumed in growth-sustaining quantities. Sellner (1976) and Lee et al. (1976) have also found that copepods exhibit different growth characteristics on different species of algae.

In addition to food, nematodes may undergo temporal fluctuations because of the effect of temperature on reproductive rate. Temperature has been shown to exert a significant effect on the reproduction of several species of nematodes (Tietjen et al. 1970; Gerlach and Schrage

1971, 1972; Tietjen and Lee 1973, 1977 b; Hopper et al. 1973). Depending on temperature, the life cycle of marine nematodes can vary from 2.25 days (Rhabditis marina) to two years (Desmodora scaldensis) (Tietjen et al. 1970; Gerlach and Schrage 1972). Thus, variations in reproductive rate of nematodes at various temperatures may be reflected in temporal fluctuations in some species.

In summary, there were no significant seasonal changes in total nematode densities, nematode families and relative abundances of trophic types at Sandy Hook. This was due to the large percentage of overlapping reproductive cycles and to the dominance of epigrowth feeders. At the species level the majority of the dominant species did not undergo seasonal changes and appeared capable of continuous reproduction which, in turn is clear evidence for the fact that they are capable of exploiting available food resources at all temperatures. Other species showed distinct seasonal patterns that might be related to differences in reproductive capabilities at different temperatures and to variations in the availability and utilization of food resources throughout the year.

Vertical Distribution of Nematodes

Density of nematodes declined significantly with increasing depth in the sediment. Similar observations have been made by other workers (Wieser 1964; Teal and Wieser 1966; Tietjen 1969; Coull 1970; Ott 1972; Boucher 1972; Wieser 1974, Wieser and Schiemer 1977), some of whom have attributed this decline to vertical decreases in oxygen and vertical differences in food composition. Measurement at Sandy Hook of a number of environmental parameters (temperature, salinity, pH, Eh, median grain size, sorting, percent silt-clay, interstitial water content, dissolved oxygen, hydrogen sulfide, organic content and chlorophyll a) allowed

for a greater understanding of the possible causes for the vertical distribution patterns. Within the upper 6 cm of sediment, the densities of nematodes were significantly positively correlated with dissolved oxygen, Eh and chlorophyll a and negatively correlated with hydrogen sulfide. Temperature, salinity, median grain size, percent silt-clay, sorting, interstitial water content and organic carbon either did not exhibit significant vertical changes, or the changes were so slight that they have questionable biological significance (as previously discussed on pp. 96 — 100) and will not be discussed in relationship to nematode vertical distribution.

In the following discussion of the vertical distribution of the nematode species, the main emphasis will be on distribution patterns within the upper 6 cm because > 94% of the nematodes occurred in this region. However, a few species such as Pseudonchus kosswigi and Micro-laimus honestus had their primary centers of distribution from 6 to 10 cm. These nematodes generally accounted for $< 50 \text{ } 10 \text{ cm}^{-2}$ and their low densities within the limits of sampling error or variances inherent in the population as a whole preclude their discussion.

Since the results of cluster analysis indicated the presence of a surface cluster of nematode species at 0-2 cm and a deeper cluster of nematode species at 2-6 cm differences in vertical distribution of nematode species and trophic types will be discussed in the following sections within these zones.

Nematode species distribution in the 0-2 cm zone

The 0-2 cm zone is dominated by species which, on the basis of buccal morphology, are classed as epigrowth feeders (Neochromadora poecilosoma, Nudora lineata, Cyatholaimus gracilis, Metachromadora obesa,

