

ABSTRACT

Katrina Leigh Owens Lueck. VERTICAL DISTRIBUTION OF STAINED BENTHIC FORAMINIFERA IN SEDIMENTS OF THE 23-MILE-ROCK AREA, ONSLOW BAY, NORTH CAROLINA (Under the supervision of Dr. Scott W. Snyder) Department of Geology, April 1995.

Twelve cores, each subdivided at one-cm intervals downward from the sediment-water interface to a maximum depth of 8 cm, yielded 81 samples containing benthic foraminiferal species. These samples were preserved, stained, and sieved to retain the greater-than-63-micron size fraction. The total number of stained specimens, normalized to 10 ml, ranges from 10 to 1070 specimens per sample. Thirty-four species accounting for 84% of stained specimens were statistically analyzed for this study.

Cluster analysis, principle components analysis and two-way analysis of variance do not indicate a preference for depth-related microhabitats. No one species is entirely epifaunal or infaunal; rather all species seem to be infaunal to some degree. The only quantifiable depth-related trends are overall decreases in abundance of stained foraminifera and in species diversity with increasing depth below the sediment-water interface, with the sharpest drop occurring below 4 cm.

Quantitative and qualitative analyses do not indicate a correlation between sediment grain size and species composition, indicating that variation in sediment grain size between cores has little influence on foraminiferal species distributions or the species composition of foraminiferal populations.

Lack of vertical partitioning of the sediments, probably the result of frequent biological and physical mixing, argues for caution in applying microhabitat preferences established in the deep sea to shallow-water/continental shelf environments.

**VERTICAL DISTRIBUTION OF STAINED BENTHIC FORAMINIFERA
IN SEDIMENTS OF THE 23-MILE-ROCK AREA,
ONslow BAY, NORTH CAROLINA**

A Thesis

Presented to

**the Faculty of the Department of Geology
East Carolina University**

In Partial Fulfillment

of the Requirements for the Degree

Master of Science in Geology

by

Katrina Leigh Owens Lueck

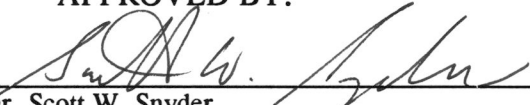
April 1995

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IN SEDIMENTS OF THE 23-MILE-ROCK AREA,
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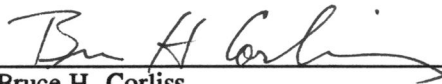
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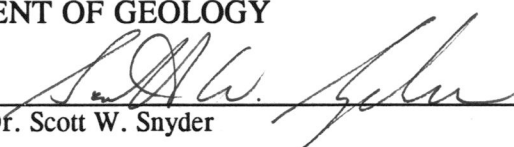
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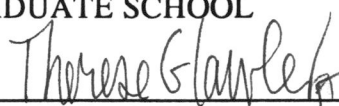
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INTRODUCTION

Although many studies have recognized infaunal habits among benthic foraminifera (Boltovskoy, 1966; Buzas, 1965, 1977; Frankel, 1972, 1975; Corliss, 1985; Gooday, 1986; among others), detailed knowledge of interspecific differences in microhabitat variation is incomplete. Vertical stratification of species exists within deep-sea sediments (Corliss, 1985; Corliss and Emerson, 1990), but studies on shallow-water sediments have reached varying conclusions. For example, Buzas (1974), Collison (1980), and Bernhard (1989), found no evidence of vertical stratification, whereas Matora and Lee (1972), Jorissen and others (1992), and Barmawidjaja and others (1992) did recognize vertical stratification for some species. Study of the upper 10 cm of surface sediment would give a more accurate representation of the total fauna than examination of only the sediment-water interface (Denne and Sen Gupta, 1989; Loubere, 1989; Loubere and Gary, 1990).

Because geochemical gradients are steep in the first few cm of many sediments, it is important to determine where species live with respect to the sediment-water interface (McCorkle and Emerson, 1988). For example, deep-sea benthic foraminifera, used extensively for paleoceanographic (isotopic and elemental) studies (Corliss and others, 1986), may equilibrate with interstitial waters of their respective microhabitats rather than with overlying bottom waters.

In order to better understand and interpret microfossil assemblages used in paleoecology, modern microhabitat variation and interspecific differences must be documented. The more that is known about microhabitat preferences, the more detailed reconstruction of paleoenvironments can be. The ability to correctly interpret at what depth within the sediment taxa lived, and whether they preferred a particular grain size or composition is essential.

This study addresses modern foraminifera in surface sediments of the mid-continental shelf, their preferred microhabitats, and their relationship to sediment type and grain size. Specific objectives are to determine:

1. foraminiferal microhabitat preferences with respect to the sediment-water interface;
2. relationships (if any) between the species composition of foraminiferal populations and proximity to hardbottom scarps;
3. relationships (if any) between sediment grain size and species composition of foraminiferal populations.

STUDY AREA

ONslow BAY

Onslow Bay (Fig. 1) is a high-energy, sediment-starved, arcuate embayment located on the southeastern continental margin of North Carolina. It is bordered by Cape Fear to the south and Cape Lookout to the north. The continental shelf extends from the barrier islands to approximately the 50-meter isobath. The study area, known as 23-Mile-Rock, is located at mid-shelf in southeastern Onslow Bay (Fig. 1).

Pleistocene moldic calcirudites and oolitic calcarenites unconformably overlie shallow-dipping Miocene beds and form irregularly distributed hardbottoms genetically related to high-frequency sea-level fluctuations (Riggs and others, 1985). Pleistocene carbonates deposited during marine transgressions were altered during subsequent regressive periods by subaerial and fluvial processes (Snyder and Riggs, 1989), forming flat indurated hardbottoms of extensively bored, fossiliferous calcarenites with variable amounts of quartz sand and phosphate (Mearns, 1986). Along the continental shelf, these hardbottoms have been partially eroded to form mesa-like carbonate platforms surrounded by vertical scarps, rising up to 10 meters above the adjacent

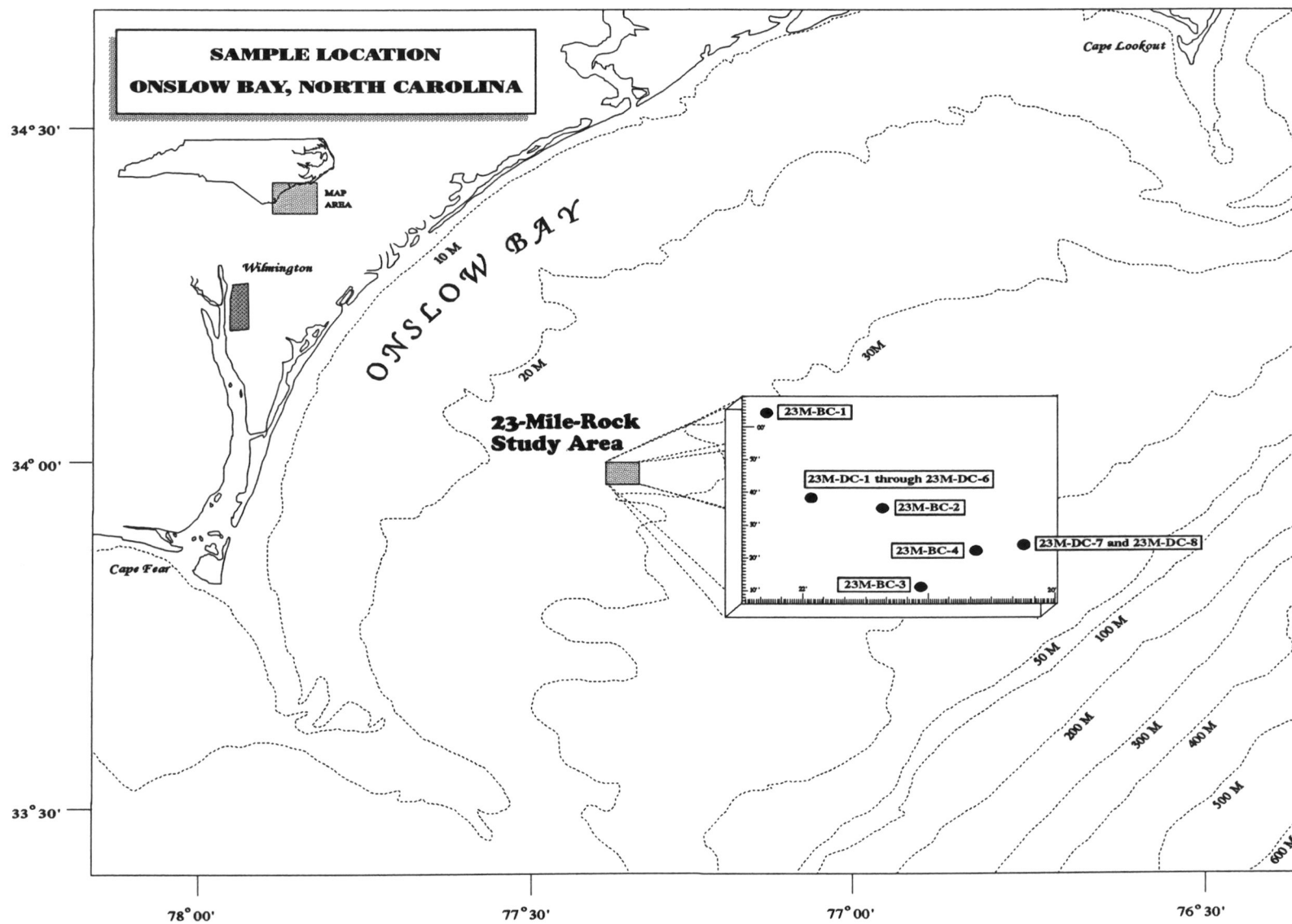


Figure 1. Location of 23-Mile-Rock study area and sample cores.

seafloor, and rubble ramps which support abundant marine biota (Snyder and Riggs, 1989). Mobile Holocene sands thinly cover approximately 10% of the hardbottoms (Riggs, oral communication). These sands consist of two major types: fine sand, composed mostly of quartz, and gravelly sands, composed mostly of carbonate material.

Onslow Bay is influenced by the Carolinian Coastal water mass which is formed by Gulf Stream water mixing with minimal land runoff (Bumpas and Pierce, 1955). Sediments of Onslow Bay are uniformly low in organic carbon, and seem to support a distinct benthic microflora in surface sands across the continental shelf (Cahoon, and others, 1990). January bottom temperatures range from 10°C near shore to 19°C at the shelf edge (Bumpas and Pierce, 1955; Pietrafesa and others, 1985) with summer bottom temperatures reaching 26°C (Atkinson, 1985). Bottom temperatures obtained by CTD in July 1992, averaged 23°C at the study area. Surface water temperatures range from 12°C in winter to 27°C in the summer (Fuglister, 1947; Atkinson, 1985; Pietrafesa and others, 1985). Bottom-water salinity generally ranges between 35-36 ‰ (Bumpas and Pierce, 1956). Bottom-water salinity measurements obtained by CTD at the study area averaged 36.5 ‰ in the summer of 1992. Because temperature and salinity data were not available for 1991, the year most samples were taken, data from the following year were used.

TRANSECT LINE

The study area transect line crosses through six different environments (Fig. 2). They are from south to north: lower sand flats, an erosional ramp, middle flat hardbottom, a vertical scarp and overhang, and an upper flat hardbottom.

The distal portion of the lower sand flats consists of fine sands 0.5 to 0.7 m thick, lying above a 6 to 8 cm thick layer of rippled gravelly sand. The gravelly sand is

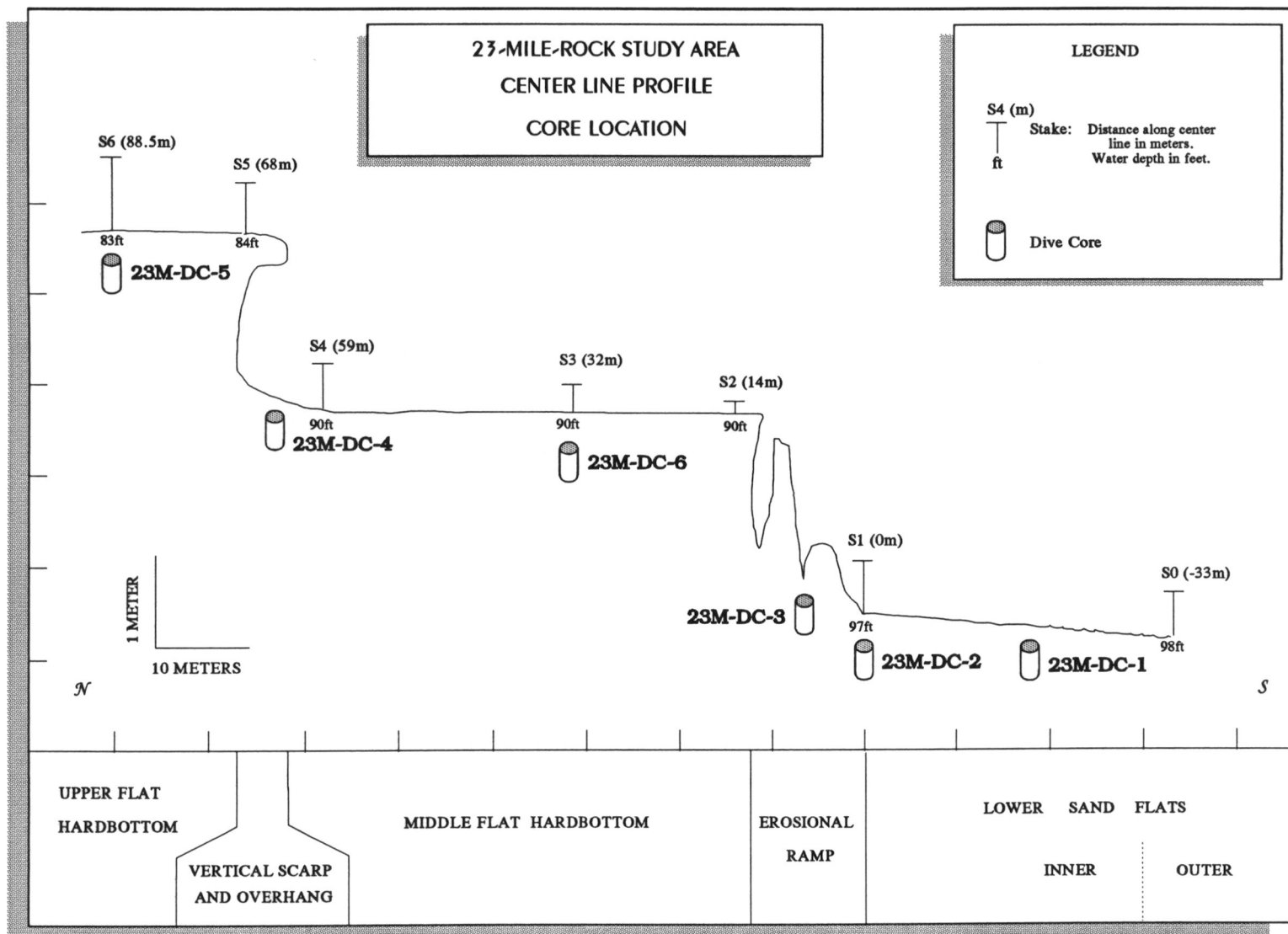


Figure 2. Location of cores along transect line.

a mixture of highly abraded and corroded shells and shell hash. The proximal portion of the lower sand flats is a nonrippled, fine sand about 15 cm thick overlying a hard Miocene substrate. The erosional ramp, 4 to 15 m wide, consists of moderately-hard Quaternary limestone blocks ranging from 1 to 7 m across. These blocks are dissected by sand-filled crevasses that are 20 to 60 cm wide at the top. The middle flat hardbottom is dominated by medium to coarse biogenic sand, from 0 to 5 cm thick with some local areas up to 15 cm thick in the southern half, and thickening to 15 cm northward towards the vertical scarp. Underlying these sands is a moderately-hard, fine-grained moldic carbonate. Sands at the base of the scarp range from fine to medium-grained with very little biogenic material. They are frequently moved by currents that flow into the wall and are turned parallel to the scarp. Cones of sand up to 0.7 m high are found locally at the base of the scarp. The rock surface of the upper flat hardbottom is flat and smooth, apparently a hardened upper crust of cemented limestone. It is covered with sand that ranges from 1 to 6 cm deep, with occasional elongated sand mounds about 6 cm thick and 30 cm across.

PREVIOUS WORKS

Widely cited studies of the vertical distribution of foraminifera within bottom sediments have focused on the deep sea. Corliss (1985) concluded that depth distribution of deep-sea foraminifera is controlled by physicochemical conditions within sediments rather than by overlying bottom-water conditions, that distinct morphological features are associated with epifaunal vs. infaunal species, and that taxa are vertically stratified as a result of preference for specific microhabitats within the upper 15 cm of sediment. Gooday (1986) documented vertical stratification and the existence of microhabitat preference among deep-sea benthic foraminifera, as did Corliss and

Emerson (1990) for benthic foraminifera from the Scotian margin and Gulf of Maine (200-3000m). Corliss (1991) correlated microhabitat preference with test morphology.

Studies along continental margins often do not reveal patterns similar to those of the deep sea. Buzas found no evidence for vertical stratification of foraminifera in the top 10 cm of sediment in Rhode River, Maryland (1974) or to depths of 7 cm in Indian River, Florida (1977). Ellison and Peck (1983) reported that the abundance of species, particularly agglutinated types, declined with depth below the sediment-water interface on the New Jersey continental shelf. Corliss and Fois (1990) determined that infaunal morphotypes dominate shallow water (100 to 1300 m), whereas epifaunal morphotypes dominate deeper water (> 2000 m) with a transitional zone from 1300 to 2000 m. In the Northern Adriatic Sea, Barmawidjaja and others (1992) found no taxa to be exclusively epifaunal or infaunal, while Jorissen and others (1992) concluded that microhabitat separation is controlled by oxygen content of bottom sediments and that downward organic flux is the main factor determining overall benthic foraminiferal abundance. While studying foraminiferal distribution on the California continental slope, Bernhard (1992) determined certain species are infaunal while others live only at the sediment surface. Recently, Murosky and Snyder (1994) found no evidence for microhabitat preference in southernmost Onslow Bay, and Jorissen and others (1994) came to a similar conclusion in a study of sediments in submarine canyons off New Jersey.

Studies on the influence of sediment grain size on foraminiferal population densities also have produced contrasting conclusions. Boltovskoy (1966) noted that the greatest penetration occurs in coarsest sediments, probably due to better aeration, which implies a relationship to availability of dissolved oxygen. Matera and Lee (1972) noted correlation of vertical and lateral foraminiferal distributions with changes in sediment grain size. Anderson (1975) found that the number of species and the number

of foraminifera per gram of sediment increases with increased mud content. Conversely, Boltovskoy and Wright (1976) stated that substrate preference may be due to cohesion rather than to grain size. Buzas and others (1989) found that particle size was not an important factor in foraminiferal species composition or density as long as there was some mud present. Buzas (1989) also concluded that mineralogy of the sediment was not an important factor.

METHODS

Twelve cores, all collected in late spring to mid-summer in 1989 and 1991, from the 23-Mile-Rock Area were used in this study (Fig. 1 and Table 1). Eight of these cores, two (23M-DC-7 and 23M-DC-8) collected by Shepard in 1989 and six (23M-DC-1 through 23M-DC-6) from the RASS-91 research cruise, were retrieved by divers. The six cores from the RASS-91 cruise were taken through various environments (Fig. 2) along a transect perpendicular to a hardbottom escarpment. The remaining four cores (23M-BC-1 through 23M-BC-4) are subsamples from box cores acquired during research cruise CH-06-91 aboard the R/V Cape Hatteras. Both diver-retrieved cores and subsamples of box cores were taken using a plastic core-liner manually inserted into the sediment and capped. Cores were handled carefully to prevent mixing within the core. On deck, sediment was extruded at one-cm intervals, sequentially sliced off, and preserved in a solution of buffered formalin, sea water and rose Bengal. Rose Bengal stains foraminifera that contain cytoplasm at time of collection. Because rose Bengal may stain cytoplasm months after death (Bernhard, 1988), specimens will be referred to as stained rather than living.

In the lab, each sample was washed through a No. 230 U. S. Standard sieve (63 μm mesh) to remove fine sediment, then stored in ethyl alcohol until picked. Just prior to picking, samples were dried, split using a microsplitter, and then rewetted. Stained

Sample no. (this study)	Source	Cruise Sample No.	Date	Depth of Core (cm)	Latitude	Longitude
23M-DC-1	RASS-91	1	8-4-91	6	33°59'37.8"	77°21'56.4"
23M-DC-2	RASS-91	3	8-4-91	8	"	"
23M-DC-3	RASS-91	4	8-6-91	8	"	"
23M-DC-4	RASS-91	7	8-6-91	6	"	"
23M-DC-5	RASS-91	10	8-9-91	2	"	"
23M-DC-6	RASS-91	12	8-9-91	4	"	"
23M-DC-7	SHEPARD	1	8-18-89	8	33°59'23.4"	77°20'15"
23M-DC-8	SHEPARD	4	8-18-89	7	"	"
23M-BC-1	CH-O6-91	BC-103	5-22-91	8	34°00'3.6"	77°22'18"
23M-BC-2	CH-O6-91	BC-104	5-22-91	8	33°59'34.2"	77°21'21"
23M-BC-3	CH-O6-91	BC-106	5-22-91	8	33°59'10.8"	77°21'4.8"
23M-BC-4	CH-O6-91	BC-105	5-22-91	8	33°59'21.6"	77°20'37.2"

Table 1. Samples used in this study.

specimens were picked, sorted and identified to species or subspecies level and counted. Counts were then normalized to a sediment volume of 10 ml. Dive core samples taken during the RASS-91 cruise were halved in the field. Half was preserved for analysis of foraminifers, and the remainder was utilized for sedimentological analysis.

Abundance data were transformed using $\ln(x+1)$ to make the data more nearly normal and to stabilize variance (Scheffe, 1959; Buzas, 1977). Using SAS (Statistical Analysis System) software, several statistical tests were performed. A cluster analysis was used to recognize populations with similar species in similar abundances. Principal component analysis (PCA) was used to identify which species accounted for the most variance. Because it is difficult to interpret unrotated factors, the widely used varimax rotation (Norusis, 1985; Afifi and Clark, 1990) method was used to render results more easily interpretable. An analysis of variance was performed on the 10 most abundant species plus those species identified by PCA, for a total of 15 species.

Sedimentological analysis of the transect cores (23M-DC-1 through 23M-DC-6) began by drying and weighing each sample. Mud was removed by wet sieving through a 63 μm mesh. After drying, the sample was again weighed and poured into a set of stacked sieves to separate coarse, medium and fine sand fractions (1, 2, and 4 phi). Sieves were placed on a Ro-Tap shaker for 15 minutes. The fraction from each sieve was then weighed and recorded.

Data collected from each sample were plotted on a ternary diagram to recognize groupings. A cluster analysis was used to group samples with similar sedimentological compositions. A separate cluster analysis was performed using foraminiferal population data from the transect cores (23M-DC-1 through 23M-DC-6) in order to facilitate comparison with sedimentological data. A Pearson correlation analysis was done on a data matrix consisting of sedimentological composition data and foraminiferal

population data to investigate possible relationships between grain size and species composition of foraminiferal populations.

RESULTS

VERTICAL DISTRIBUTION

Eighty-one samples from twelve cores yielded 142 species. The total number of stained specimens, normalized to 10 ml, ranged from 10 to 1070 specimens per sample, for a total of 17,131 stained specimens. Thirty-four species representing the most abundant and/or persistent taxa were utilized for this study. These 34 species account for 84% of stained specimens and closely parallel abundance trends of the entire data set (Fig. 3).

Qualitative Analysis

Qualitative analysis indicates that taxa are not vertically stratified within surface sediments. No one species is entirely epifaunal or infaunal; rather all species seem to be infaunal to some degree. Individual species decline in mean abundance as depth below the sediment-water interface increases.

Cumulative abundances for the 34 most abundant or persistent taxa (Table 2) and for all 142 species (Table 3) indicate no preference for a particular interval below the sediment-water interface. Abundance trends of dominant species for each core are presented in Appendix A. The maximum number of specimens occurs at various intervals within individual cores. Mean cumulative abundances for all cores combined indicate a general decrease in specimens as depth in the sediment increases.

The mean number of species for all cores combined also declines with depth (Table 4). Although most cores are characterized by progressive reduction of diversity

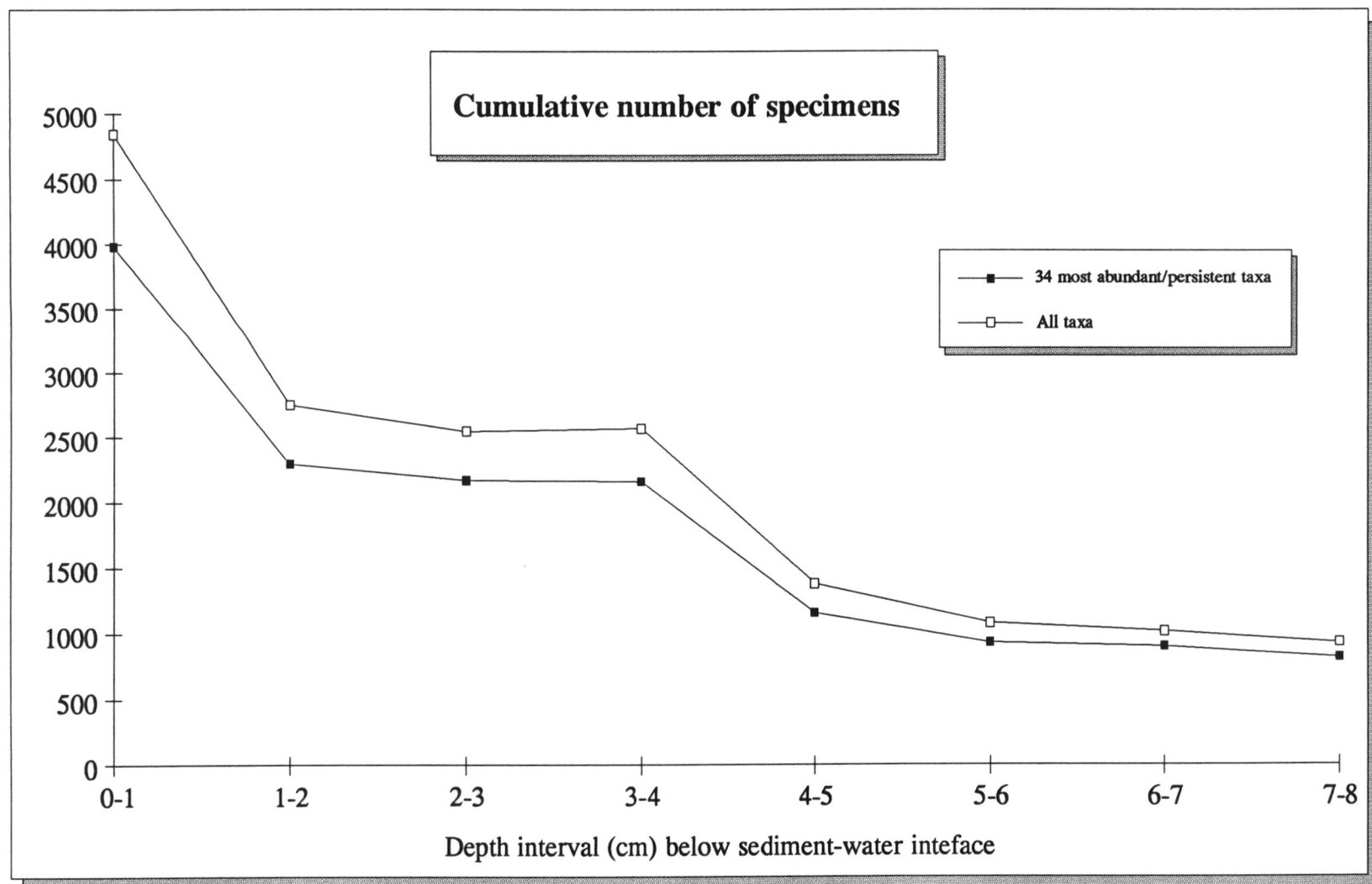


Figure 3. Graph illustrating parallel trends between all 142 taxa and 34 most abundant/persistent taxa (counts normalized to 10 ml sample volume).

	DC1	DC2	DC3	DC4	DC5	DC6	DC7	DC8	BC1	BC2	BC3	BC4	Total	Mean
0-1 cm	395	482	293	240	269	543	319	620	98	132	449	140	3979	332
1-2 cm	41	331	249	252	97	471	242	211	55	124	85	136	2295	191
2-3 cm	34	353	129	324		241	143	223	77	373	106	163	2167	197
3-4 cm	51	62	307	163		185	138	97	76	880	77	125	2160	196
4-5 cm	60	40	175	118			130	136	87	283	9	120	1158	116
5-6 cm	90	54	99	58			112	74	98	149	40	158	932	93
6-7 cm		22	342				69	40	87	139	76	127	902	100
7-8 cm		31	251				90		80	203	56	107	818	102

Table 2. Cumulative abundances of the 34 most abundant/persistent species (adjusted to 10 ml sample volume and rounded to nearest whole number).

	DC1	DC2	DC3	DC4	DC5	DC6	DC7	DC8	BC1	BC2	BC3	BC4	Total	Mean
0-1 cm	467	591	385	301	287	661	394	740	123	151	579	164	4843	404
1-2 cm	48	416	316	302	111	566	275	247	61	157	93	163	2754	230
2-3 cm	35	416	175	379		292	165	257	81	452	109	186	2548	232
3-4 cm	55	76	381	192		205	157	113	87	1070	86	151	2571	234
4-5 cm	65	47	231	136			139	166	93	357	10	137	1381	138
5-6 cm	90	60	127	77			125	88	105	180	42	185	1082	108
6-7 cm		23	385				75	40	89	165	83	158	1018	113
7-8 cm		33	289				108		90	238	60	117	934	117

Table 3. Cumulative abundances of all 142 species (adjusted to 10 ml sample volume and rounded to nearest whole number).

	DC1	DC2	DC3	DC4	DC5	DC6	DC7	DC8	BC1	BC2	BC3	BC4	Mean
0-1 cm	64	76	67	66	43	74	57	71	34	42	71	43	59
1-2 cm	25	65	59	56	28	73	47	51	17	40	27	51	45
2-3 cm	15	64	42	67		61	45	47	15	65	24	48	45
3-4 cm	22	32	58	52		39	37	35	24	69	29	48	40
4-5 cm	20	25	50	38			35	50	17	72	6	46	36
5-6 cm	11	26	44	34			36	35	16	37	14	53	31
6-7 cm		13	51				27	18	12	43	24	53	27
7-8 cm		15	53				33		10	52	18	31	27

Table 4. Total number of stained species.

with increasing depth, three cores show a maximum number of species below the 0-2 cm interval.

Cluster Analysis

In an attempt to identify any vertical or lateral distribution trends, cluster analysis was performed using the 34 most abundant or persistent species (Table 5). The average-linkage method was used to group samples according to the degree of between-sample faunal similarity. Six clusters were selected based on the "Cubic Clustering Criterion" as suggested by the SAS users guide (SAS Institute, Inc., 1985).

Four major clusters were formed along with 2 single-sample clusters (Fig. 4), each of which represents a sample with an unusually high number of individuals and high species diversity. The four major clusters (labeled A-D) are most useful for investigating faunal trends.

Cluster A -- With 50 samples, this cluster is the largest of the four. It contains more than half of all samples, including all samples from cores 23M-BC-1 and 23M-BC-4, all but the top centimeter of cores 23M-DC-1 and 23M-BC-3, all but the top 3 centimeters from cores 23M-DC-2 and 23M-DC-8, along with samples from cores 23M-DC-3, 23M-DC-4, and 23M-DC-7. Cluster A is characterized by samples with low diversity and by rarity of *Rosalina concinna*, *Neoconorbina terquemi* and *Cibicidoides* cf. *C. io*. All samples from deeper than 5 cm, excluding three, fall into this cluster, reflecting a general decrease in abundance and species diversity with depth.

Cluster B -- Consisting of 14 samples, this cluster represents samples ranging from zero to three cm in depth. Samples from the 0-1 cm depth interval from half the cores cluster here. Characterized by moderate abundances of *Angulogerina angulosa occidentalis* combined with high abundances of *Nonionoides auriculus*, *Stetsonia*

Depth interval below sediment-water interface (cm)	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	17	12	11	14	9	8	11	9
<i>Asterigerina carinata</i>	44	22	32	37	16	13	19	25
<i>Bigerina irregularis</i>	3	2	2	1	1	0	1	0
<i>Bolivina lowmani</i>	4	2	2	3	1	2	3	2
<i>Caribbeanella polystoma</i>	5	2	4	4	1	1	1	2
<i>Cibicides bradyi</i>	17	9	11	13	6	5	8	8
<i>Cibicidoides cf. C. io</i>	2	2	2	3	1	0	1	1
<i>Discorbinella bertholoti</i>	14	12	11	11	6	6	5	5
<i>Eggerella advena</i>	5	4	2	2	2	1	0	1
<i>Fursenkoina punctata</i>	6	5	3	2	3	3	4	2
<i>Gavelinopsis praegeri</i>	27	19	19	20	14	16	13	17
<i>Hanzawaia concentrica forma typica</i>	4	2	2	1	1	1	1	2
<i>Neoconorbina terquemi</i>	7	5	6	6	1	2	2	3
<i>Nonionoides atlanticus</i>	9	3	4	1	1	2	1	1
<i>Nonionoides auriculus</i>	14	7	6	1	3	2	2	1
<i>Peneroplis proteus</i>	5	2	2	2	1	2	3	1
<i>Quinqueloculina bicarinata</i>	6	2	2	2	2	1	1	2
<i>Quinqueloculina compta</i>	5	4	3	4	3	1	2	1
<i>Quinqueloculina cf. Q. milleti</i>	6	3	2	2	1	0	0	1
<i>Quinqueloculina parkeri forma occidentalis</i>	3	2	2	2	1	0	2	1
<i>Rectobolivina advena</i>	2	1	2	3	2	1	2	2
<i>Rosalina concinna</i>	10	5	5	3	2	1	2	2
<i>Rosalina globularis</i>	30	13	15	15	9	6	6	5
<i>Sagrina pulchella</i>	5	2	2	2	1	1	2	1
<i>Stetsonia minuta</i>	16	10	7	5	4	1	3	2
<i>Textularia candeiana</i>	7	3	2	4	2	1	1	1
<i>Textularia conica</i>	5	3	4	5	2	1	1	1
<i>Trochammina advena</i>	3	2	2	4	2	1	1	1
<i>Trochammina compacta</i>	4	3	3	2	1	1	2	1
<i>Trochammina inflata</i>	1	2	2	1	1	1	1	1
<i>Trochammina lobata</i>	5	4	3	2	1	0	1	0
<i>Trochammina ochracea</i>	30	17	17	17	11	9	10	10
<i>Trochammina squamata</i>	6	2	4	1	2	1	1	3
<i>Valvulineria cf. V. floridana</i>	5	3	3	3	2	1	2	2

Table 5. Mean number of specimens at each depth interval for the 34 most abundant/persistent taxa (normalized to 10 ml sample volume).

minuta, *Rosalina globularis*, *Quinqueloculina* cf. *Q. milletti* and *Asterigerina carinata*, cluster B has high species diversity and common occurrences of numerous species.

Cluster C -- This cluster, containing 9 samples, is composed of samples from two cores: 23M-DC-3 and 23M-BC-2. It is characterized by high abundance of *Angulogerina angulosa occidentalis*, *Asterigerina carinata*, and *Gavelinopsis praegeri*, combined with a rarity of *Nonionoides atlanticus* and *Nonionoides auriculus* and high species diversity (though not as high as cluster B) .

Cluster D -- The six samples in this cluster come from cores 23M-DC-4, 23M-DC-5, and 23M-DC-6, all taken along the transect line. Cluster D is typified by rarity of several species (*Fursenkoina punctata*, *Neoconorbina terquemi*, *Rectobolivina advena*, *Sagrina pulchella*, *Textularia candieana*, and *Nonionoides atlanticus*) combined with a high abundance of *Discorbinella bertheloti*.

A tendency for species to occupy certain depths within the sediment would be shown as samples clustering with other samples of the same or similar depth on the dendrogram. As Figure 4 shows, each of the four major clusters contain samples from various depths. Only cluster B shows any relation to depth with all of its samples falling between zero to three cm.

Principle Component Analysis

Using the 34 most abundant and persistent taxa, a principle component analysis was performed followed by a varimax rotation. Four factors accounting for 88% of the total variance were retained by the mineigen criterion. The proportions of the total variance attributable to each factor are: Factor 1 = 65%; Factor 2 = 11%; Factor 3 = 8%; Factor 4 = 4%.

Twelve species are associated with the four factors by having high positive loadings (Table 6). Communality estimates for three of these species approach one:

PRINCIPLE COMPONENTS ANALYSIS VARIMAX ROTATION				
Species	Factor 1	Factor 2	Factor 3	Factor 4
<i>Angulogerina angulosa occidentalis</i>	-0.11	0.30	0.92	0.15
<i>Asterigerina carinata</i>	0.21	0.95	0.21	0.06
<i>Bigenerina irregularis</i>	0.46	0.38	0.01	0.17
<i>Bolivina lowmani</i>	0.31	0.48	0.57	0.06
<i>Caribbeanella polystoma</i>	0.23	0.46	0.17	0.14
<i>Cibicides bradyi</i>	0.33	0.48	0.34	-0.01
<i>Cibicidoides cf. C. io</i>	0.15	0.72	0.28	0.26
<i>Discorbinella bertheloti</i>	0.52	0.51	0.05	0.27
<i>Eggerella advena</i>	0.42	0.16	0.41	0.10
<i>Fursendoina punctata</i>	0.01	0.04	0.56	-0.01
<i>Gavelinopsis praegeri</i>	0.06	0.40	0.30	0.86
<i>Hanzawaia concentrica forma typica</i>	0.67	0.27	0.16	0.04
<i>Neoconorbina terquemi</i>	0.42	0.67	0.17	0.23
<i>Nonionoides atlanticus</i>	0.83	0.11	0.05	0.09
<i>Nonionoides auriculus</i>	0.89	0.07	-0.04	0.01
<i>Peneroplis proteus</i>	0.45	0.32	0.14	0.00
<i>Quinqueloculina bicarinata</i>	0.58	0.12	0.26	0.20
<i>Quinqueloculina compta</i>	0.28	0.45	0.55	0.24
<i>Quinqueloculina cf. Q. milletti</i>	0.72	0.44	0.07	0.09
<i>Quinqueloculina parkeri forma occiden</i>	0.22	0.18	0.51	0.23
<i>Rectobolivina advena</i>	-0.01	0.54	0.61	0.05
<i>Rosalina concinna</i>	0.79	0.29	0.04	0.06
<i>Rosalina globularis</i>	0.73	0.45	0.23	0.24
<i>Sagrina pulchella</i>	0.46	0.01	0.65	-0.10
<i>Stetsonia minuta</i>	0.73	0.26	0.42	0.05
<i>Textularia condeiana</i>	0.29	0.62	0.52	0.18
<i>Textularia conica</i>	0.17	0.60	0.44	0.14
<i>Trochammina advena</i>	0.29	0.69	0.11	0.19
<i>Trochammina compacta</i>	0.62	0.20	-0.01	0.09
<i>Trochammina inflata</i>	0.12	0.23	0.02	0.28
<i>Trochammina ochracea</i>	0.78	0.24	0.40	0.16
<i>Trochammina squamata</i>	0.72	0.04	0.22	-0.11
<i>Trochammina lobata</i>	0.68	0.23	0.10	0.12
<i>Valvulineria cf. V. floridana</i>	0.58	0.59	0.16	-0.03

Table 6. Principle components analysis with varimax rotation. Shaded values indicate high positive loadings for each factor.

Asterigerina carinata = 0.998, *Angulogerina angulosa occidentalis* = 0.969, and *Gavelinopsis praeegeri* = 0.987. High positive loadings for these three species typify Factors 2, 3 and 4, respectively. Communality estimates for *Cibicidoides* cf. *C. io*, *Nonionoides atlanticus*, *Nonionoides auriculus*, *Quinqueloculina* cf. *Q. milletti*, *Rosalina concinna*, *Rosalina globularis*, *Stetsonia minuta*, *Trochammina ochracea*, and *Trochammina squamata* range from 0.58 to 0.85, indicating that the variance within each is adequately represented by this set of factors. High positive loadings on all of these species, except for *Cibicidoides* cf. *C. io* define Factor 1.

Analysis of Variance

A two-way analysis of variance (ANOVA) using the method of Scheffe (1959) was performed on 15 species to test for significant differences in the mean number of individuals between depth intervals (vertical variation) and between cores (lateral variation). Species utilized were those identified by PCA combined with the 10 most abundant/persistent taxa. Also analyzed was the total abundance for all 142 species.

Asterigerina carinata, *Cibicidoides* cf. *C. io*, *Discorbinella bertheloti*, and *Gavelinopsis praeegeri* show significant differences between cores but not between depths, indicating pronounced lateral but little vertical variation in the distribution of these taxa (Table 7).

Angulogerina angulosa occidentalis, *Cibicides bradyi*, *Neoconorbina terquemi*, *Nonionoides atlanticus*, *Nonionoides auriculus*, *Quinqueloculina* cf. *Q. milletti*, *Rosalina concinna*, *Rosalina globularis*, *Stetsonia minuta*, *Trochammina ochracea*, and *Trochammina squamata* exhibit significant differences between cores and between depths. *Angulogerina angulosa occidentalis* has the highest "between-core" F-value indicating variability in lateral distribution. The F-values are highest "between-depths" for *Quinqueloculina* cf. *Q. milletti* and *Stetsonia minuta*. Both of these species show

Species	Source of Variation	D.F.	Sum of Squares	F	p(F)	Significant at 0.05 level
<i>Angulogerina angulosa occidentalis</i>	Between cores	11	64.00	14.84	0.0001	*
	Between depths	7	8.27	3.01	0.0087	*
	Residual	62	24.32			
<i>Asterigerina carinata</i>	Between cores	11	54.04	4.56	0.0001	*
	Between depths	7	14.28	1.90	0.0855	
	Residual	62	66.75			
<i>Cibicides bradyi</i>	Between cores	11	12.82	2.56	0.0097	*
	Between depths	7	7.03	2.21	0.0456	*
	Residual	62	28.21			
<i>Cibicidoides cf. C. io</i>	Between cores	11	15.37	4.07	0.0002	*
	Between depths	7	5.05	2.10	0.0565	
	Residual	62	21.31			
<i>Discorbinella bertheloti</i>	Between cores	11	25.94	4.56	0.0001	*
	Between depths	7	6.07	1.68	0.1306	
	Residual	62	32.04			
<i>Gavellinopsis praegeri</i>	Between cores	11	29.64	5.58	0.0001	*
	Between depths	7	7.20	2.13	0.0533	
	Residual	62	29.95			
<i>Neoconorbina terquemi</i>	Between cores	11	26.58	4.75	0.0001	*
	Between depths	7	14.84	4.17	0.0008	*
	Residual	62	31.52			
<i>Nonionoides atlanticus</i>	Between cores	11	31.37	6.13	0.0001	*
	Between depths	7	9.88	3.03	0.0083	*
	Residual	62	28.86			
<i>Nonionoides auriculus</i>	Between cores	11	50.13	8.81	0.0001	*
	Between depths	7	17.05	4.71	0.0003	*
	Residual	62	32.10			
<i>Quinqueloculina cf. Q. milleti</i>	Between cores	11	15.96	4.19	0.0001	*
	Between depths	7	18.35	7.56	0.0001	*
	Residual	62	21.50			
<i>Rosalina concinna</i>	Between cores	11	21.53	4.73	0.0001	*
	Between depths	7	13.24	4.57	0.0004	*
	Residual	62	25.66			
<i>Rosalina globularis</i>	Between cores	11	23.81	5.01	0.0001	*
	Between depths	7	20.42	6.75	0.0001	*
	Residual	62	26.80			
<i>Stetsonia minuta</i>	Between cores	11	30.63	5.20	0.0001	*
	Between depths	7	28.27	7.54	0.0001	*
	Residual	62	33.18			
<i>Trochammina ochracea</i>	Between cores	11	16.55	2.99	0.0030	*
	Between depths	7	11.71	3.32	0.0046	*
	Residual	62	31.23			
<i>Trochammina squamata</i>	Between cores	11	14.68	2.80	0.0051	*
	Between depths	7	11.96	3.58	0.0027	*
	Residual	62	29.60			
Total 142 species	Between cores	11	18.58	4.44	0.0001	*
	Between depths	7	15.25	5.72	0.0001	*
	Residual	62	23.60			

Table 7. Two-way analysis of variance for individual taxa.

significant differences between the 0-1 cm interval and depth intervals greater than 3 cm (Table 8).

The total stained population (142 species) exhibits significant differences between cores and between depths, with the sum of squares being higher between cores than between depths. The uppermost centimeter is significantly different from intervals at depths of 4 cm or greater (Table 8).

23-MILE-ROCK TRANSECT LINE

Thirty-four samples from six cores yielded 134 species. Thirty species representing the most abundant and/or persistent taxa were utilized for comparing the distribution of foraminiferal populations to grain size and for determining relationships to hardbottom scarps. These 30 species (Table 9) account for 80% of the total foraminiferal population encountered along the transect. Plots of dominant taxa in cores along the transect line (Appendix B) indicate no obvious trends between species patterns and position on transect.

Grain Size Preference

Grain size analysis was performed on cores 23M-DC-1 through 23M-DC-6 to determine percent mud and coarse, medium and fine sand (Table 10). There is little variation in grain size distribution within each core, but there is some variation between cores. All cores contain very little mud. Coarse sand varies from 4% in core 23M-DC-5 to 55% in core 23M-DC-1. Medium sand ranges from 11% in core 23M-DC-3 to 28% in core 23M-DC-6, and fine sand ranges from 24% in core 23M-DC-1 to 80% in core 23M-DC-5. Cores 23M-DC-1 and 23M-DC-4 show the most variation between depth intervals.