Neochromadora tecta, Chromadorita sp., Tripyloides gracilis, and Chromadorella vanmeterae). Epigrowth feeders possess teeth and can scrape algae or other materials off of larger particles or can puncture large cells and ingest cellular contents by the sucking power of their esophagus. This method of feeding has been confirmed by Von Thun (1968) and Tietjen and Lee (1973, 1977 a). Feeding studies of nematodes by Tietjen and Lee (1973, 1977 a) showed that epigrowth feeders consumed significantly greater amounts of algae than bacteria. For example, only one bacterium was ingested by the epigrowth feeder Chromadorina germanica to any extent, whereas most of the algae tested were more or less equally grazed (Tietjen and Lee 1977 a). In addition, Deutsch (personal communication) observed that Chromadorina germanica did not survive on diets of bacteria alone, but was sustained by most algae tested. Where bacteria were found in the gut of Chromadorina germanica they showed no signs of being digested. Therefore, it is probable that the primary distribution of epigrowth feeders is confined to sedimentary layers containing large quantities of algae, such as the 0-2 cm zone in the present study.

The primary distribution of some non-selective deposit feeders (Axonolaimus interrogativus) and some predator/omnivores (Oncholaimus paralanqrundensis and Enoplolaimus vulgaris) also occurred in the 0-2 cm layer. Since algae have been observed in the guts of the above species in the present study, the distribution in the upper layers may be somewhat related to feeding. Although Axonolaimus interrogativus lacks teeth and cannot puncture algal cells and suck out the contents, or scrape algae off sand grains, the large size of the buccal cavity may enable this species to ingest some algal cells intact. The predator/

omnivores (Oncholaimus paralangrunensis and Enoplolaimus vulgaris) with their massive teeth and very large buccal cavity have the option of piercing large algal cells and sucking out contents or ingesting the entire algal cell.

In addition to food, environmental parameters such as oxygen, Eh, and sulfide may also affect the vertical distribution of nematode species. The 0-2 cm layer at Sandy Hook is a zone of significantly greater oxygen and significantly lower sulfide concentration than the deeper layers. Significant positive correlations of many epigrowth feeders as well as other feeding types with oxygen and Eh, and significant negative correlations with sulfide were found in this study. This suggests that certain species may be oxyphilic and exist in these upper layers in order to meet their physiological and metabolic requirements.

Some of the nematodes that occurred primarily in the upper layers at Sandy Hook (Oncholaimus paralangrunensis, Tripyloides gracilis, Neochromadora poecilosoma and Nudora lineata) were found to have high respiration rates and/or be most sensitive to low Eh values in other studies (Wieser and Kanwisher 1961; Wieser et al. 1974).

High respiration rates may be necessary to sustain metabolic and behavioral functions required by various feeding activities (Wieser and Kanwisher 1961; Wieser and Schiemer 1977). In the present study most of the epigrowth feeders (Neochromadora poecilosoma, Neochromadora tecta, Nudora lineata, Chromadorita sp., Cyatholaimus gracilis and Tripyloides gracilis); some of the non-selective deposit feeders (Axonolaimus interrogativus); and some of the predator/omnivores (Oncholaimus paralangrunensis) were observed to be very active; moving with constant swimming motions. Wieser and Kanwisher (1961) observed that Axonolaimus interrogativus

and Oncholaimus paralangrunensis continuously moved with "whip like motions of the whole body." Wieser and Kanwisher (1961) and Wieser (1977) have suggested that the increase in respiration associated with the increase in activity is related to the feeding behavior and morphology of the buccal cavity. They have speculated that species with larger buccal cavities can only use a fraction of the food that they ingest; therefore, these species may have to move about more actively to ingest larger quantities of food.

Sulfide may also limit the distribution of certain nematodes to the upper layers. For example, Lasserre and Renaud-Mornant (1973) have found that some meiofauna have low tolerances to low oxygen concentrations when small quantities (7 mg/l) of sulfide are present. Thus, the restriction of many nematodes to the upper layers may reflect their increased sensitivity to low oxygen concentration in the presence of sulfides and increased respiration rates associated with their feeding behavior.