Depth (cm)	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
0-1				NA QM SM	QM RG SM NT TOT	QM RG SM RC TOT	QM RG SM RC TS TOT	NA QM RG SM RC TOT
1-2								
2-3								
3-4	NA QM SM							
4-5	QM RG SM NT TOT							
5-6	QM RG SM RC TOT							
6-7	QM RG SM RC TS TOT							
7-8	NA QM RG SM RC TOT							
NA = Nonionoides auriculus SM = Stetsonia minuta TS = Trochammina squamata QM = Quinqueloculina cf. Q. milleti RC = Rosalina concinna TOT = Total (all 142 species) RG = Rosalina globularis NT = Neoconorbina terquemi								

Table 8. Summary of depth intervals showing significant differences for appropriate taxa based on analysis of variance.

Depth interval below sediment-water interface (cm)	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	16	13	13	11	8	6	4	3
<i>Asterigerina carinata</i>	21	16	12	13	6	6	5	4
<i>Bolivina lowmani</i>	7	7	4	5	3	2	3	2
<i>Caribbeanella polystoma</i>	11	6	7	7	3	3	2	2
<i>Cibicides bradyi</i>	15	13	12	10	7	5	3	4
<i>Discorbinella bertheloti</i>	17	16	11	12	7	6	4	4
<i>Eggerella advena</i>	12	10	6	5	5	2	1	2
<i>Fursenkoina punctata</i>	9	8	3	3	2	2	2	0
<i>Gavelinopsis praegeri</i>	20	17	14	11	8	10	4	4
<i>Hanzawaia concentrica forma typica</i>	9	8	4	3	2	4	1	1
<i>Neoconorbina terquemi</i>	14	11	9	5	1	4	2	2
<i>Nonionoides atlanticus</i>	8	7	6	1	0	1	0	1
<i>Nonionoides auriculus</i>	12	10	7	3	1	2	0	1
<i>Peneroplis proteus</i>	10	5	6	5	4	3	2	2
<i>Quinqueloculina bicarinata</i>	10	7	4	6	3	2	1	2
<i>Quinqueloculina compta</i>	12	10	8	6	5	1	2	1
<i>Quinqueloculina parkeri forma occidentalis</i>	10	9	5	5	2	2	2	1
<i>Rosalina concinna</i>	14	10	9	7	5	4	3	3
<i>Rosalina globularis</i>	21	15	14	12	10	8	4	4
<i>Sagrina pulchella</i>	8	4	4	5	2	3	2	1
<i>Spiroloculina antillarum</i>	5	5	4	4	4	2	2	1
<i>Stetsonia minuta</i>	17	12	8	5	4	1	4	3
<i>Textularia candeiana</i>	10	7	3	3	2	1	2	1
<i>Textularia conica</i>	12	10	6	7	5	2	3	3
<i>Trochammina advena</i>	8	7	2	4	3	1	2	1
<i>Trochammina compacta</i>	10	9	6	4	2	3	2	3
<i>Trochammina inflata</i>	6	7	4	3	2	2	1	0
<i>Trochammina ochracea</i>	20	15	13	13	9	8	3	4
<i>Trochammina lobata</i>	11	9	5	5	1	1	2	0
<i>Valvulineria cf. V. floridana</i>	10	6	6	4	4	0	2	1

Table 9. Mean number of specimens at each depth interval for the 30 most abundant/persistent taxa in transect cores (normalized to 10 ml sample volume).

Depth (cm)	Total Wt. (g)	% Mud	Sand		
			% Fine	% Medium	% Coarse
23M-DC-1					
1	46.3	3	45	20	32
2	34.0	3	42	19	35
3	44.0	3	44	20	33
4	24.4	5	38	19	37
5	37.0	4	31	19	46
6	34.7	6	24	15	55
23M-DC-2					
1	35.4	3	69	17	11
2	28.4	3	62	18	17
3	28.4	3	71	17	9
4	23.5	3	69	18	10
5	37.7	3	66	19	12
6	25.7	2	66	19	12
7	22.0	2	65	20	13
8	43.4	2	66	20	13
23M-DC-3					
1	32.7	5	65	17	13
2	30.1	6	74	13	7
3	33.0	6	74	13	6
4	26.4	7	72	15	6
5	24.7	9	74	12	5
6	24.3	8	76	11	5
7	28.9	6	73	14	6
8	28.8	6	72	15	7
23M-DC-4					
1	41.3	3	71	18	8
2	30.7	2	62	24	12
3	31.3	3	61	18	18
4	29.8	2	55	18	25
5	29.2	3	51	22	25
6	49.8	18	51	16	15
23M-DC-5					
1	27.8	1	71	20	8
2	38.2	1	80	15	4
23M-DC-6					
1	25.6	2	49	28	21
2	37.7	2	47	27	24
3	24.1	2	42	28	28
4	36.6	2	43	28	28

Table 10. Sedimentological analysis on cores from transect line.

A ternary plot (Fig. 5) of the sand-sized fraction illustrates that Cores 23M-DC-2, 23M-DC-3, and 23M-DC-5 contain mostly fine sand with little coarse or medium sand. Core 23M-DC-1 contains approximately the same amount of medium sand, but much more coarse sand and much less fine sand. Core 23M-DC-4 is intermediate between the two previous groups, whereas core 23M-DC-6 contains the highest amount of medium sand, a smaller amount of fine sand and an intermediate amount of coarse sand. These groupings are also reflected in the cluster dendrogram (Fig. 6).

A correlation analysis was performed on grain size data and foraminiferal abundance data. Pearson correlation coefficients reveal no evidence of correlation between grain size and occurrences of individual species (Table 11). R-values range from 0.003 to 0.474. Plots of sediment analyses against foraminiferal abundances within each core reveal no correlations (Appendix C). A plot of the average grain size distribution against the average foraminiferal abundance within each core reveals no correlation (Appendix D).

Cluster analysis was performed using the 30 most abundant or persistent species. Three clusters labeled A-C on Fig. 7 were selected based on the "Cubic Clustering Criterion". An additional cluster analysis was performed using the sedimentological data resulting in 5 clusters (labeled A-E, Fig. 6). Comparison of the two cluster dendrograms reveal no obvious relationship. If species composition is strongly influenced by grain size, samples would be expected to group similarly in each dendrogram.

DISCUSSION AND CONCLUSIONS

Quantitative and qualitative analyses of stained foraminifera in the 23-Mile-Rock area of Onslow Bay do not indicate a preference for depth-related microhabitats.

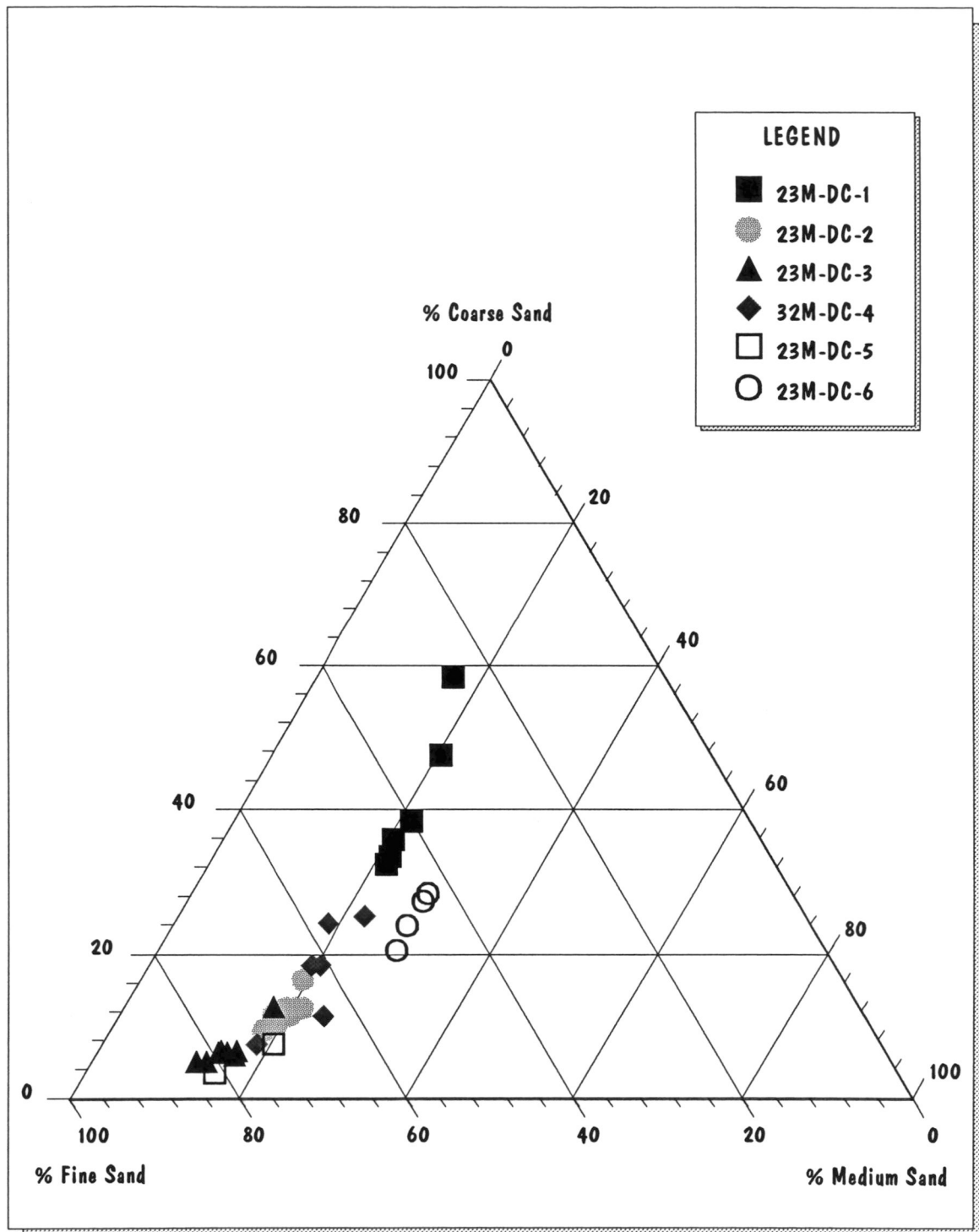


Figure 5. Ternary diagram of sand-sized grains from samples along transect line.

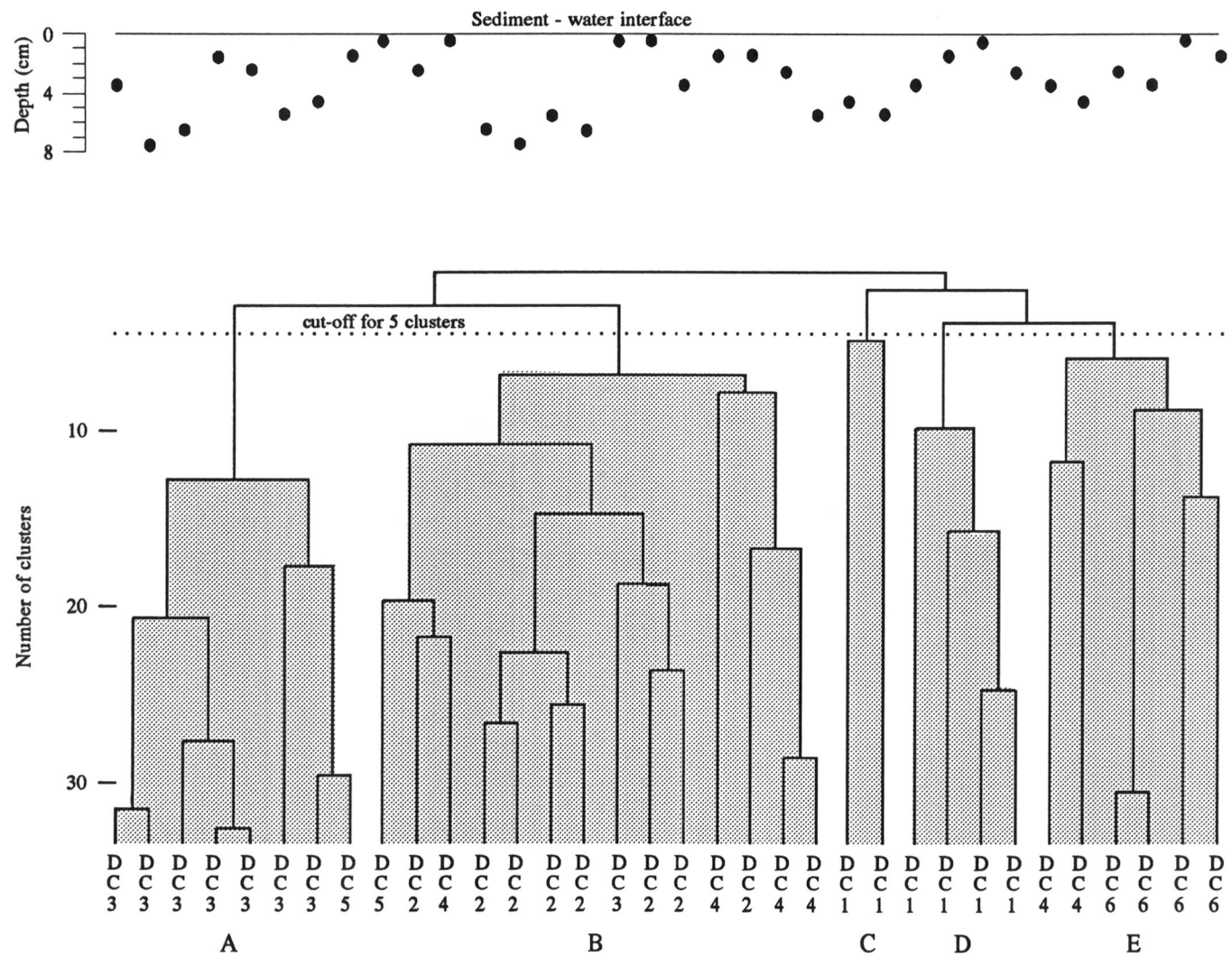


Figure 6. Cluster dendrogram of sedimentological data on transect line.

Pearson Correlation Coefficients			
Species	Sand		
	Fine	Medium	Coarse
<i>Angulogerina angulosa occidentalis</i>	0.319	-0.352	-0.260
<i>Asterigerina carinata</i>	-0.085	0.428	-0.035
<i>Bolivina lowmani</i>	0.262	-0.214	-0.245
<i>Caribbeanella polystoma</i>	0.007	0.289	-0.098
<i>Cibicides bradyi</i>	0.078	0.071	-0.120
<i>Discorbinella bertheloti</i>	-0.018	0.205	-0.040
<i>Eggerella advena</i>	0.253	-0.021	-0.280
<i>Fursendoina punctata</i>	0.162	-0.203	-0.121
<i>Gavelinopsis praegeri</i>	0.052	0.106	-0.095
<i>Hanzawaia concentrica forma typica</i>	-0.054	0.320	-0.039
<i>Neoconorbina terquemi</i>	-0.024	0.398	-0.096
<i>Nonionoides atlanticus</i>	-0.109	0.474	-0.017
<i>Nonionoides auriculus</i>	-0.057	0.398	-0.054
<i>Peneroplis proteus</i>	0.074	0.332	-0.191
<i>Quinqueloculina bicarinata</i>	0.203	0.160	-0.293
<i>Quinqueloculina compta</i>	0.295	-0.060	-0.327
<i>Quinqueloculina parkeri forma occidentalis</i>	0.371	-0.089	-0.405
<i>Rosalina concinna</i>	0.034	0.150	-0.083
<i>Rosalina globularis</i>	0.027	0.232	-0.096
<i>Sagrina pulchella</i>	0.369	-0.389	-0.310
<i>Spiroloculina antillarum</i>	0.359	-0.406	-0.286
<i>Stetsonia minuta</i>	0.171	0.066	-0.214
<i>Textularia candeiana</i>	0.198	0.025	-0.242
<i>Textularia conica</i>	0.244	-0.074	-0.259
<i>Trochammina advena</i>	-0.003	0.429	-0.127
<i>Trochammina compacta</i>	-0.025	0.389	-0.084
<i>Trochammina inflata</i>	0.091	0.230	-0.166
<i>Trochammina ochracea</i>	0.191	0.043	-0.229
<i>Trochammina lobata</i>	-0.054	0.444	-0.072
<i>Valvulineria cf. V. floridana</i>	-0.042	0.353	-0.060

Table 11. Pearson Correlation Coefficients using 23-Mile Transect Line data set.

Benthic foraminifera cannot be categorized simply into infaunal or epifaunal taxa. All taxa occur infaunally to some degree, and no one taxon is entirely epifaunal or infaunal. Taxa exhibit maxima at varying depth intervals below the sediment-water interface and commonly occur through the entire length of cores. Jorissen (1988), and Corliss and Emerson (1990) suggest that microhabitat preference may change due to the depth of the redox front and/or the amount of food available in the sediment. However, well oxygenated pore waters and abundant nutrients in shallow-water sediments may not limit foraminiferal habitats to any particular depth or require species to partition vertically within the sediment (Gooday, 1986). Because sediments of the 23-Mile-Rock area of Onslow Bay are well mixed by bioturbation and physical processes and have little mud, there is little need for foraminifera to concentrate at any particular level.

The only quantifiable depth-related trends in the 23-Mile-Rock area of Onslow Bay are overall decreases in the abundance of stained foraminifera and in species diversity with increasing depth below the sediment-water interface. The greatest drop in abundance occurs below 4 cm where the number of specimens decreases more than 50%, which may be due to a decrease in food source and/or available oxygen.

Due to complexity of the transect area (Fig. 2) and the limited number of cores available, relationships between species composition of foraminiferal populations and proximity to hardbottom scarps are difficult to summarize. The average number of specimens per given volume of sediment initially increases with distance downslope from core 23M-DC-5 until it peaks at core 23M-DC-6, and then it decreases downslope from 23M-DC-3 to 23M-DC-1. The average number of species follows this same trend. Although there is no evidence of vertical microhabitat preference, there is some indication of lateral variation along the transect line; however, these changes are inconsistent.

Qualitative and quantitative analyses do not indicate a correlation between sediment grain size and species composition. Variation in sediment grain size between cores is not an important influence on species distributions or the species composition of foraminiferal populations.

Results from the 23-Mile-Rock area are consistent with the findings of Murosky and Snyder (1994) in the Frying Pan area of Onslow Bay. The 23-Mile-Rock area yielded 13 additional species, but most taxa are common to both areas. For example, of the 34 most abundant/persistent taxa in my study, 26 are among those listed for the Frying Pan area. Benthic foraminiferal specimens are more abundant at 23-Mile-Rock than in the Frying Pan area. Specimen counts, normalized to a sample volume of 10 ml, range from 3 to 259 in the Frying Pan area as compared to a range of 10 to 1070 in the 23-Mile-Rock area. Despite these differences, overall faunal patterns in both areas are quite similar. In both areas, species diversity and abundance generally decline down core. While foraminiferal species compositions and total abundances differ between the two areas, both areas demonstrate the same lack of microhabitat preferences.

Lack of vertical partitioning of the sediments, probably the result of frequent biological and physical mixing, argues for caution in applying microhabitat preferences recognized in deeper water environments to shallow-water/continental shelf environments.

Systematic Paleontology

One hundred forty-two species of benthic foraminifera were identified in the 23-Mile-Rock area of Onslow Bay. Of the 34 most abundant or persistent taxa, 26 occur in the Frying Pan Shoals area and have been described by Murosky (1993); they will not be included here. The remaining eight taxa are listed alphabetically by genus and then by species within each genus. A brief morphological description and citation to the original description are included. Generic concepts follow Loeblich and Tappan (1988). SEM photomicrographs of the ten most abundant/persistent taxa, plus additional species with high positive loadings (PCA), are illustrated in Plates 1 & 2.

A complete list of stained species identified and their abundance is located in Appendix E. Normalized abundances (for a 10 ml standard volume) for the 34 most abundant/persistent taxa are presented in Appendix F.

Benthic Foraminifera

GENUS: *Eggerella* Cushman, 1935

Eggerella advena (Cushman)

Verneuilina advena CUSHMAN, 1922, Canada, Biol. Board, Contr. to Canadian Biol. (1921), Toronto, no. 9, p. 141.

Arenaceous, elongate, tapering, triserial test with inflated chambers and depressed sutures. Variable in size and total number of chambers. Interiomarginal aperture at junction of last three chambers.

GENUS: *Neoconorbina* Hofker, 1951

Neoconorbina terquemi (Rzehak)

Discorbina terquemi RZEHAK, 1888, Geol. Reichsanst., Verh. Wein, no. 11, p. 228.

Highly trochospiral conical test with concave umbilical side. Long, arched, narrow chambers and keeled periphery.

GENUS: *Quinqueloculina* d'Orbigny, 1826

Quinqueloculina cf. *Q. milletti* (Wiesner)

Miliolina bosciana D'ORBIGNY, 1898, Millett(pars), Jour. Roy. Micr. Soc., p. 267, pl. 6, fig. 1 = *Miliolina milletti* WIESNER, 1912, Arch. Protistenk., v. 25, p. 220, 237.

Test with rounded, sometimes angulate peripheral margin. Early chambers oblique. Aperture open or with simple small tooth. Variable in overall shape, from rounded to subrounded.

GENUS: *Rectobolivina* Cushman, 1927

Rectobolivina advena (Cushman)

Siphogenerina advena CUSHMAN, 1922, Carnegie Inst. Washington, Publ. 311, p. 35, pl. 5, fig. 2.

Test compressed with early portion irregularly triserial, followed by a biserial stage with later adult stage being uniserial. Terminal and elliptical aperture.

GENUS: *Rosalina* d'Orbigny, 1826

Rosalina concinna (Brady)

Discorbina concinna H.B. BRADY, 1884, Rept. Voy. Challenger, Zool., vol. 9, p. 646, pl. 90, figs. 7,8.

Subcircular, non-keeled periphery. Usually four chambers in final whorl with final chamber occupying nearly half of whorl. Flattened imperforate to finely perforate umbilical side.

GENUS: *Sagrina* d'Orbigny, 1839

Sagrina pulchella d'Orbigny

Sagrina pulchella D'ORBIGNY, 1839, in de la Sagra, Histoire... de l'ile de Cuba, "Foraminifères", p. 150, pl. 1, figs. 23,24.

Small flaring test, subtriangular in outline. Short early triserial portion, later biserial with inflated chambers. Surface ornamented with many low longitudinal costae, discontinuous across chambers and may end in short spinules at chamber margin. Terminal aperture bordered by low narrow lip.

GENUS: *Trochammina* Parker and Jones, 1859

Trochammina advena Cushman

Trochammina advena CUSHMAN, 1922, Carnegie Inst. Washington Publ. 311, p. 20, pl. 1, figs. 2-4.

Small, unequally biconvex, finely agglutinated test. Final whorl of three or four chambers. Chambers inflated with sutures slightly depressed. Aperture at inner margin of final chamber.

Trochammina squamata Jones and Parker

Trochammina squamata JONES AND PARKER, 1860, Quart. Jour. Geol. Soc., vol. 16, p. 304.

Finely arenaceous, trochospiral test with rounded margin. Chambers excavated on umbilical side with only four chambers visible. Test slightly compressed. Sutures distinct, curving slightly backwards on spiral side.

PLATE I

Figure

- | | |
|--------|---|
| 1, 2 | <i>Angulogerina angulosa occidentalis</i> (Cushman)
1 Edge view
2. Oblique apertural view |
| 3-5 | <i>Asterigerina carinata</i> d'Orbigny
3 Spiral view
4 Umbilical view
5 Edge view |
| 6, 7 | <i>Cibicides bradyi</i> (Trauth)
6 Spiral view
7 Umbilical view |
| 8, 9 | <i>Cibicidoides</i> cf. <i>C. io</i> (Cushman)
8 Spiral view
9 Umbilical view |
| 10, 14 | <i>Discorbinella bertheloti</i> (d'Orbigny)
10 Spiral view
14 Umbilical view |
| 12, 13 | <i>Gavelinopsis praegeri</i> (Heron-Allen and Earland)
12 Spiral view
13 Umbilical view |
| 11, 15 | <i>Neoconorbina terquemi</i> (Rzehak)
11 Spiral view
15 Umbilical view |
| 16, 17 | <i>Nonionoides atlanticus</i> (Cushman)
16 Spiral view
17 Umbilical view |

Each scale bar represents 100 microns

PLATE I

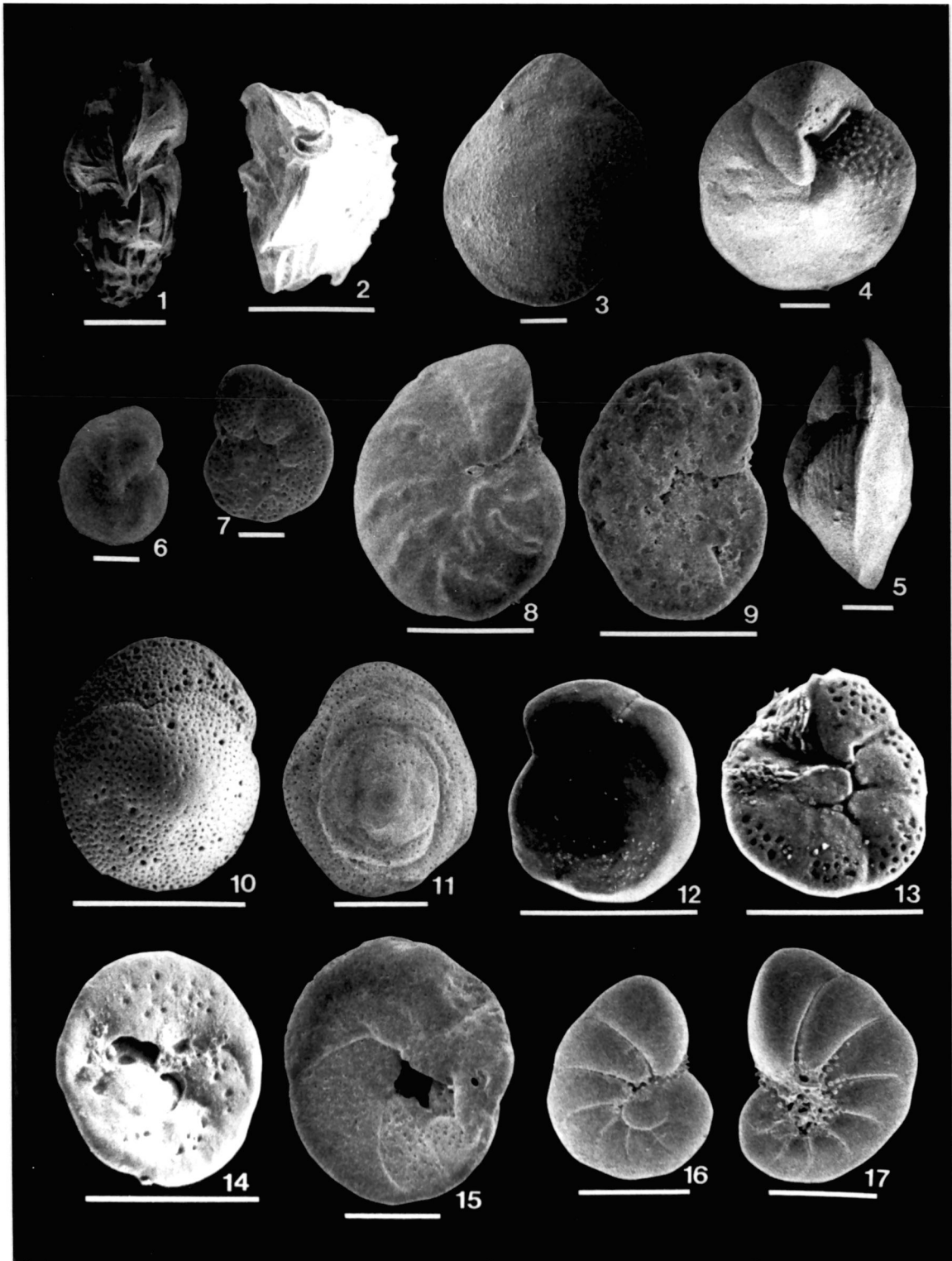


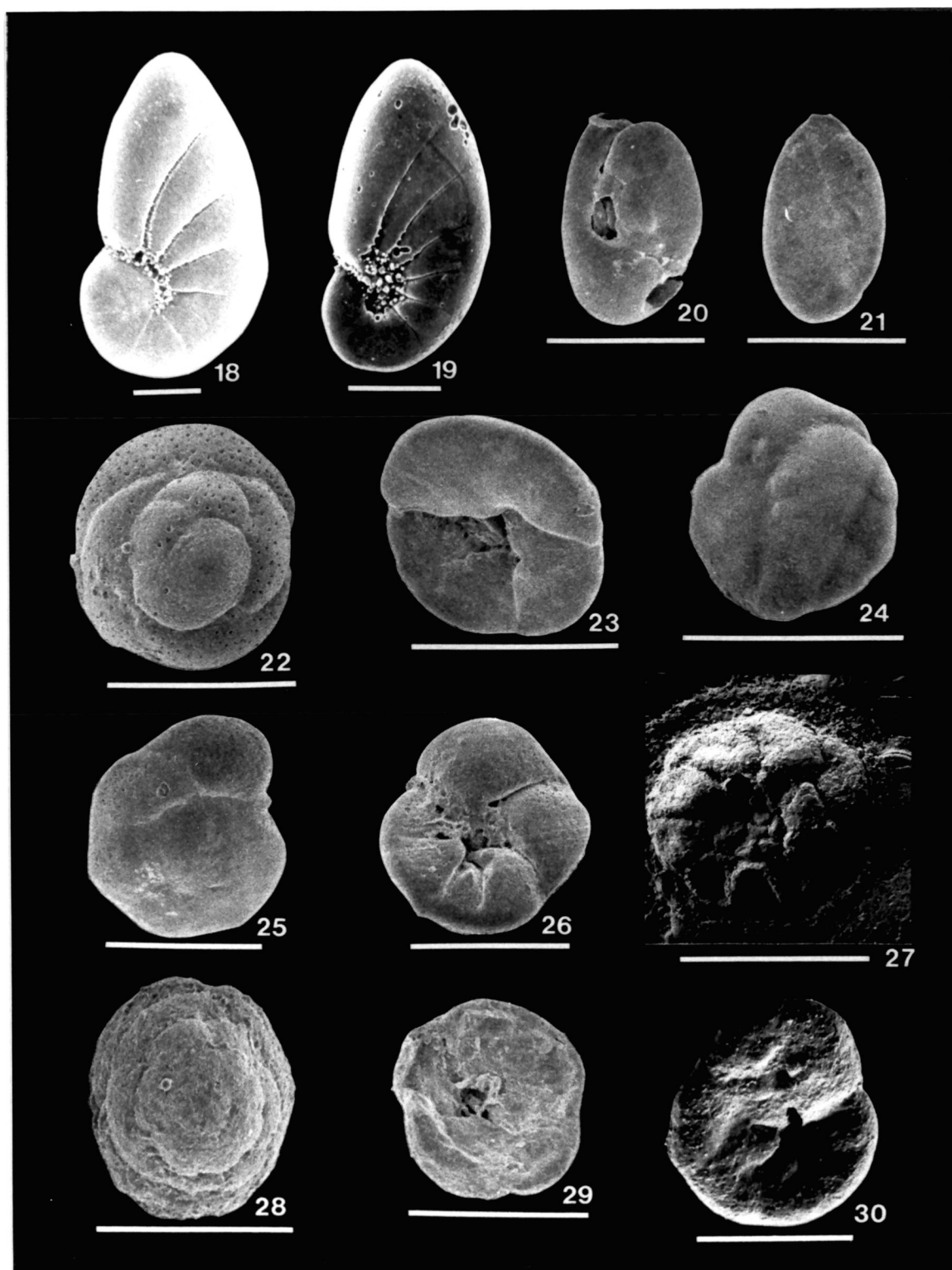
PLATE II

Figure

- 18, 19 *Nonionoides auriculus* (Heron-Allen and Earland)
18 Spiral view
19 Umbilical view
- 20, 21 *Quinqueloculina* cf. *Q. milletti* (Wiesner)
20, 21 Opposite sides
- 22, 23 *Rosalina concinna* (Brady)
22 Spiral view
23 Umbilical view
- 25, 26 *Rosalina globularis* d'Orbigny
25 Spiral view
26 Umbilical view
- 24 *Stetsonia minuta* F. L. Parker
24 Side view
- 27, 30 *Trochammina ochracea* (Williamson)
27 Spiral view
30 Umbilical view
- 28, 29 *Trochammina squamata* Jones and Parker
28 Spiral view
29 Umbilical view

Each scale bar represents 100 microns

PLATE II



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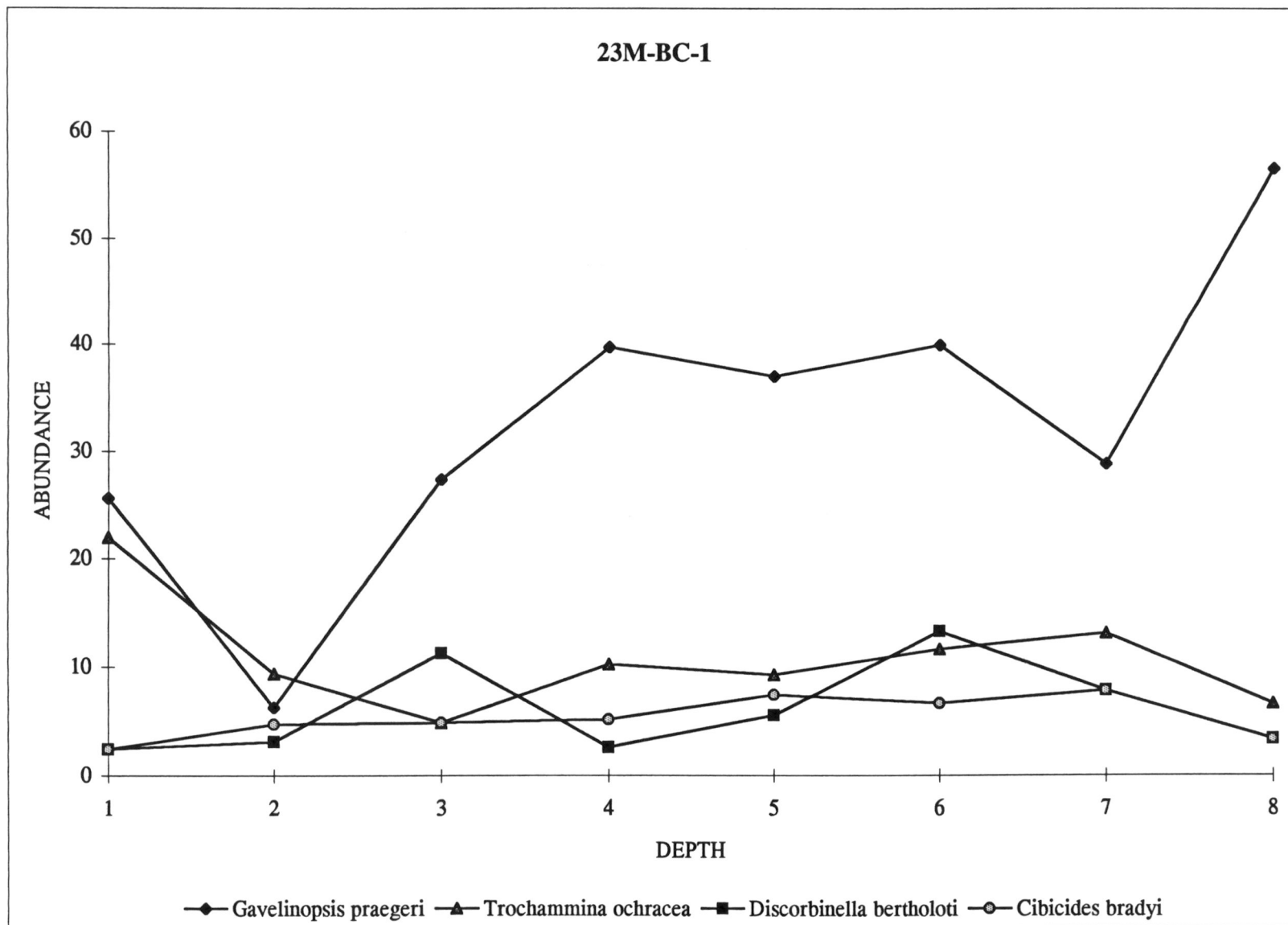
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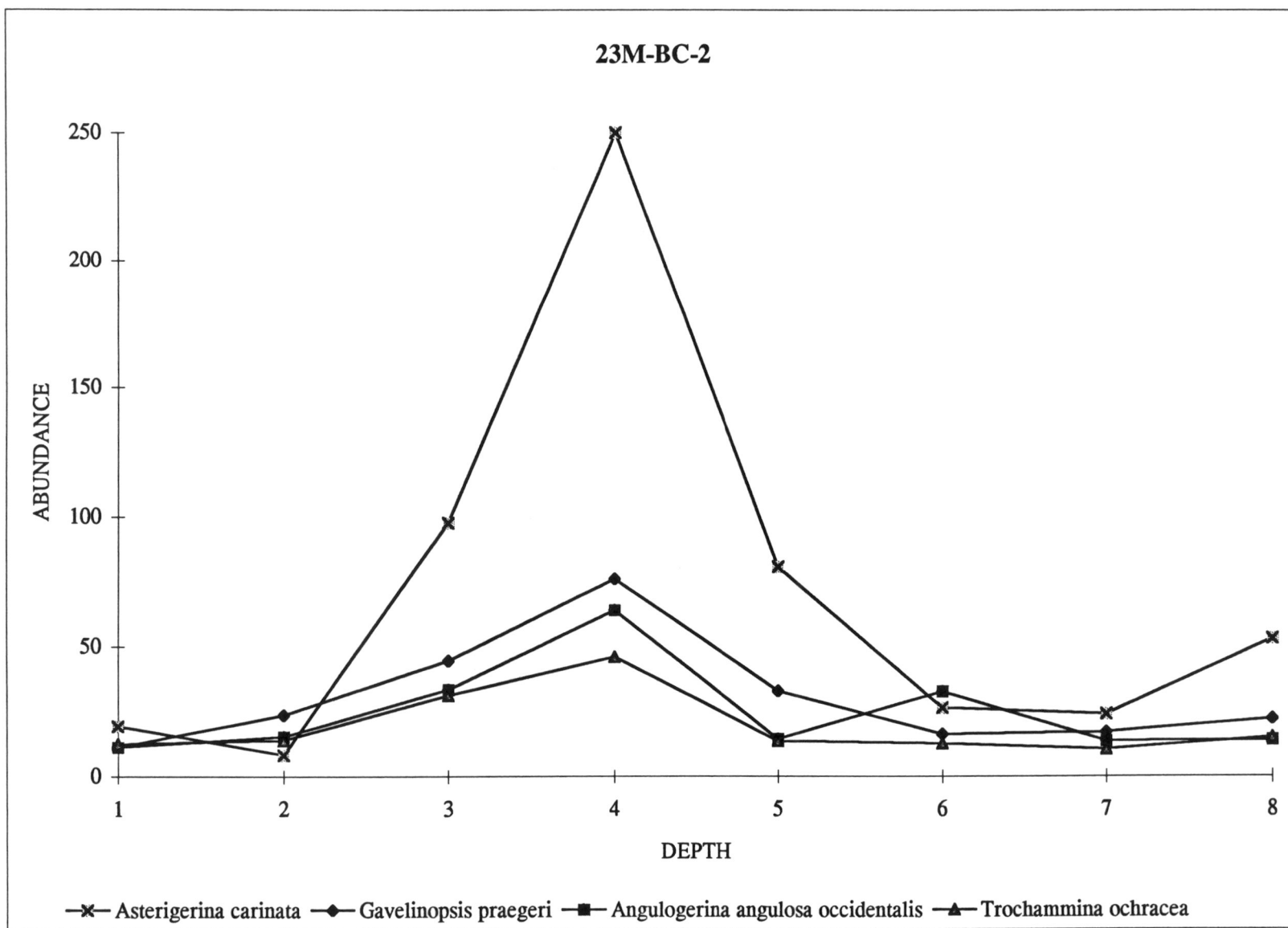
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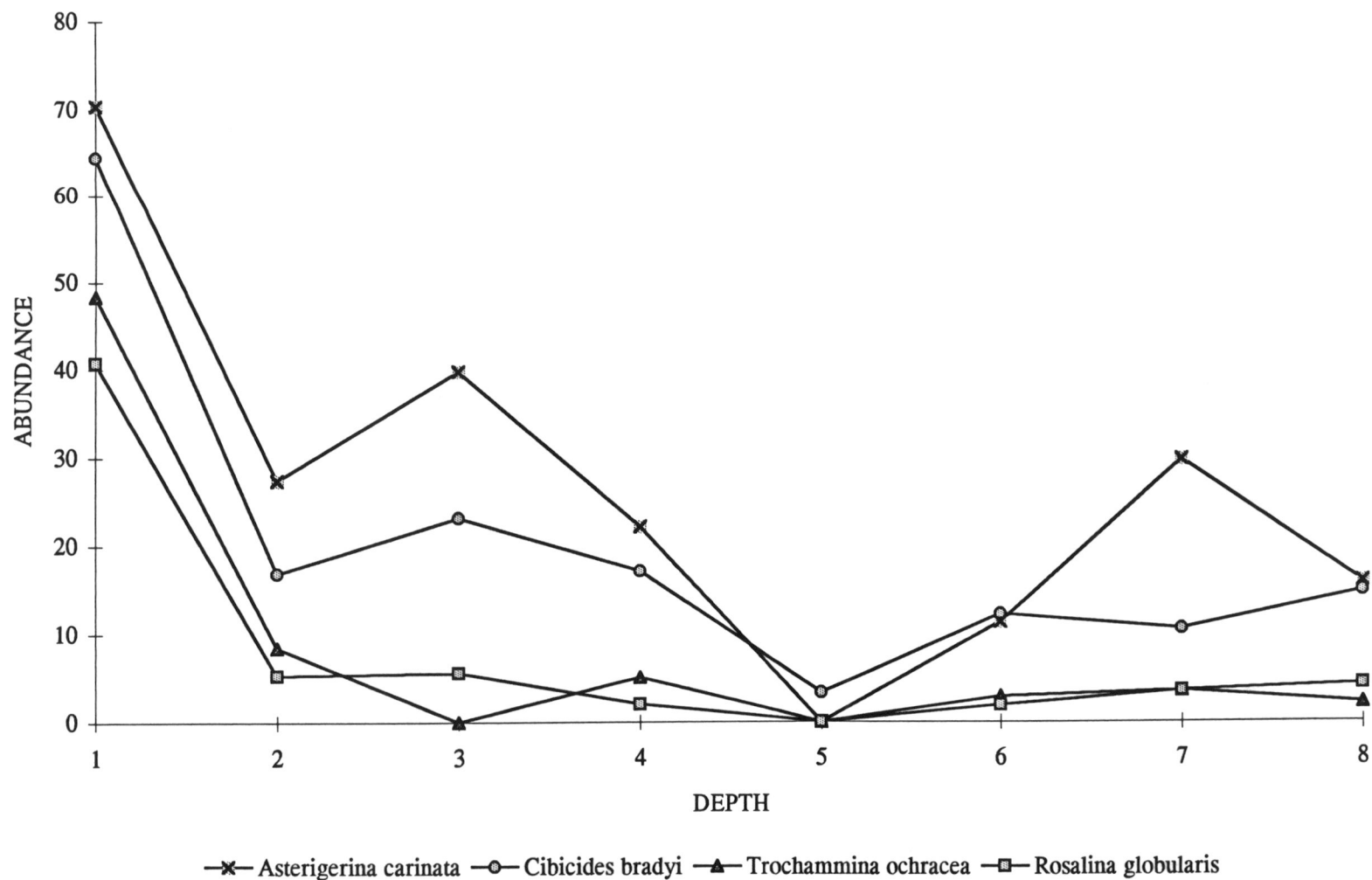
APPENDIX A