Nematode species distribution in the 2-6 cm zone

The 2-6 cm layer is dominated by species which, on the basis of buccal morphology, are classed as selective deposit feeders. The selective deposit feeders at Sandy Hook have very small buccal cavities and lack teeth. Thus, they are restricted to feeding on very small particles. An oxygen minimum zone between 2 and 6 cm that corresponds to a zone of maximum hydrogen sulfide indicates that increased anaerobic processes, such as SO_4^{2-} reduction, are due to maximal bacterial activity below the surface layers (Jorgensen 1977). Thus, the 2-6 cm layers have potentially abundant densities of bacteria available as food resources.

Tietjen (personal communication) has shown that a selective deposit feeder (Diplolaimella sp.) does not grow as well on diatoms and large chlorophytes as it does on bacteria and small chlorophytes. This suggests that distribution of selective deposit feeders may be at least partially related to the distribution of small size food particles (bacteria and small chlorophytes). A combination of the abundance of bacteria and particular physiological requirements of the organisms (to be discussed later), may have been responsible for selective deposit feeders having their centers of abundance in the 2-6 cm layers.

In addition to selective deposit feeders, one species of non-selective deposit feeder (Theristus flevensis) was also found to be most abundant in the 2-6 cm layers. Compared to selective deposit feeders, Theristus flevensis has a large stoma which enables it to ingest algae as well as bacteria.

Some predator/omnivore species (Pareurystomina accuminata, Halichoanolaimus raritanensis and Siphonolaimus conicus) were also found to have their primary centers of distribution from 2 to 6 cm. Since the predator/omnivores possess very large buccal cavities and massive teeth, they can exploit a wide variety of food resources. No data on the qualitative or quantitative aspects of their feeding behavior are available, but Odontophora setosa (non-selective deposit feeder) was observed in the guts of Halichoanolaimus raritanensis and Pareurystomina accuminata on a number of occasions. Further explanation of their vertical distribution may be found in particular metabolic requirements and interaction, with other nematode species throughout the sediment.

Besides food, environmental parameters such as dissolved oxygen and sulfide may explain the occurrence of the above nematode species in

the 2-6 cm layers. In general, the nematodes that are primarily distributed in the 2-6 cm layers exhibited significant negative correlations with dissolved oxygen and positive correlations with sulfide. This suggests that the nematode species in these layers may be more euryoxic and can withstand higher sulfide concentrations than the nematodes in the 0-2 cm layer. Some of the nematodes that occurred primarily in the lower layers at Sandy Hook (Anticoma litoris and Halichoanolaimus raritanensis) were found to have lower respiration rates and/or were the least sensitive to low Eh values as noted by Wieser and Kanwisher (1961). Compared to the constant swimming activity noted for species in the 0-2 cm zone at Sandy Hook, nematodes in the 2-6 cm layer, such as Anticoma litoris and Crenopharynx marioni were often much more sluggish. Wieser and Kanwisher (1961) observed that species with low respiration rates ($300-500 \text{ mm}^3 \text{O}_2/\text{g/hr}$; were slower moving than those with high respiration rates $1000-1800 \text{ mm}^3 \text{O}_2/\text{g/hr}$). They also found that the selective deposit feeder Anticoma litoris ($400-625 \text{ mm}^3 \text{O}_2/\text{g/hr}$) was often "lying motionless in a rigid position" while more active epigrowth feeding species, such as Tripyloides gracilis ($940-1860 \text{ mm}^3 \text{O}_2/\text{g/hr}$), were constantly moving. Thus, the distribution of some nematodes in the 2-6 cm layer may be explained by their ability to exploit food materials in environments with low oxygen and elevated sulfide concentrations.

Nematode species whose distribution extends throughout the 0-6 cm zone

Although most nematodes at Sandy Hook occurred primarily in either the more highly oxidized zones (0-2 cm) or the more reduced zones (2-6 cm), some species (Polysigma uniforme, Desmodora scaldensis, Desmodora polychaeta, Odontophora setosa and Theristus acer) occurred in

relative equal abundances throughout the 0-6 cm zone. These species may be able to exist over a broader range of environmental conditions because of increased plasticity of food and metabolic requirements than species living primarily in the 0-2 or 2-6 cm zones.