ABUNDANCE TRENDS OF DOMINANT TAXA FOR EACH CORE

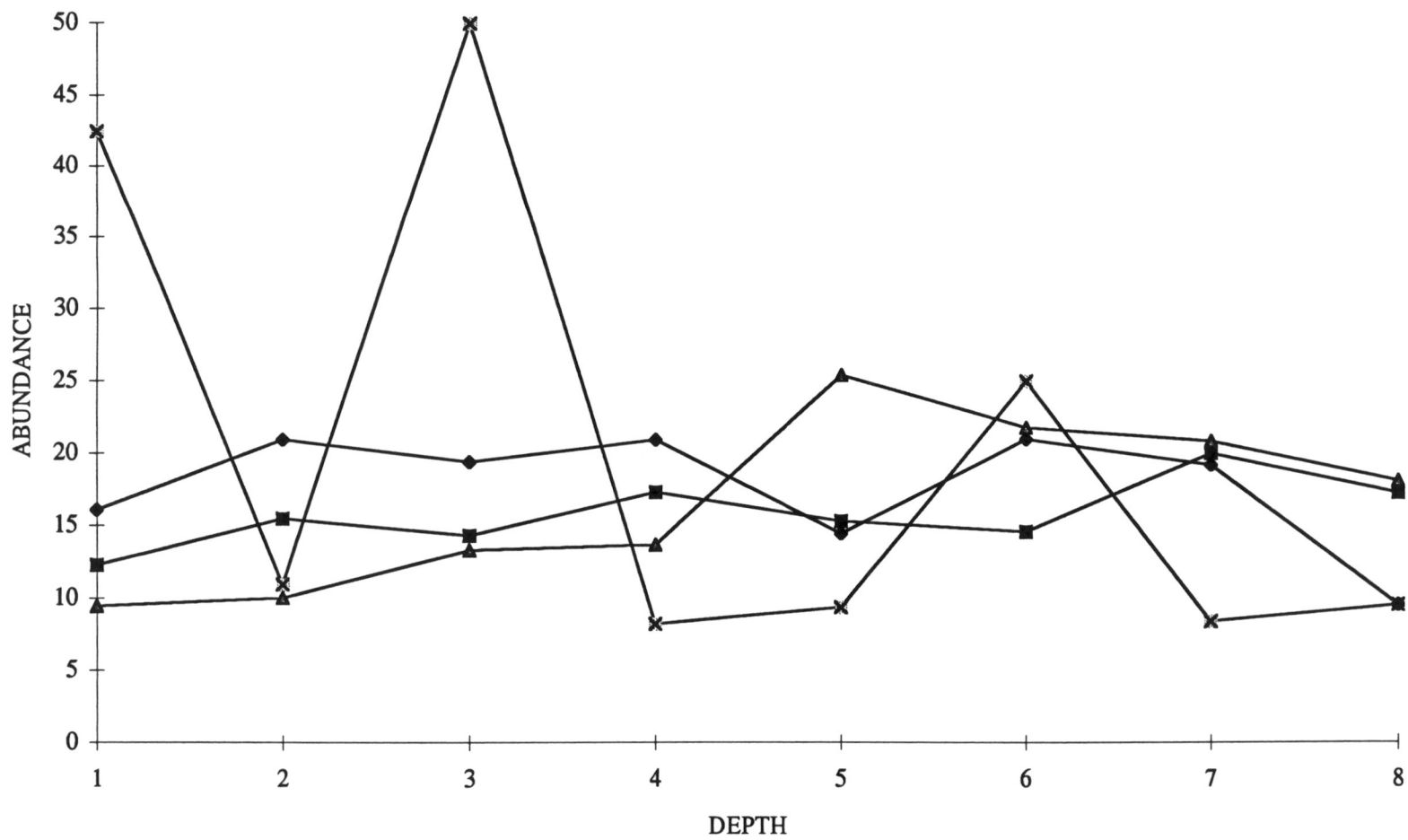




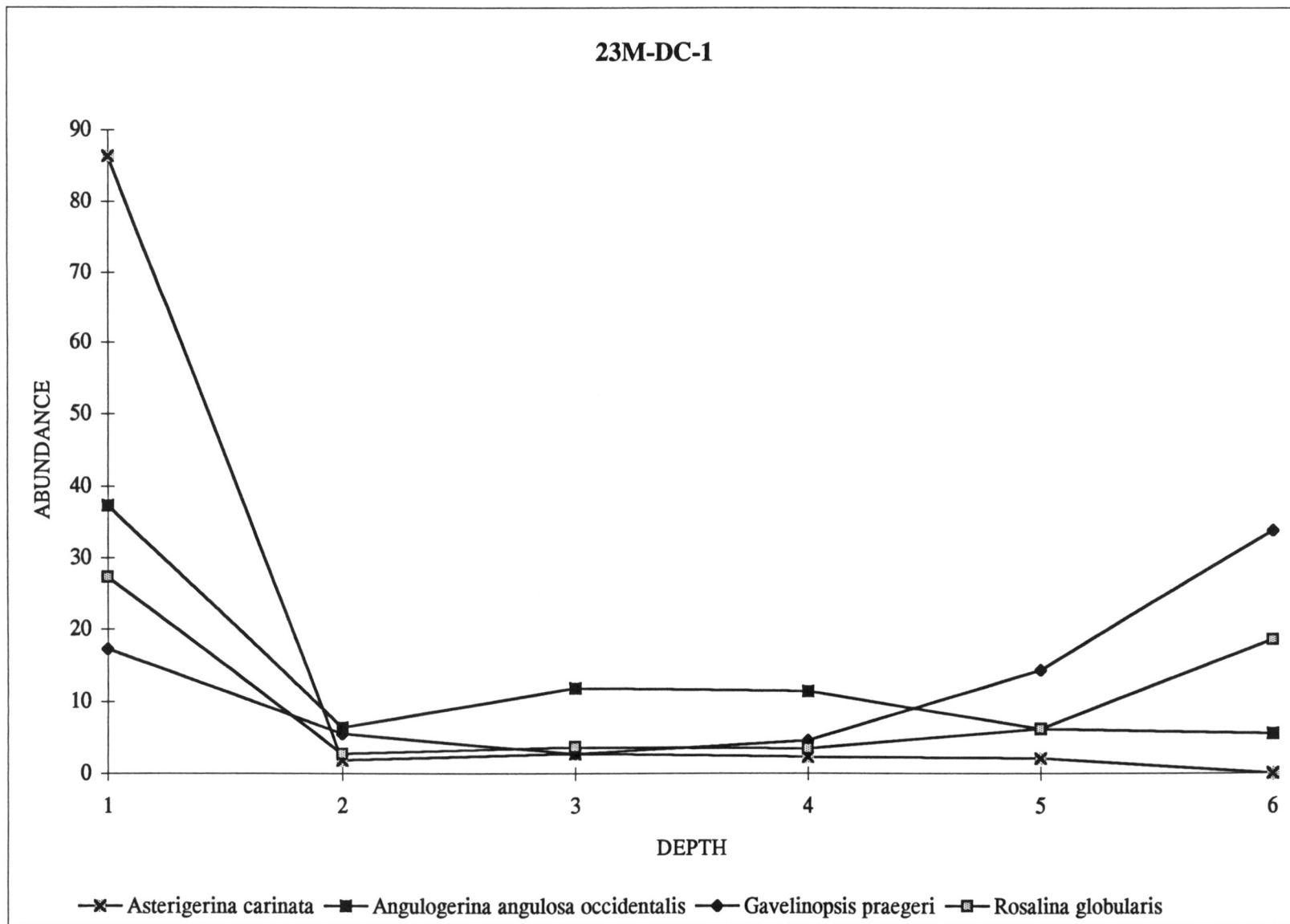
23M-BC-3



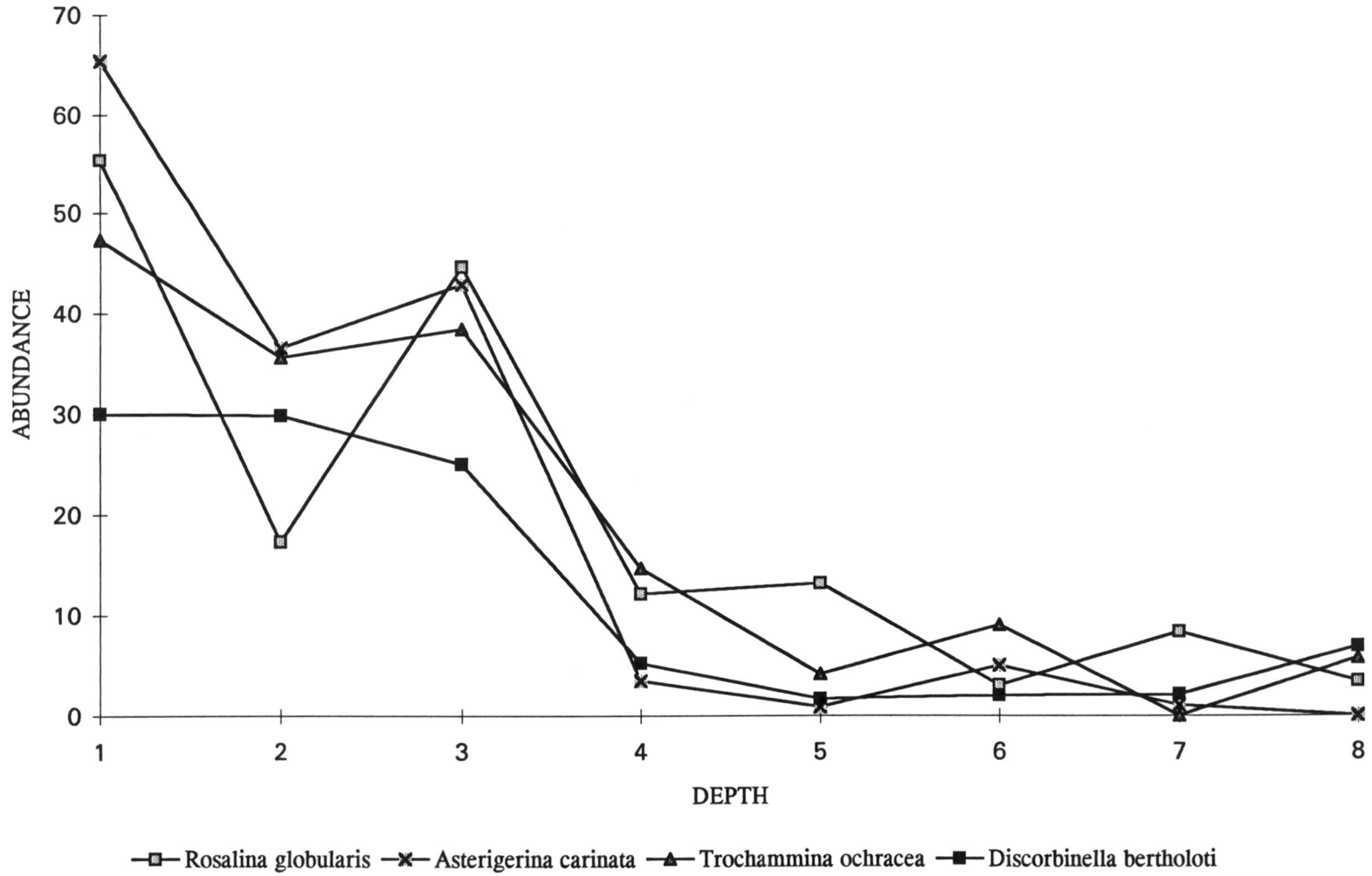
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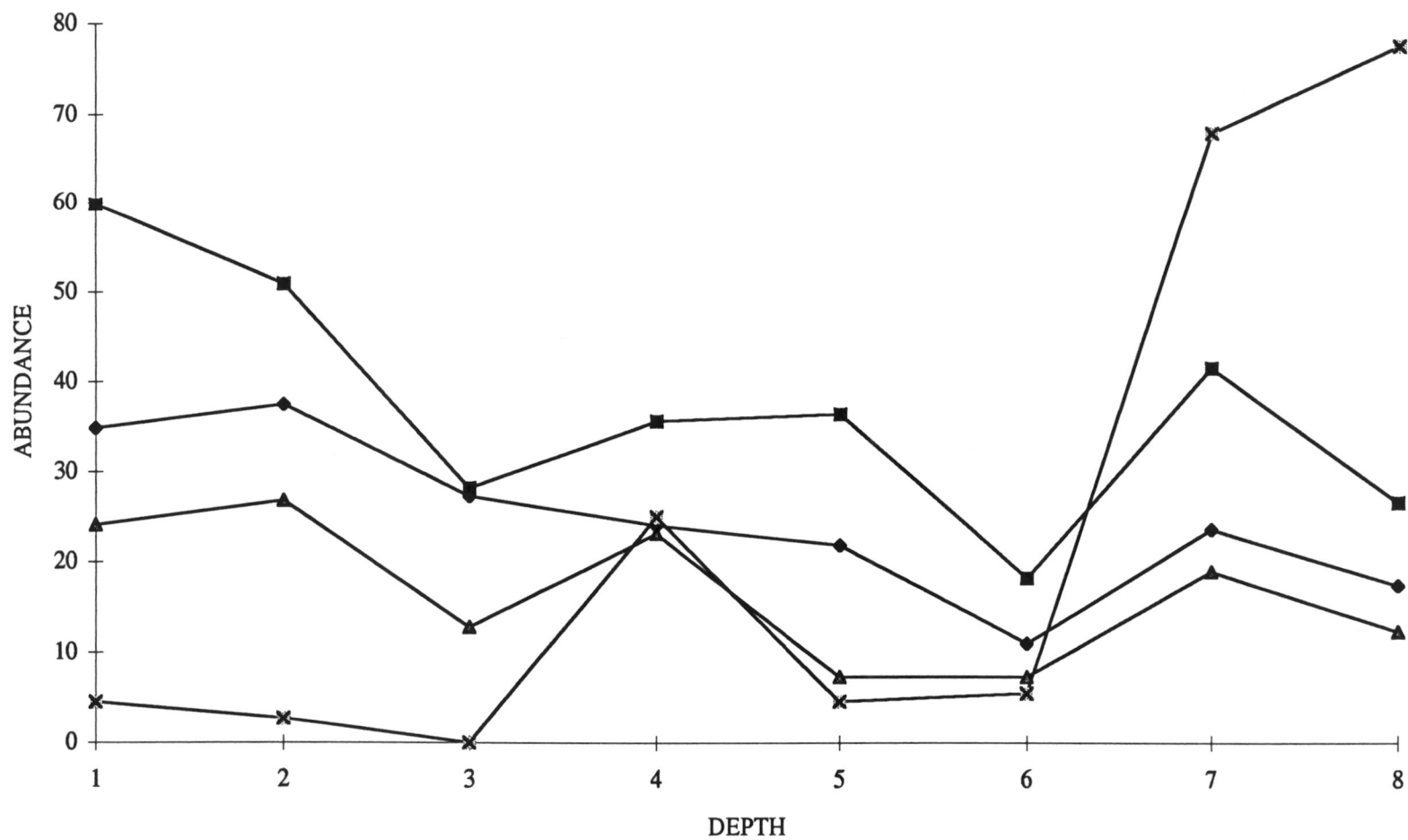
—x— Asterigerina carinata —◆— Gavelinopsis praegeri —▲— Trochammina ochracea —■— Angulogerina angulosa occidentalis



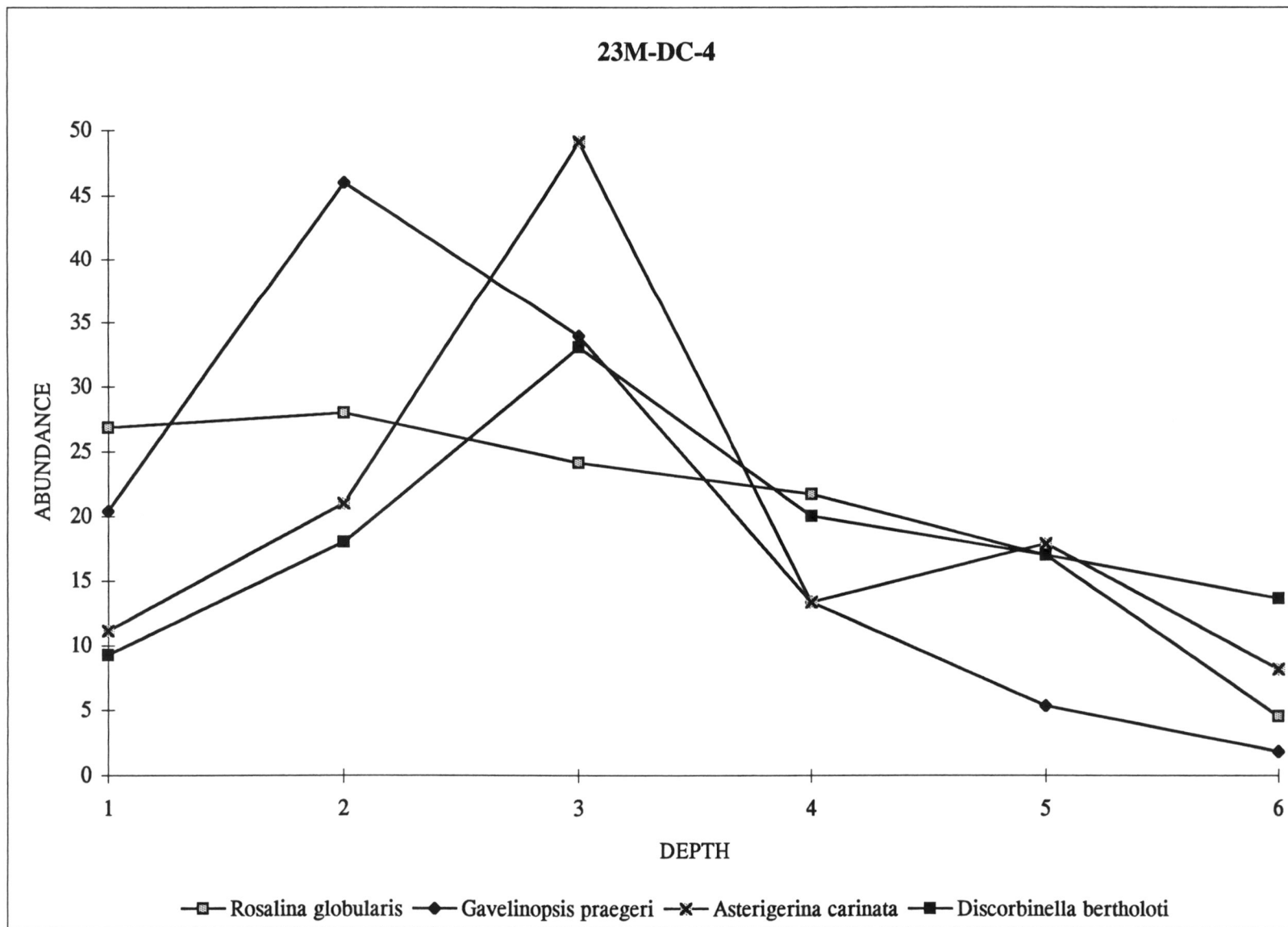
23M-DC-2

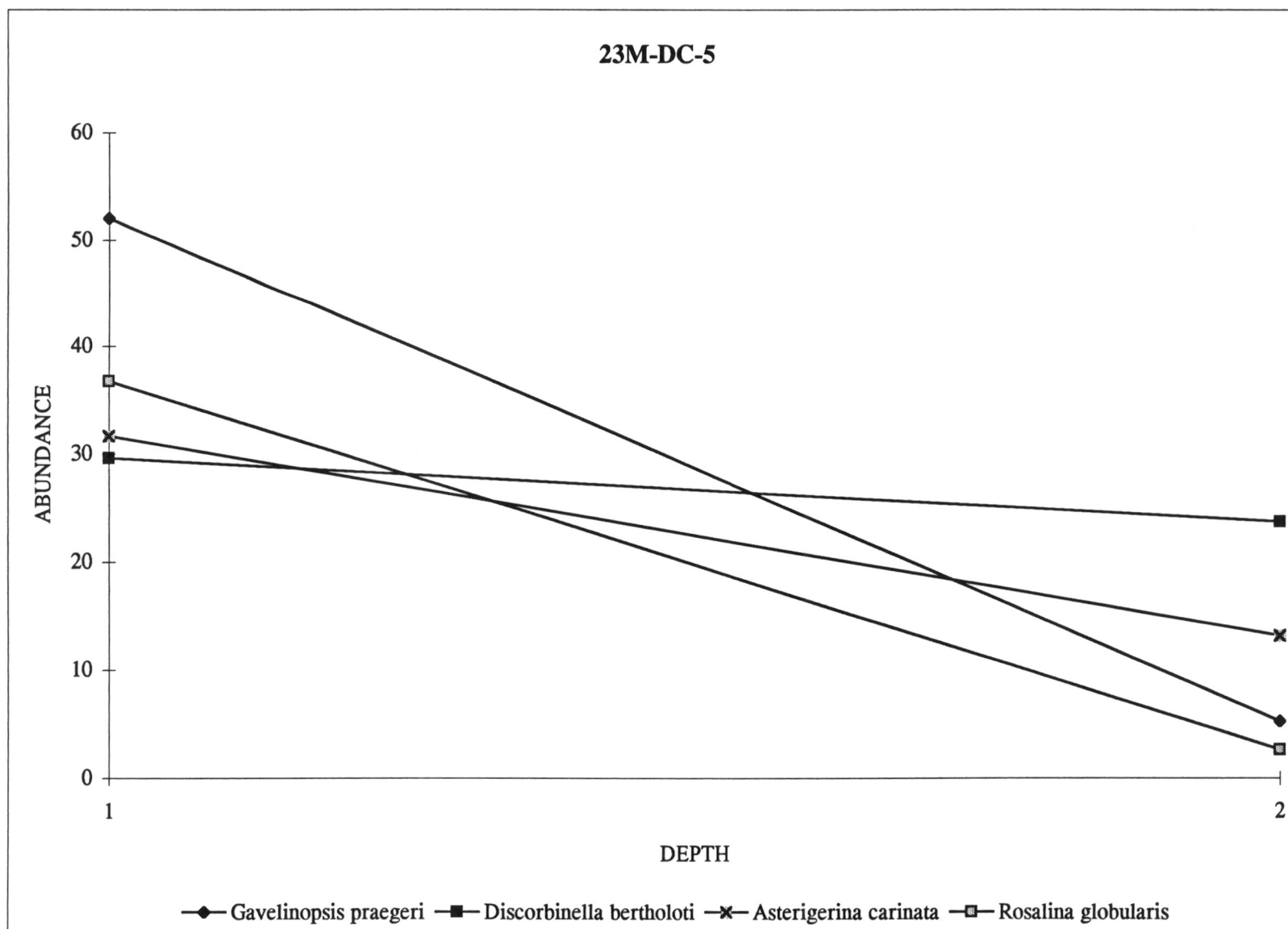


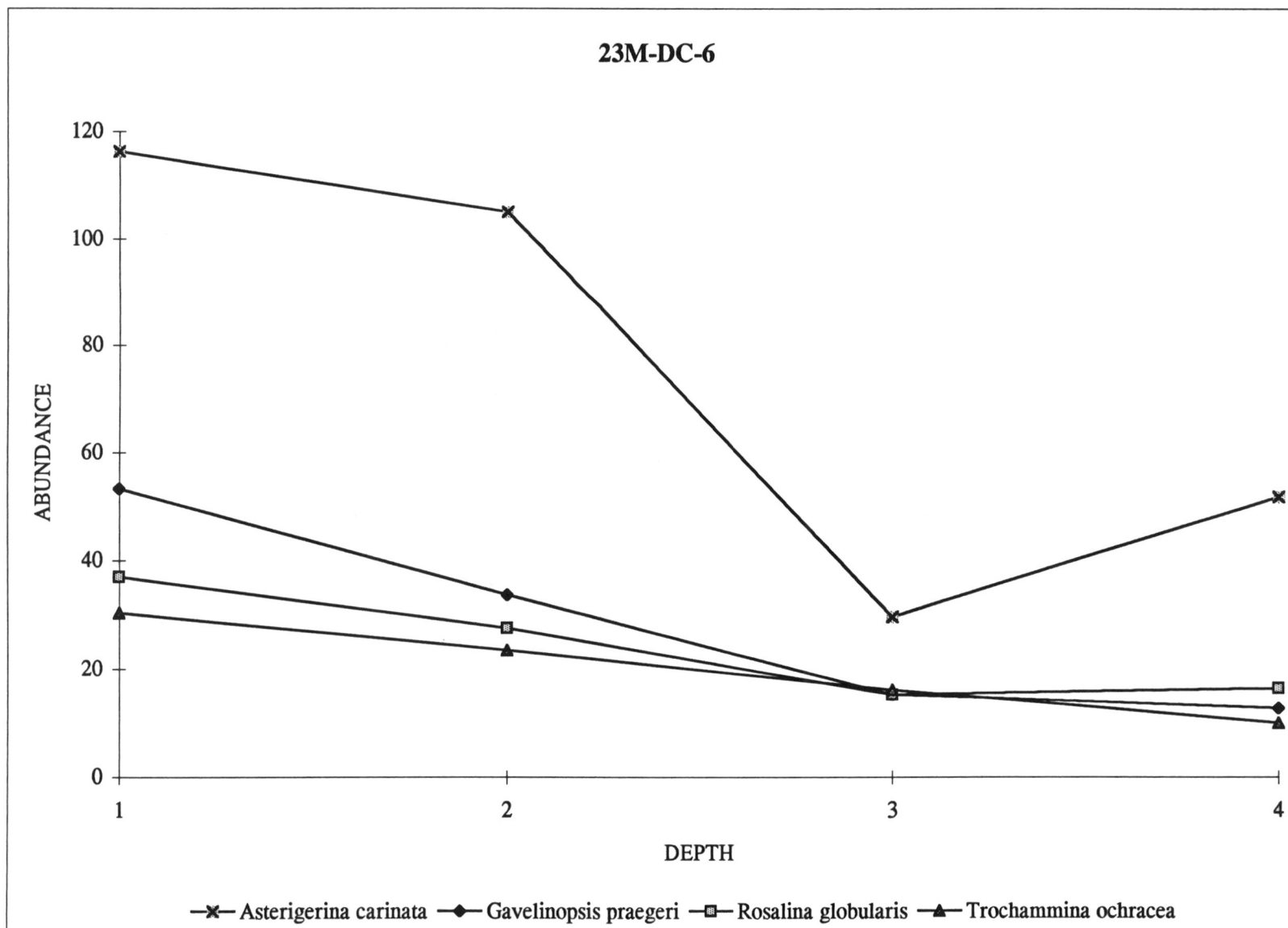
23M-DC-3



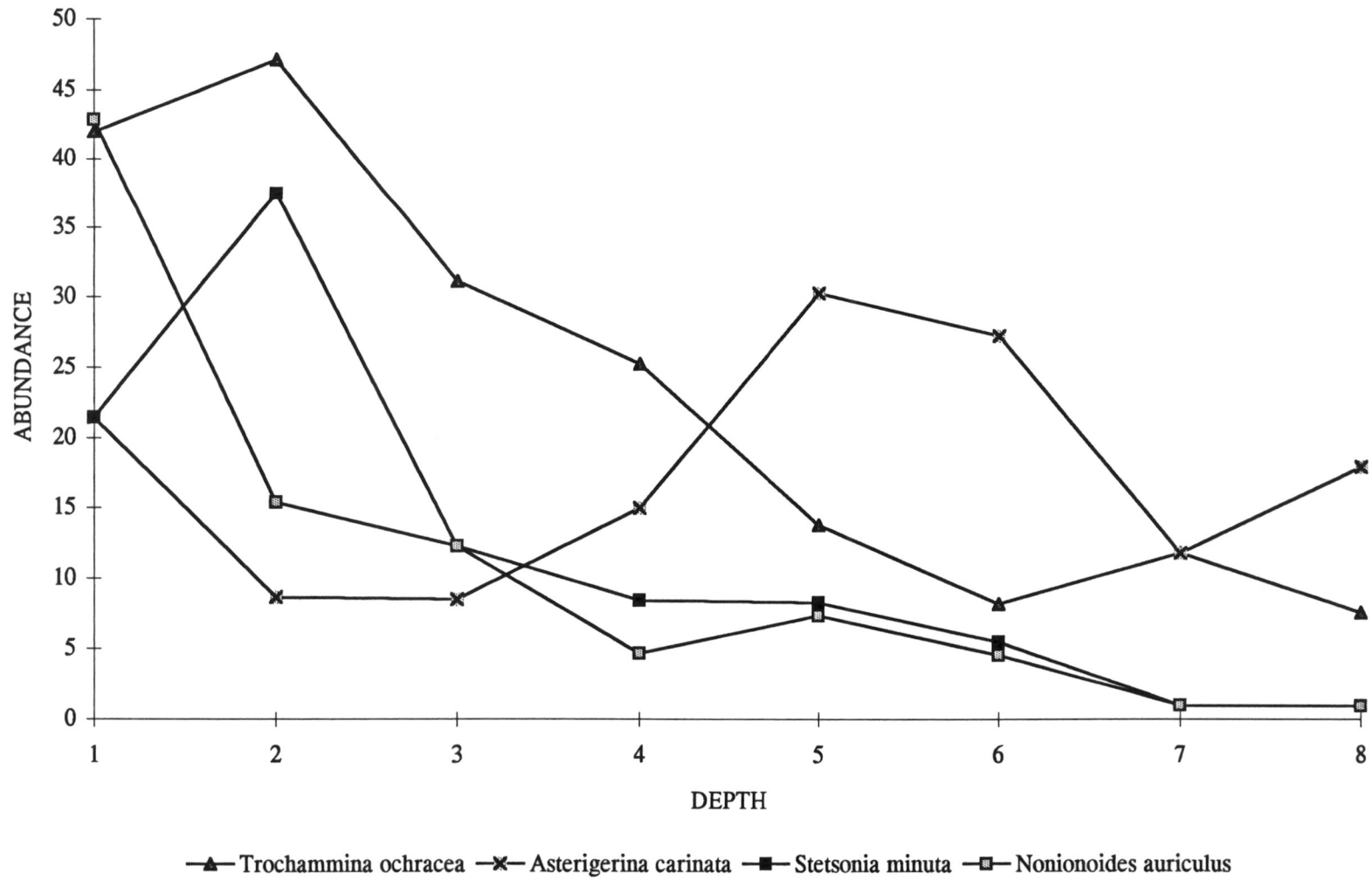
■ Angulogerina angulosa occidentalis ◆ Gavelinopsis praegeri ✕ Asterigerina carinata ▲ Trochammina ochracea



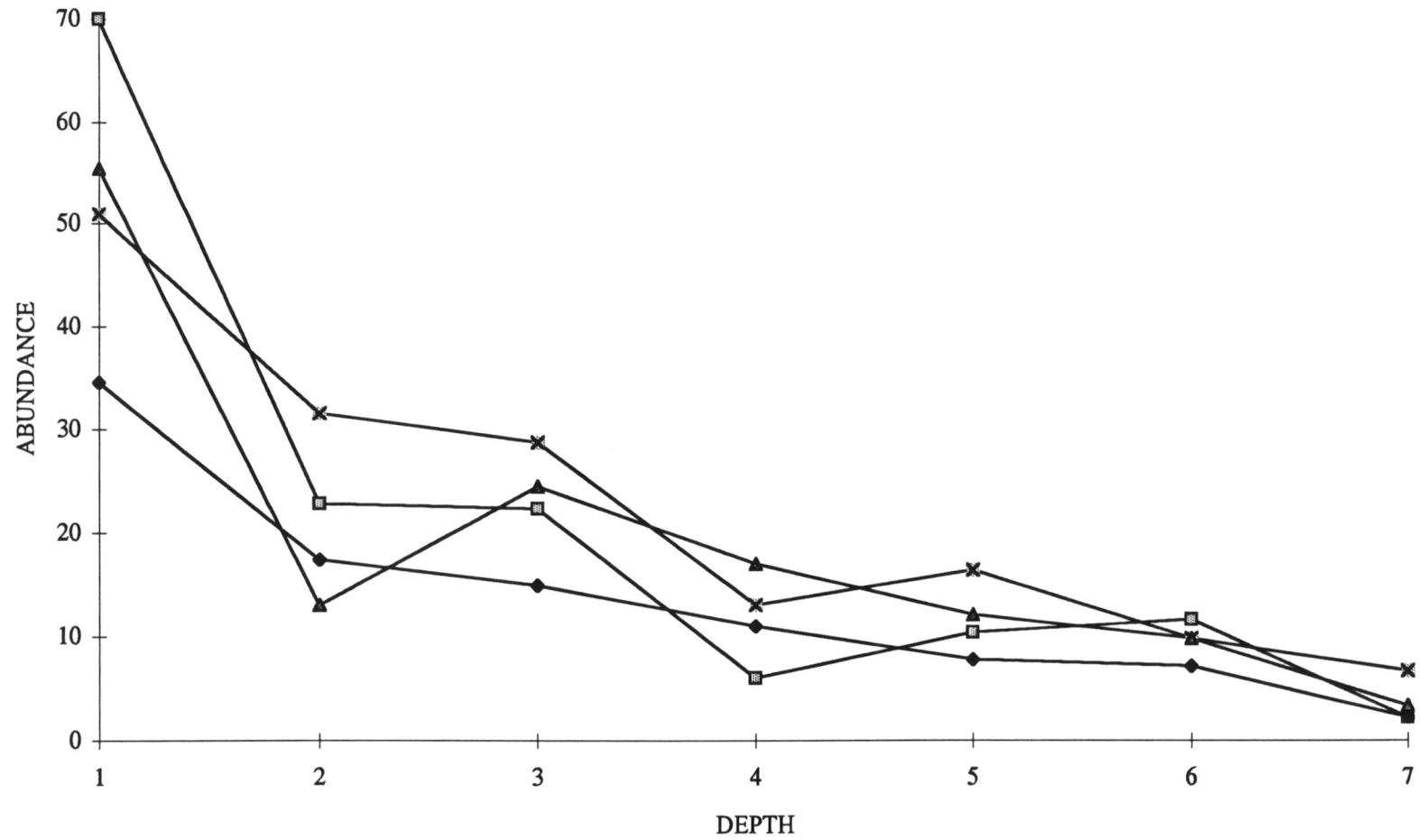




23M-DC-7



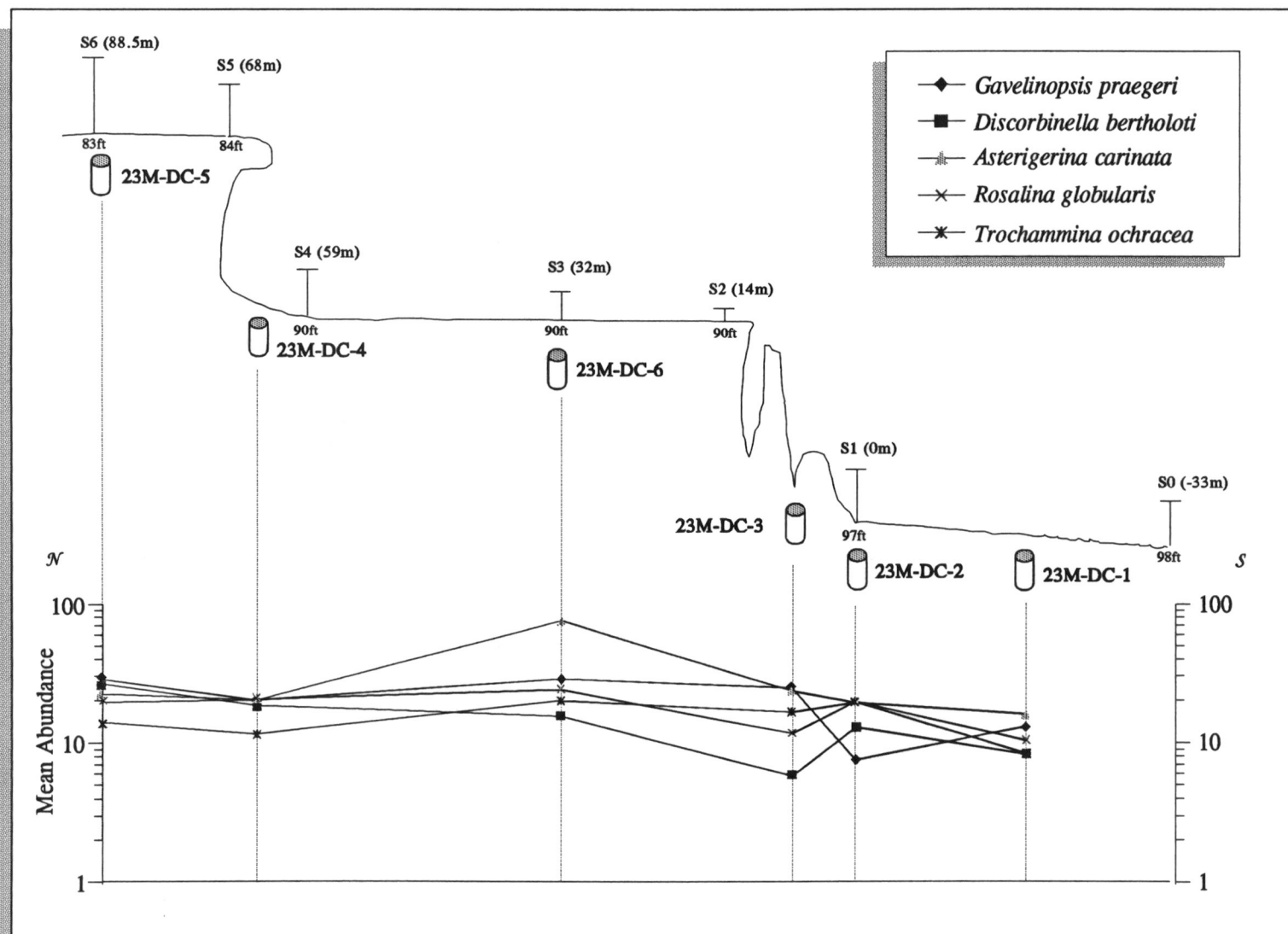
23M-DC-8



—x— Asterigerina carinata —□— Rosalina globularis —▲— Trochammina ochracea —◆— Gavelinopsis praegeri

APPENDIX B

ABUNDANCE TRENDS OF DOMINANT TAXA ALONG TRANSECT LINE

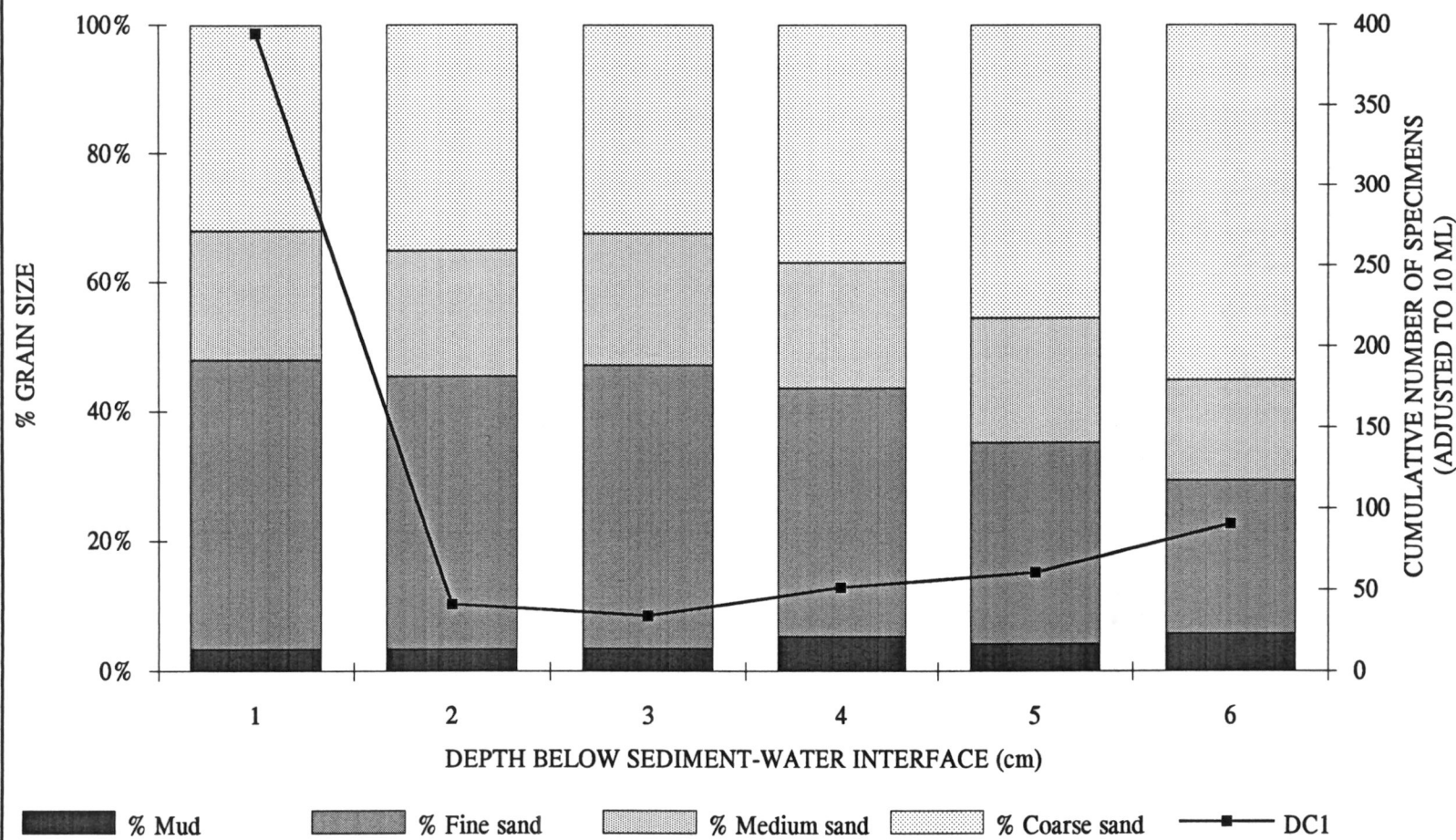


Appendix B: Trends of dominant taxa along transect line.

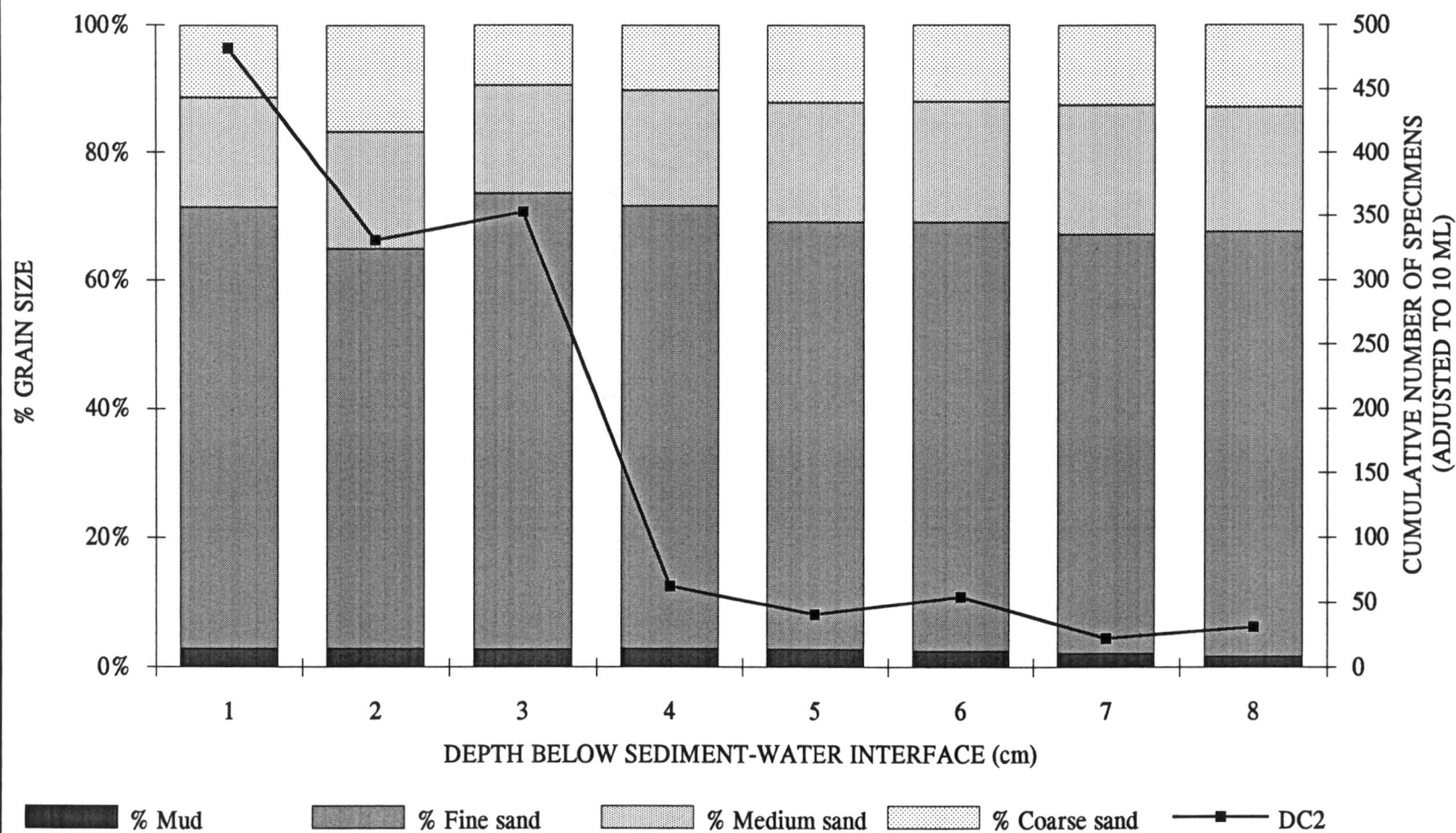
APPENDIX C

PLOTS: SEDIMENT SIZE VS. FORAMINIFERAL ABUNDANCE

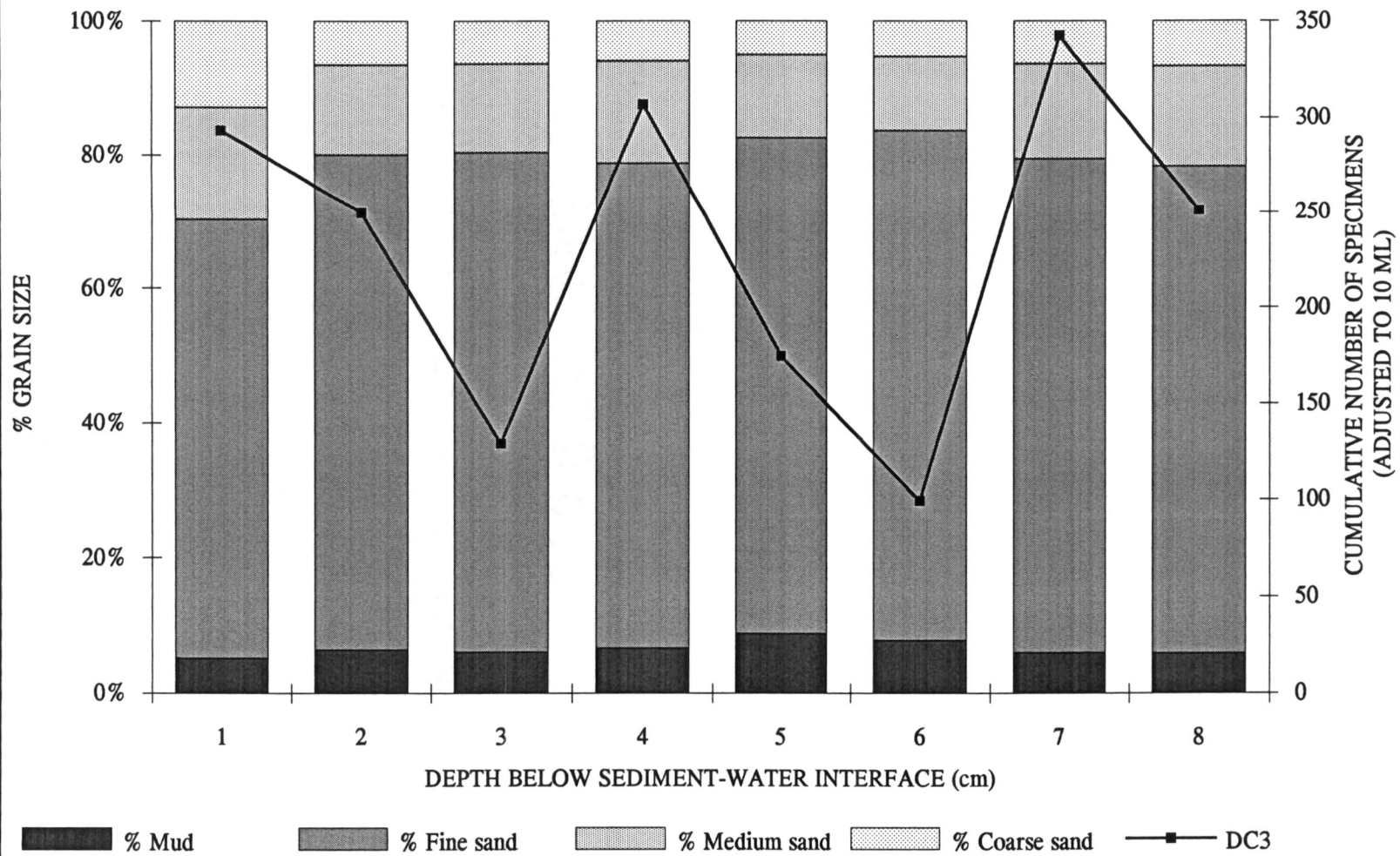
GRAIN SIZE VS FORAMINIFERAL ABUNDANCE IN CORE 23M-DC-1