Species distributed throughout the core may be able to exploit algae and bacteria in the upper or lower layers that may not be processed by either epigrowth feeders or deposit feeders living primarily in the 0-2 and 0-6 cm layers, respectively. Species with more uniform distributions may possess a suite of digestive enzymes that makes it possible for them to digest materials not digested by other nematodes. For example, Tietjen *et al.* (1970) noted that large numbers of chlorophyte ingested by a deposit feeder passed through the gut almost totally undigested. Thus, it is possible that algal or bacterial cells that are passed out of the guts of some nematodes living primarily in the 0-2 or 2-6 cm layers may be exploited by those nematodes living throughout the 0-6 cm zone.

In addition to food, the species that occur throughout 0-6 cm must also have a wide tolerance for dissolved oxygen and sulfide. The range of dissolved oxygen in the 0-2 and 2-6 cm layers is from 34% to 6% of air saturation and the range of sulfide in the 0-2 and 2-6 cm layers is from 0.37 mg/l to 1.05 mg/l. Species that exist throughout these layers may be considered euryoxic. Wieser and Kanwisher (1961) and Teal and Wieser (1966) have found that closely related species (Desmodora cephalata, Odontophora papusi, Theristus sp.) to those found at Sandy Hook had "intermediate" respiration rates ($600-900 \text{ mm}^3 \text{ O}_2/\text{g/hr}$) and/or "intermediate" tolerance to low Eh. Thus, respiration rates and tolerance experiments may suggest that metabolic requirements for

some nematode species evenly distributed throughout 0-6 cm may be satisfied by oxygen conditions in either the 0-2 cm layer or 2-6 cm layer.

Interactions of nematode species

Since a large number of nematodes are confined to a small space such as the 0-6 cm layer, differences in reproductive strategy, feeding activities and vertical partitioning of the sediment may be employed to avoid interaction. For example, Neochromadora poecilosoma and Neochromadora tecta are both epigrowth feeders that occur primarily in the 0-2 cm layers, and competition for similar food resources might be expected. However, Neochromadora tecta attains peak abundances in January and April, the times of lowest abundance of Neochromadora poecilosoma. Similarly, peak abundances of Neochromadora poecilosoma in May, June and July are at times of lowest abundance of Neochromadora tecta. Juveniles and gravid females have been observed for both of these species during the various months of peak abundances. Thus, interactions may be avoided by temporal variations in reproductive activity.

An example of interaction avoidance occurs when species of the same feeding type partition the environment vertically. For example, Enoplolaimus vulgaris and Halichoanolaimus raritanensis are found primarily in the 0-2 and 2-6 cm layers, respectively. The occurrence of these two species of predator/omnivores in different layers may be a means by which interaction is avoided. Another example occurs with Axonolaimus interrogativus and Theristus flevensis. Both of these species are non-selective deposit feeders, but Axonolaimus interrogativus occurs primarily in the 0-2 cm layer and Theristus flevensis primarily

in the 2-6 cm layer.

A number of species of similar feeding types do, however, occur in the same layers. For example, two epigrowth feeders, Tripyloides gracilis and Nudora lineata both occur in the upper 2 cm of sediment and both exhibit peak abundances during April, December and March. Similarly, some selective deposit feeders (Anticoma litoris and Crenopharynx marioni) both occur in the 2-6 cm layers. Cohabitation of the same environment by two or more species of the same feeding type has also been shown elsewhere (Juario, 1975). Although some species appear to be feeding on the same foods on the basis of buccal morphology, selective ingestion of different species of algae (Tietjen et al. 1970; Tietjen and Lee 1973, 1977 a) has been demonstrated. In addition, selective digestion may also occur. Jennings and Deutsch (1975) studied the digestive enzymes of two species of marine nematodes and detected the enzyme beta-glucuronides, during the digestion of bacteria by Monhystera denticulata. This enzyme, lacking in Chromadorina germanica, may be important in digesting the polysaccharide covering of bacterial cell walls (Jennings and Deutsch 1975). Furthermore, Deutsch (personal communication) has shown that digestion may occur primarily extracellularly in some species and primarily intracellularly in others. Thus, selective digestion as well as selective ingestion may reduce interactions and allow two or more species of the same feeding type to occupy the same environment.