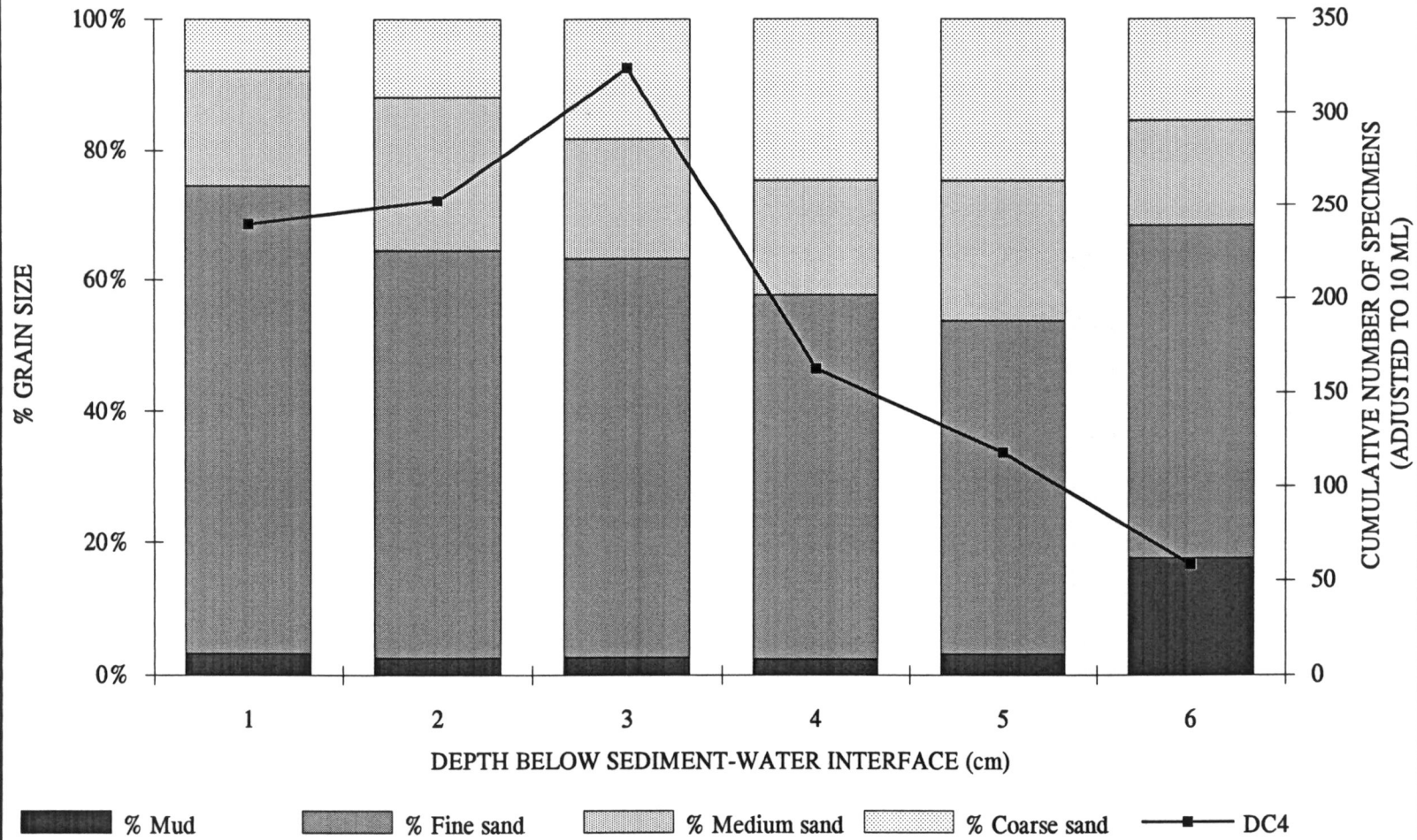
GRAIN SIZE VS FORAMINIFERAL ABUNDANCE IN CORE 23M-DC-2



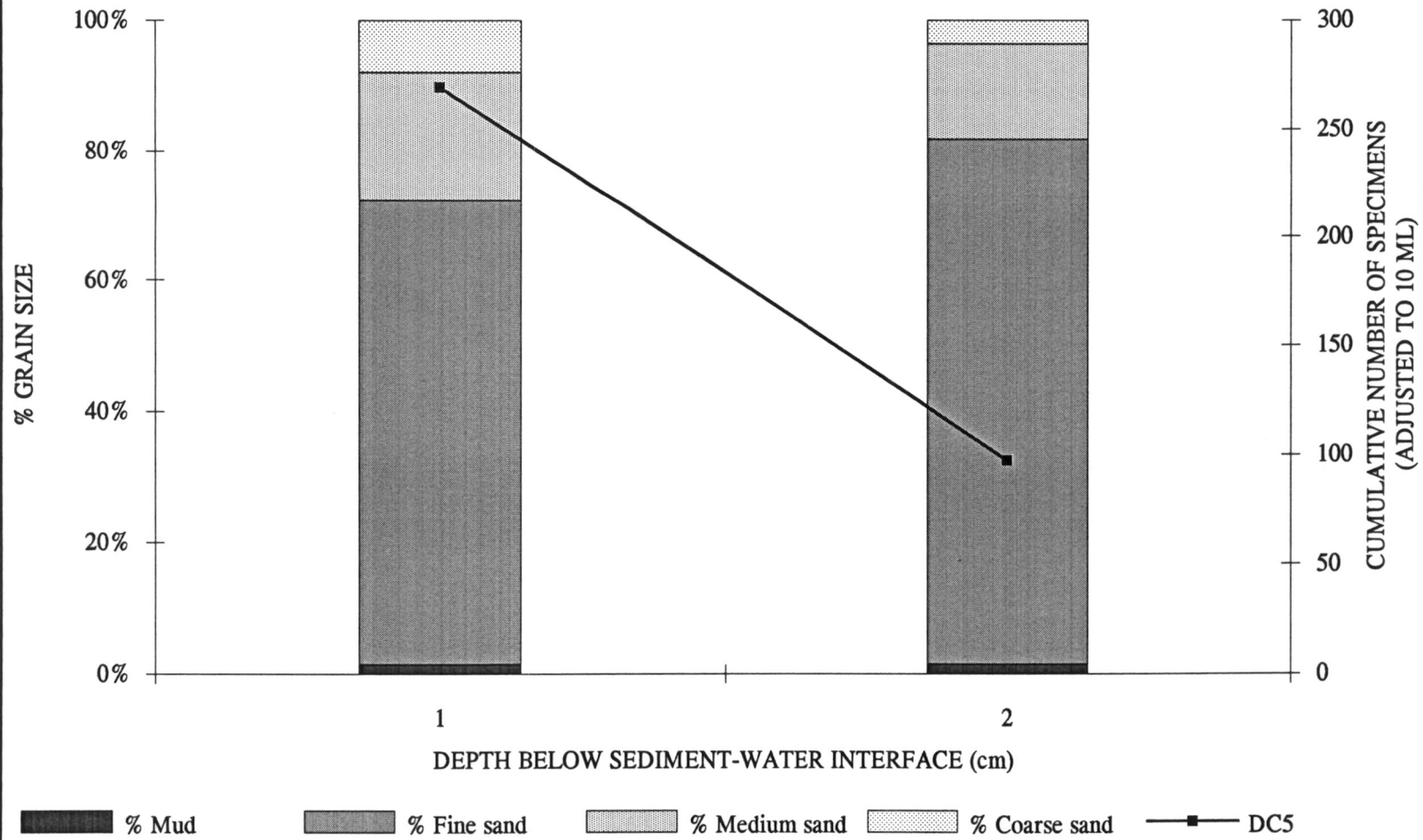
GRAIN SIZE VS FORAMINIFERAL ABUNDANCE IN CORE 23M-DC-3



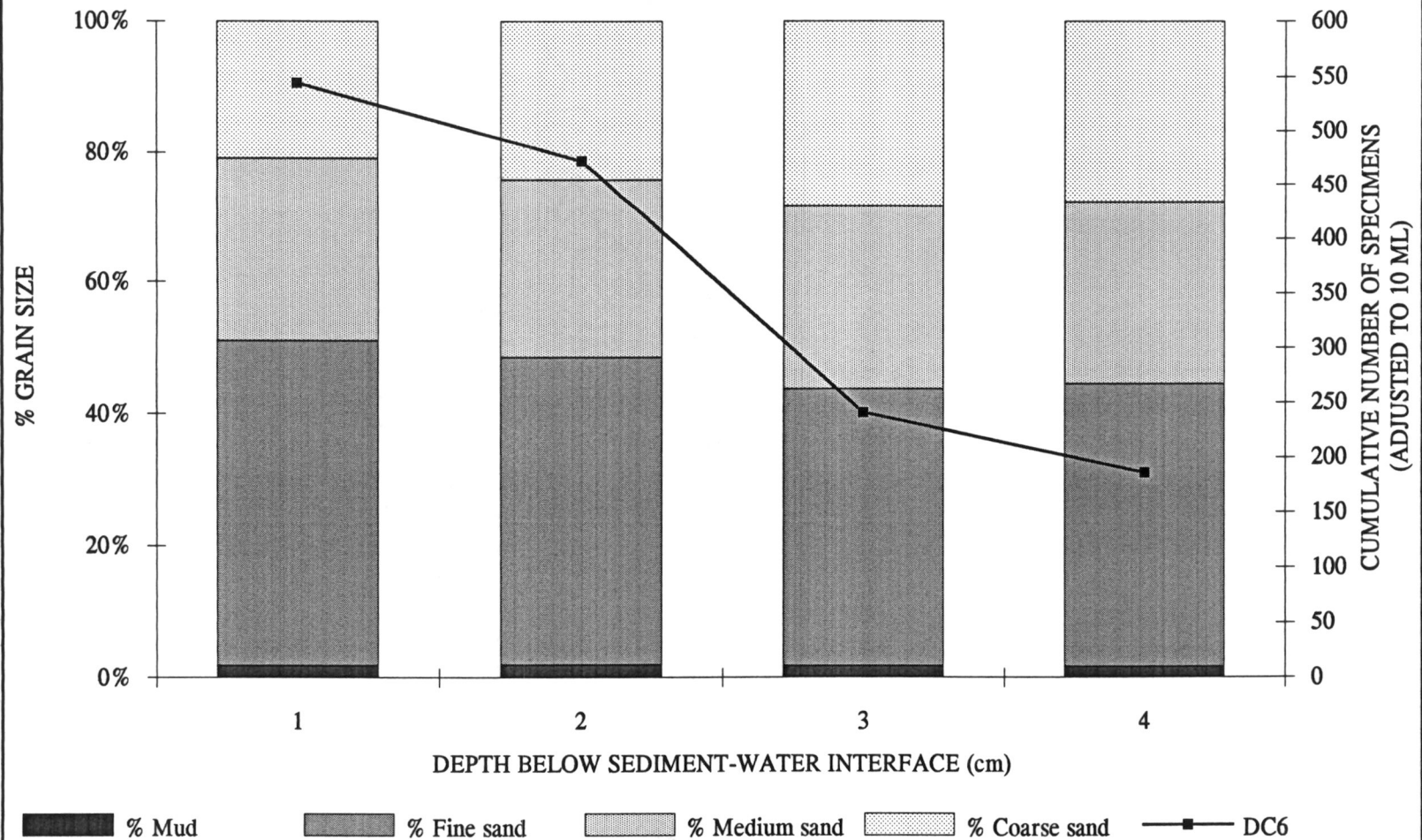
GRAIN SIZE VS FORAMINIFERAL ABUNDANCE IN CORE 23M-DC-4



GRAIN SIZE VS FORAMINIFERAL ABUNDANCE IN CORE 23M-DC-5

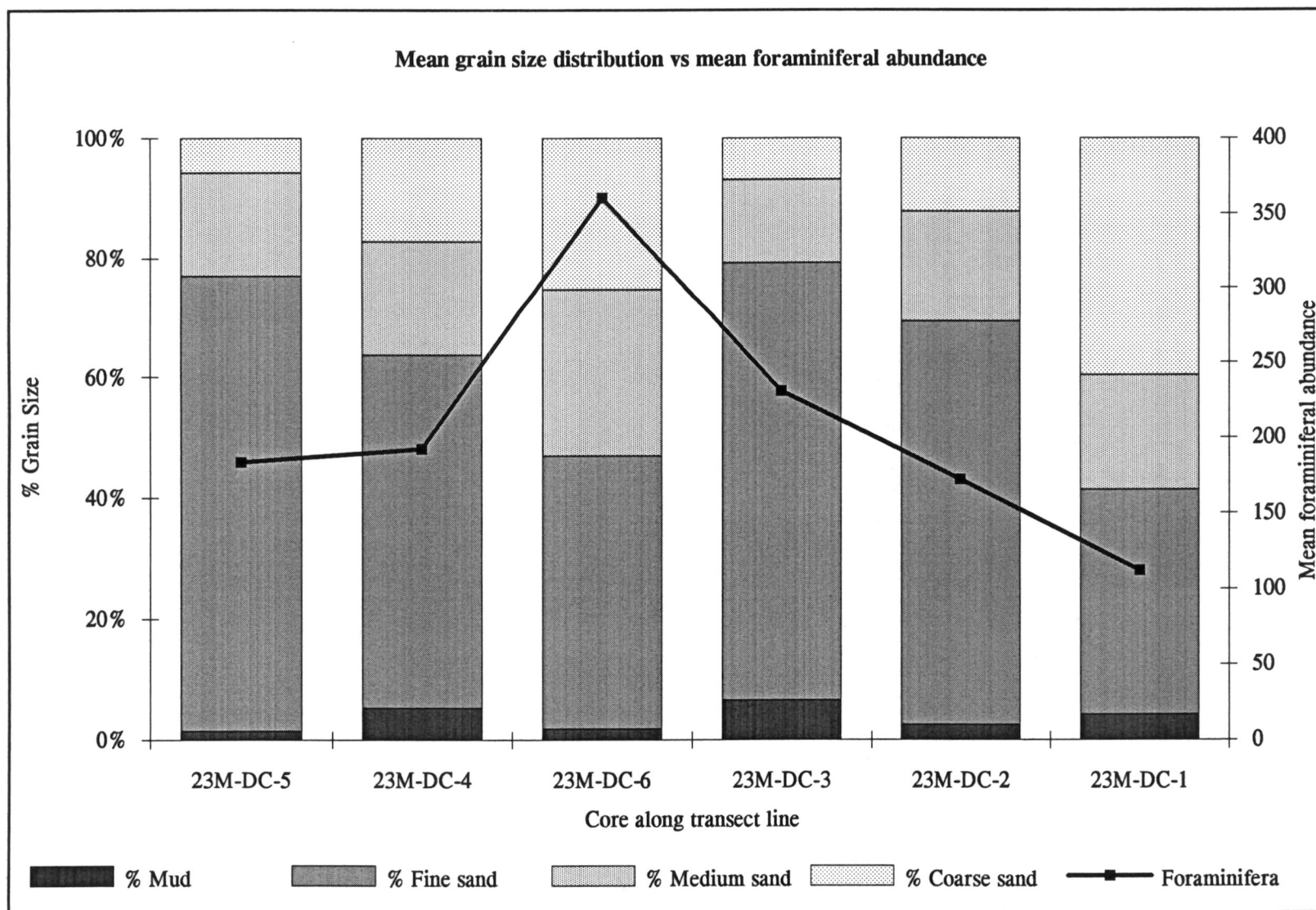


GRAIN SIZE VS FORAMINIFERAL ABUNDANCE IN CORE 23M-DC-6



APPENDIX D

PLOT: MEAN SEDIMENT SIZE VS. MEAN FORAMINIFERAL ABUNDANCE



APPENDIX E

NUMERICAL ABUNDANCES OF ALL STAINED SPECIES

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-1

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
Volume picked (ml)	8.2	6.4	6.2	7.8	5.4	6	3.8	3
<i>Ammobaculites dilatatus</i>								
<i>Ammobaculites exiguus</i>								
<i>Ammodiscus catinus</i>								
<i>Ammonia parkinsoniana forma tepida</i>								
<i>Ammonia parkinsoniana forma typica</i>				1				
<i>Amphistegina lessonii</i>								
<i>Angulogerina angulosa occidentalis</i>	6	3	1	1	5	4	2	
<i>Articulina carinata</i>								
<i>Articulina pacifica</i>	3							
<i>Articulina sagra</i>								
<i>Asterigerina carinata</i>	4		1	1		5	1	1
<i>Asterigerinata pulchella</i>								
<i>Bigenerina irregularis</i>								
<i>Bolivina cf. B. lanceolata</i>								
<i>Bolivina cf. B. sublittoralis</i>	2			1				
<i>Bolivina lowmani</i>	1							
<i>Bolivina pseudoplicata</i>	2				1			
<i>Bolivina striatula</i>								
<i>Bolivina tortuosa</i>								
<i>Buccella hannai</i>								
<i>Bulimina aculeata</i>								
<i>Bulimina sp.</i>								
<i>Buliminella elegantissima</i>								
<i>Bulinella sp.</i>								
<i>Caribbeanella polystoma</i>		1	1	2	1	1		1
<i>Carterina spiculotesta</i>				1				
<i>Cassidulina laevigata</i>								
<i>Cibicides bradyi</i>	2	3	3	4	4	4	3	1
<i>Cibicides lobatulus</i>				1				1
<i>Cibicides robustus</i>								
<i>Cibicidoides cf. C. io</i>		2	2	2				
<i>Conicospirillina atlantica</i>								
<i>Cornuspira planorbis</i>			1			1		
<i>Cornuspira selseyensis</i>								
<i>Discorbinella bertheloti</i>	2	2	7	2	3	8	3	1
<i>Edentostomina cultrata</i>								
<i>Eggerella advena</i>								
<i>Eggerella sp.</i>								
<i>Elphidium advenum</i>								
<i>Elphidium discoidale forma typicum</i>								
<i>Elphidium excavatum forma clavata</i>								
<i>Elphidium excavatum forma selseyensis</i>								
<i>Elphidium galvestonense forma mexicanum</i>								
<i>Elphidium limatulum</i>								
<i>Elphidium poeyanum</i>								
<i>Eponides antillarum</i>								
<i>Eponides repandus</i>				1				
<i>Fissurina laevigata</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-1

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Fissurina lucida</i>	1							
<i>Fissurina stewartii</i>	1					1		
<i>Fursenkoina punctata</i>	3	1	2		1			
<i>Gavelinopsis praegeri</i>	21	4	17	31	20	24	11	17
<i>Glabratella lauriei</i>								
<i>Globulina</i> sp.					1			
<i>Guadryina</i> sp.				1				
<i>Guttulina austriaca</i>								
<i>Guttulina problema</i>						1		
<i>Guttulina pulchella</i>								
<i>Guttulina recticornata</i>								
<i>Hanzawaia concentrica</i> forma <i>strattoni</i>								
<i>Hanzawaia concentrica</i> forma <i>typica</i>					1			
<i>Islandiella subglobosa</i>	2							
<i>Jaculella acuta</i>	1			1				
<i>Lagena tenuis</i>	1							
<i>Lenticulina americana</i>								
<i>Monalysidium politom</i> (Chapman)								
<i>Mychostomina revertens</i>								
<i>Neoconorbina terquemii</i>	1		4			1		
<i>Nodobaculariella cassis</i>								
<i>Nodosaria catesbyi</i>								
<i>Nonion</i> sp.	2	1						
<i>Nonion grateloupi</i>								
<i>Nonionoides atlanticus</i>				1	1	1	1	
<i>Nonionoides auriculus</i>					1			
<i>Oolina</i> sp.								
<i>Parrina</i> sp.								
<i>Patellina corrugata</i>								
<i>Peneroplis planatus</i>								
<i>Peneroplis proteus</i>	3							
<i>Planorbulina mediterraneensis</i>								
<i>Planulina exorna</i>		1						
<i>Pyrgo elongata</i>								
<i>Pyrgo</i> sp.								
<i>Pyrgo subsphaerica</i>								
<i>Quinqueloculina agglutinans</i>								
<i>Quinqueloculina bicarinata</i>	1							
<i>Quinqueloculina bicostata</i> forma <i>garrettii</i>								
<i>Quinqueloculina bicostata</i> forma <i>typica</i>	1							
<i>Quinqueloculina boschiana</i>								
<i>Quinqueloculina</i> cf. <i>Q. milleti</i>	1							
<i>Quinqueloculina compta</i>								
<i>Quinqueloculina jugosa</i>								
<i>Quinqueloculina lamarckiana</i>	1							
<i>Quinqueloculina parkeri</i> forma <i>occidentalis</i>							2	
<i>Quinqueloculina poeyana</i>	1							
<i>Quinqueloculina polygona</i>								
<i>Quinqueloculina seminula</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-1