Trophic role of nematodes in benthic communities

The complexity and interactions within the meiobenthic food web was recently reviewed by Coull (1973). Although meiofauna has been found in the guts of macrofauna (Tietjen 1969; Gerlach and Schrage 1969;

Coull 1970) and nektonic forms (Bruun 1949; Smidt 1951; Darnell 1961; Bregnballe 1961; Mulkana 1964), their nutritional value remains unknown (Gerlach 1967). It appears that meiofauna may act as supplementary or emergency food for larger organisms (Gerlach 1971). However, the most important role of meiofauna in marine sediments may be to assist in the recycling of nutrients at lower trophic levels and to enhance the mineralization of organic matter (Johannes 1965; McIntyre 1969, 1973; Marshall 1970; Coull 1973).

In assessing the role of nematodes in mineralization, Tietjen and Tenore (personal communication) have found that the oxidation rate of detritus may be enhanced by the presence of nematodes. Grazing of bacteria by deposit feeders in the lower layers at Sandy Hook may keep bacteria in an active phase of growth (Johannes 1965; Mercer and Cairns 1973) and enhance rates of mineralization in the sediment. Cullen (1973) and Lee *et al.* (1975a) have observed that some nematodes may affect microbial activity in the sediments. The latter authors noted, for example, that in experimental chambers lacking meiofauna anaerobic conditions developed near the sediment surface, whereas in chambers containing meiofauna the RPD occurred much deeper, indicating reworking of the sediment surface. Furthermore, mechanical breakdown of detrital particles by nematodes may make the particles more susceptible to further colonization by bacteria, enhancing organic decomposition.

Besides the break down of detrital particles, the grazing of algae by epigrowth feeders in the upper layers at Sandy Hook may keep the algal cells in an active phase of growth ('physiologically young'). The increase in turnover or oxidation rate of algal cells in these upper layers may, in turn, enhance the recycling of nutrients. Recently,

Tietjen (personal communication) has observed that the epigrowth feeding nematode, Chromadorina germanica, may significantly increase the remineralization of dissolved inorganic phosphorus from live algal cultures.

One of the most important zones involved in mineralization of organic matter in marine sediments is the transition (RPD) between the more highly oxidized and more reduced layers (Fenchel 1969; Jorgensen 1977). Reduced compounds such as hydrogen sulfide in the 2-6 cm layer at Sandy Hook will eventually diffuse into the more oxidized surface layers (0-2 cm). When reduced compounds reach the oxidized layers, the chemical energy stored in organic particles becomes available for organisms living in the surface layers. It has been observed in the present study that some nematodes are evenly distributed vertically throughout the sediment. This pattern of distribution suggests the possibility of movement of these species throughout the oxidized and reduced zones. Any increase in contact between these zones will enhance the exchange of materials and mineralization of organic deposits. Some nematodes that are more evenly distributed throughout the sediment may act in a similar fashion to that proposed for some deposit feeding macrofauna (Rhoads 1974 and Johnson 1977). The concept of "conveyor-belt detritivores" (Rhoads 1974) may be expanded to include species of nematodes (Odontophora setosa, Theristus acer and Comesoma stenocephalum) that are also able to bring sediment from lower depths to the surface. The concept could be further extended to include "conveyor-belt herbivores" (Polysicma uniforme, Desmodora polychaeta and Desmodora scaldensis) that bring oxidized material into the more reduced zones. Thus, the nematodes at Sandy Hook and in other

estuarine sediments may be extremely important in the mineralization of detritus and recycling of nutrients.

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