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Quinqueloculina sp. A</i>								
<i>Quinqueloculina subpoezana</i>				1	1	1		
<i>Rectobolivina advena</i>								
<i>Reophax arayaensis</i>	1							
<i>Reophax scorpiurus</i>								
<i>Reussella atlantica</i>	1							
<i>Rosalina bahamaensis</i>		1						
<i>Rosalina concinna</i>	1			1	1			
<i>Rosalina floridensis</i>			1					
<i>Rosalina globularis</i>	7	8	3			1	2	
<i>Rosalina subarauca</i>								
<i>Saccamina difflugiformis forma atlantica</i>								
<i>Saccamina difflugiformis forma typica</i>								
<i>Sagrina pulchella</i>								
<i>Siphonaperta sabulosa</i>								
<i>Siphonina pulchra</i>								1
<i>Siphonotextularia rolshauseni</i>								
<i>Spiroloculina antillarum</i>								
<i>Spiroloculina soldanii forma typica</i>								
<i>Spiroloculina sp.</i>								
<i>Stetsonia minuta</i>	4			1				
<i>Textularia agglutinans</i>								
<i>Textularia candeiana</i>	1					1		
<i>Textularia cf. T. parvula</i>								
<i>Textularia conica</i>								
<i>Textularia sp.</i>								
<i>Textularia truncata</i>		1					1	
<i>Tretomphalus (Cymbaloforella) atlanticus</i>								
<i>Trifarina bradyi</i>								
<i>Triloculina tricarinata</i>								
<i>Triloculina trigonula</i>								
<i>Triloculinella circularis</i>								1
<i>Triloculinella procera</i>								
<i>Trochammina advena</i>	2	1	1	1	2	2		
<i>Trochammina compacta</i>	1	1		1			2	
<i>Trochammina inflata</i>		2	3	2	1			1
<i>Trochammina ochracea</i>	18	6	3	8	5	7	5	2
<i>Trochammina squamata</i>		1		1				
<i>Trochammina lobata</i>	1				1		1	
<i>Uvigerina auberiana</i>				1				
<i>Uvigerina peregrina</i>								
<i>Valvulinaria cf. V. floridana</i>								
<i>Vasiglobulina sp.</i>	1							
<i>Webbinella concava</i>								
<i>Wiesnerella auriculata</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-2

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
Volume picked (ml)	8.8	7.2	9	5	10.4	8	8.8	10
<i>Ammobaculites dilatatus</i>	1		1	1	2			
<i>Ammobaculites exiguus</i>			1	1	1			
<i>Ammodiscus catinus</i>		2	5	5	4	3	2	5
<i>Ammonia parkinsoniana forma tepida</i>								
<i>Ammonia parkinsoniana forma typica</i>								
<i>Amphistegina lessonii</i>					1			
<i>Angulogerina angulosa occidentalis</i>	10	11	30	32	15	26	12	14
<i>Articulina carinata</i>			2	2	2		1	1
<i>Articulina pacifica</i>				3				
<i>Articulina sagra</i>	1							1
<i>Asterigerina carinata</i>	17	6	88	125	84	21	21	53
<i>Asterigerinata pulchella</i>				1				
<i>Bigennerina irregularis</i>		1		1	2			
<i>Bolivina cf. B. lanceolata</i>					1			
<i>Bolivina cf. B. sublittoralis</i>	1		1	2	1		1	
<i>Bolivina lowmani</i>	2		5	9	4	5	2	4
<i>Bolivina pseudoplicata</i>	1	1	4	1	4	3		
<i>Bolivina striatula</i>		1		1	1			2
<i>Bolivina tortuosa</i>								
<i>Buccella hannai</i>							1	
<i>Bulimina aculeata</i>								
<i>Bulimina sp.</i>					2			
<i>Buliminella elegantissima</i>								
<i>Bulinella sp.</i>								
<i>Caribbeanella polystoma</i>	1		5	6	2		1	
<i>Carterina spiculotesta</i>								
<i>Cassidulina laevigata</i>								
<i>Cibicides bradyi</i>	7	2	11	16	11	1	7	8
<i>Cibicides lobatulus</i>				1	1			
<i>Cibicides robustus</i>								
<i>Cibicides cf. C. io</i>	2	1	4	8	2			4
<i>Conicospirillina atlantica</i>		1		4			1	
<i>Cornuspira planorbis</i>		2	2	1				
<i>Cornuspira selseyensis</i>				5			2	
<i>Discorbinella bertheloti</i>	1	6	14	22	10	7	2	9
<i>Edentostomina cultrata</i>		1	1					
<i>Eggerella advena</i>	3		1	3	3			1
<i>Eggerella sp.</i>								
<i>Elphidium advenum</i>						1		
<i>Elphidium discoideale forma typicum</i>			1		2	1		1
<i>Elphidium excavatum forma clavata</i>		1	1		4	1		1
<i>Elphidium excavatum forma selseyensis</i>								
<i>Elphidium galvestonense forma mexicanum</i>			1	2				
<i>Elphidium limatum</i>								
<i>Elphidium poeyanum</i>				1				
<i>Eponides antillarum</i>								
<i>Eponides repandus</i>								
<i>Fissurina laevigata</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-2

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Fissurina lucida</i>	1		2	1	2			
<i>Fissurina stewartii</i>							1	
<i>Fursenkoina punctata</i>	7	6	8	3	9	10	16	2
<i>Gavelinopsis praegeri</i>	10	17	40	38	34	13	15	22
<i>Glabratella lauriei</i>								
<i>Globulina</i> sp.								
<i>Guadryina</i> sp.	1		1		1			
<i>Guttulina austriaca</i>								
<i>Guttulina problema</i>		1	1		1			
<i>Guttulina pulchella</i>								
<i>Guttulina rectiornata</i>								2
<i>Hanzawaia concentrica</i> forma strattoni								
<i>Hanzawaia concentrica</i> forma typica	3		1	1	3			2
<i>Islandiella subglobosa</i>								
<i>Jaculella acuta</i>								
<i>Lagena tenuis</i>								
<i>Lenticulina americana</i>			1					
<i>Monalysidium politom</i> (Chapman)								
<i>Mychostomina revertens</i>								
<i>Neoconorbina terquemi</i>	2	4	9	18	3		3	8
<i>Nodobaculariella cassis</i>				2			2	
<i>Nodosaria catesbyi</i>			1					
<i>Nonion</i> sp.			2		1		2	1
<i>Nonion grateloupi</i>								
<i>Nonionoides atlanticus</i>		1	4	3	1	2	1	2
<i>Nonionoides auriculus</i>	5	1	1	1	3	1	5	1
<i>Oolina</i> sp.								
<i>Parrina</i> sp.	1							
<i>Patellina corrugata</i>				1	1			1
<i>Peneroplis planatus</i>		1	5	6	2	2	1	
<i>Peneroplis proteus</i>		1		1	1	1		
<i>Planorbulina mediterraneensis</i>								
<i>Planulina exorna</i>		2	6	4	3	1		
<i>Pyrgo elongata</i>								
<i>Pyrgo</i> sp.								
<i>Pyrgo subsphaerica</i>								
<i>Quinqueloculina agglutinans</i>					1			1
<i>Quinqueloculina bicarinata</i>	1	1	3	1	6	2	3	2
<i>Quinqueloculina bicostata</i> forma garrettii								
<i>Quinqueloculina bicostata</i> forma typica			1					
<i>Quinqueloculina bosciana</i>	2	1	4	2	2	1		1
<i>Quinqueloculina</i> cf. <i>Q. milleti</i>	2	1	3	7	4			2
<i>Quinqueloculina compta</i>	1		6	8	9	4	1	4
<i>Quinqueloculina jugosa</i>				1				
<i>Quinqueloculina lamarckiana</i>		1		2	1	2	1	1
<i>Quinqueloculina parkeri</i> forma occidentalis			1	2	1	1	1	1
<i>Quinqueloculina poeyana</i>			1					1
<i>Quinqueloculina polygona</i>		1						
<i>Quinqueloculina seminula</i>				3	1			

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-2

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Quinqueloculina sp. A</i>				1	1			
<i>Quinqueloculina subpoeyana</i>	2	2	1	5	4	4		2
<i>Rectobolivina advena</i>	2		7	7	13	1	2	7
<i>Reophax arayaensis</i>				4	9		1	2
<i>Reophax scorpiurus</i>	1		1		2			1
<i>Reussella atlantica</i>	1			2	1		3	
<i>Rosalina bahamaensis</i>					1			
<i>Rosalina concinna</i>	1		2	7	1	1	2	2
<i>Rosalina floridensis</i>		2	7	5	2			3
<i>Rosalina globularis</i>	5	7	13	34	13	6	6	12
<i>Rosalina subaraucana</i>		1	1					1
<i>Saccammina difflugiformis forma atlantica</i>								
<i>Saccammina difflugiformis forma typica</i>					1		1	
<i>Sagrina pulchella</i>	3	1	1	2	1			2
<i>Siphonaperta sabulosa</i>			2				1	
<i>Siphonina pulchra</i>								
<i>Siphotextularia rolshauseni</i>			2					
<i>Spiroloculina antillarum</i>	1		2	5	3	1		1
<i>Spiroloculina soldanii forma typica</i>								
<i>Spiroloculina sp.</i>			1					
<i>Stetsonia minuta</i>	5		12	13	14	2	3	9
<i>Textularia agglutinans</i>				3				
<i>Textularia candeiana</i>	4	3	8	16	9	1	2	6
<i>Textularia cf. T. parvula</i>								
<i>Textularia conica</i>	4		14	12	4		1	2
<i>Textularia sp.</i>								
<i>Textularia truncata</i>			3	4	4		1	1
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>		2	1	1	1	1		
<i>Trifarina bradyi</i>								
<i>Triloculina tricarinata</i>								1
<i>Triloculina trigonula</i>						1		
<i>Triloculinella circularis</i>								
<i>Triloculinella procera</i>			1	7	2	1		
<i>Trochammina advena</i>		1	5	9	4	1	1	2
<i>Trochammina compacta</i>				1				
<i>Trochammina inflata</i>	2	2	7		5		1	3
<i>Trochammina ochracea</i>	11	10	28	23	14	10	9	15
<i>Trochammina squamata</i>	2		1	2	2		1	2
<i>Trochamminula lobata</i>	2	3	3	2	1		1	
<i>Uvigerina auberiana</i>	1			1	1	1	1	1
<i>Uvigerina peregrina</i>					1			
<i>Valvulineria cf. V. floridana</i>	1	3	1	7	6	3	3	2
<i>Vasiglobulina sp.</i>								
<i>Webbinella concava</i>								
<i>Wiesnerella auriculata</i>	1	1	4	4	2	1		3

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-3

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
Volume picked (ml)	11.8	9.5	10.8	9.9	9	10.6	11.4	9.4
<i>Ammobaculites dilatatus</i>	2		1					
<i>Ammobaculites exiguus</i>	1	1		1				
<i>Ammodiscus catinus</i>	9	1						
<i>Ammonia parkinsoniana forma tepida</i>	1		1					
<i>Ammonia parkinsoniana forma typica</i>	3							
<i>Amphistegina lessonii</i>								
<i>Angulogerina angulosa occidentalis</i>	15	3	2	3	1		3	
<i>Articulina carinata</i>								
<i>Articulina pacifica</i>								
<i>Articulina sagra</i>	4							
<i>Asterigerina carinata</i>	83	26	43	22		12	34	15
<i>Asterigerinata pulchella</i>								
<i>Bigenerina irregularis</i>	5	1						
<i>Bolivina cf. B. lanceolata</i>								
<i>Bolivina cf. B. sublittoralis</i>								
<i>Bolivina lowmani</i>	8			1				2
<i>Bolivina pseudoplicata</i>	1							
<i>Bolivina striatula</i>								
<i>Bolivina tortuosa</i>								
<i>Buccella hannai</i>								
<i>Bulimina aculeata</i>								
<i>Bulimina sp.</i>								
<i>Buliminella elegantissima</i>								
<i>Bulinella sp.</i>								
<i>Caribbeanella polystoma</i>	30	2	8	1			1	
<i>Carterina spiculotesta</i>								
<i>Cassidulina laevigata</i>								
<i>Cibicides bradyi</i>	76	16	25	17	3	13	12	14
<i>Cibicides lobatulus</i>	3							1
<i>Cibicides robustus</i>								
<i>Cibicidoides cf. C. io</i>	6		1	2	1		1	
<i>Conicospirillina atlantica</i>	2							
<i>Cornuspira planorbis</i>	3							
<i>Cornuspira selseyensis</i>		1						
<i>Discorbinella bertheloti</i>	17	3	5	2		1	3	
<i>Edentostomina cultrata</i>								
<i>Eggerella advena</i>	6							
<i>Eggerella sp.</i>				2				
<i>Elphidium advenum</i>				1				
<i>Elphidium discoidale forma typicum</i>	1			1			1	
<i>Elphidium excavatum forma clavata</i>	10						1	
<i>Elphidium excavatum forma selseyensis</i>	1							
<i>Elphidium galvestonense forma mexicanum</i>							1	
<i>Elphidium limatum</i>	2							
<i>Elphidium poeyanum</i>								
<i>Eponides antillarum</i>								
<i>Eponides repandus</i>								
<i>Fissurina laevigata</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-3

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Fissurina lucida</i>	1							
<i>Fissurina stewartii</i>	5							
<i>Fursenkoina punctata</i>	5	1						1
<i>Gavelinopsis praegeri</i>	30	4	2	3		4	6	4
<i>Glabratella lauriei</i>								
<i>Globulina sp.</i>								
<i>Guadryina sp.</i>								
<i>Guttulina austriaca</i>								
<i>Guttulina problema</i>	3							
<i>Guttulina pulchella</i>	1							
<i>Guttulina recticornata</i>								
<i>Hanzawaia concentrica forma strattoni</i>	3					1		1
<i>Hanzawaia concentrica forma typica</i>	14					2		2
<i>Islandiella subglobosa</i>	3							
<i>Jaculella acuta</i>								
<i>Lagena tenuis</i>								
<i>Lenticulina americana</i>								
<i>Monalysidium politom(Chapman)</i>								
<i>Mychostomina revertens</i>								
<i>Neoconorbina terquemii</i>	1			1				2
<i>Nodobacularella cassis</i>	2		1					
<i>Nodosaria catesbyi</i>								
<i>Nonion sp.</i>	7							
<i>Nonion grateloupi</i>								
<i>Nonionoides atlanticus</i>	8							
<i>Nonionoides auriculus</i>	4							
<i>Oolina sp.</i>								
<i>Parrina sp.</i>								
<i>Patellina corrugata</i>								
<i>Peneroplis planatus</i>								
<i>Peneroplis proteus</i>	16	1	3	1	2	1	7	
<i>Planorbulina mediterraneensis</i>								
<i>Planulina exorna</i>	1							
<i>Pyrgo elongata</i>								
<i>Pyrgo sp.</i>								
<i>Pyrgo subsphaerica</i>								
<i>Quinqueloculina agglutinans</i>	6							
<i>Quinqueloculina bicarinata</i>	5		1	2				1
<i>Quinqueloculina bicostata forma garrettii</i>								
<i>Quinqueloculina bicostata forma typica</i>		1						
<i>Quinqueloculina bosciiana</i>	4							
<i>Quinqueloculina cf. Q. milleti</i>	5			1				
<i>Quinqueloculina compta</i>	9	1	1	1			1	
<i>Quinqueloculina jugosa</i>	1							
<i>Quinqueloculina lamarckiana</i>	3							
<i>Quinqueloculina parkeri forma occidentalis</i>	1	1	3	2				
<i>Quinqueloculina poeyana</i>	1							
<i>Quinqueloculina polygona</i>								
<i>Quinqueloculina seminula</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-3

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Quinqueloculina sp. A</i>								
<i>Quinqueloculina subpoezana</i>	1							
<i>Rectobolivina advena</i>	4		1				1	1
<i>Reophax arayaensis</i>	1							
<i>Reophax scoriurus</i>	7	1		1		1		
<i>Reussella atlantica</i>	3							
<i>Rosalina bahamaensis</i>								
<i>Rosalina concinna</i>	8			1	1	1	2	
<i>Rosalina floridensis</i>	1							
<i>Rosalina globularis</i>	48	5	6	2		2	4	4
<i>Rosalina subaracana</i>		1						
<i>Saccammina difflugiformis forma atlantica</i>								
<i>Saccammina difflugiformis forma typica</i>								
<i>Sagrina pulchella</i>	7		2	1			2	
<i>Siphonaperta sabulosa</i>	3							
<i>Siphonina pulchra</i>								
<i>Siphotextularia rolshauseni</i>								
<i>Spiroloculina antillarum</i>								
<i>Spiroloculina soldanii forma typica</i>								
<i>Spiroloculina sp.</i>								
<i>Stetsonia minuta</i>	10	3	1	1				1
<i>Textularia agglutinans</i>		1						
<i>Textularia candeiana</i>	10	1	3	1				
<i>Textularia cf. T. parvula</i>	1							
<i>Textularia conica</i>	4	1						
<i>Textularia sp.</i>								
<i>Textularia truncata</i>								
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>								
<i>Trifarina bradyi</i>								
<i>Triloculina tricarinata</i>								
<i>Triloculina trigonula</i>								
<i>Triloculinella circularis</i>								
<i>Triloculinella procera</i>						1	1	
<i>Trochammina advena</i>	8	1	1	4				2
<i>Trochammina compacta</i>	4	1	1				1	
<i>Trochammina inflata</i>	3						1	
<i>Trochammina ochracea</i>	57	8		5		3	4	2
<i>Trochammina squamata</i>	4	1	1			1		1
<i>Trochammina lobata</i>	5	1		1			1	
<i>Uvigerina auberiana</i>								
<i>Uvigerina peregrina</i>								
<i>Valvulineria cf. V. floridana</i>	14		4	1		2	3	1
<i>Vasiglobulina sp.</i>	2		1				1	
<i>Webbinella concava</i>				1	1		3	1
<i>Wiesnerella auriculata</i>	4							

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-4

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
Volume picked (ml)	10.6	11	9.8	11	11.8	12.4	12	11.6
<i>Ammobaculites dilatatus</i>			1					
<i>Ammobaculites exiguus</i>	1					1		
<i>Ammodiscus catinus</i>	3			3	1	6	4	1
<i>Ammonia parkinsoniana forma tepida</i>								
<i>Ammonia parkinsoniana forma typica</i>		1	1					
<i>Amphistegina lessonii</i>								
<i>Angulogerina angulosa occidentalis</i>	13	17	14	19	18	18	24	20
<i>Articulina carinata</i>							1	
<i>Articulina pacifica</i>								
<i>Articulina sagra</i>								
<i>Asterigerina carinata</i>	45	12	49	9	11	31	10	11
<i>Asterigerinata pulchella</i>								
<i>Bigenerina irregularis</i>	1	2	1	1	3		1	
<i>Bolivina cf. B. lanceolata</i>								
<i>Bolivina cf. B. sublittoralis</i>					1		2	
<i>Bolivina lowmani</i>	2	2	1			1	1	1
<i>Bolivina pseudoplicata</i>		2	1	1		1	2	
<i>Bolivina striatula</i>	1	1	1	1	1	1		
<i>Bolivina tortuosa</i>								
<i>Buccella hannaï</i>								
<i>Bulimina aculeata</i>								
<i>Bulimina sp.</i>								
<i>Buliminella elegantissima</i>								
<i>Bulinella sp.</i>								
<i>Caribbeanella polystoma</i>	1	3	2	2	2	4	1	2
<i>Carterina spiculotesta</i>								
<i>Cassidulina laevigata</i>								
<i>Cibicides bradyi</i>	4	5	9	9	9	10	7	8
<i>Cibicides lobatulus</i>		1	1			1	1	
<i>Cibicides robustus</i>								
<i>Cibicidoides cf. C. io</i>		1		3	1	1	3	1
<i>Conicospirillina atlantica</i>								
<i>Cornuspira planorbis</i>						2		
<i>Cornuspira selseyensis</i>		1	1				2	
<i>Discorbinella bertheloti</i>		1	2	4	3	3	2	5
<i>Edentostomina cultrata</i>	1				1	2	1	
<i>Eggerella advena</i>		1	1	1	1	1		
<i>Eggerella sp.</i>								
<i>Elphidium advenum</i>							2	
<i>Elphidium discoidale forma typicum</i>								
<i>Elphidium excavatum forma clavata</i>	2	1					1	
<i>Elphidium excavatum forma selseyensis</i>								
<i>Elphidium galvestonense forma mexicanum</i>		1						
<i>Elphidium limatum</i>								
<i>Elphidium poeyanum</i>			1					1
<i>Eponides antillarum</i>			1			1		
<i>Eponides repandus</i>						1		
<i>Fissurina laevigata</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-4

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Fissurina lucida</i>								
<i>Fissurina stewartii</i>		1		1	1	2	1	
<i>Fursenkoina punctata</i>	3	27	7	8	11	20	7	12
<i>Gavelinopsis praegeri</i>	17	23	19	23	17	26	23	11
<i>Glabratella lauriei</i>								
<i>Globulina</i> sp.								
<i>Guadryina</i> sp.	1				1			
<i>Guttulina austriaca</i>								
<i>Guttulina problema</i>				1		1	1	
<i>Guttulina pulchella</i>					1		1	
<i>Guttulina rectiorinata</i>								
<i>Hanzawaia concentrica</i> forma strattoni								
<i>Hanzawaia concentrica</i> forma typica	2		1			1		3
<i>Islandiella subglobosa</i>						1		
<i>Jaculella acuta</i>								
<i>Lagena tenuis</i>								
<i>Lenticulina americana</i>								
<i>Monalysidium politom</i> (Chapman)								
<i>Mychostomina revertens</i>								
<i>Neoconorbina terquemi</i>	4	4	1	1	2	5	6	
<i>Nodobaculariella cassis</i>								
<i>Nodosaria catesbyi</i>								
<i>Nonion</i> sp.				1	1	1		
<i>Nonion grateloupi</i>								
<i>Nonionoides atlanticus</i>		3	2	1		3	2	
<i>Nonionoides auriculus</i>		6	1	2	1		7	5
<i>Oolina</i> sp.	1							
<i>Parrina</i> sp.					1		1	
<i>Patellina corrugata</i>		2	2				1	
<i>Peneroplis planatus</i>		1			1			
<i>Peneroplis proteus</i>	1	1	4	2		5	3	1
<i>Planorbulina mediterraneensis</i>		1					1	
<i>Planulina exorna</i>	1	3	1	2	1		1	
<i>Pyrgo elongata</i>								
<i>Pyrgo</i> sp.								1
<i>Pyrgo subsphaerica</i>								
<i>Quinqueloculina agglutinans</i>				1				
<i>Quinqueloculina bicarinata</i>	4	2	1	4		1	1	2
<i>Quinqueloculina bicostata</i> forma garrettii								
<i>Quinqueloculina bicostata</i> forma typica				2				
<i>Quinqueloculina bosciana</i>	2	3	1	2	1	2	2	1
<i>Quinqueloculina</i> cf. <i>Q. milleti</i>	1	3	2		1		1	
<i>Quinqueloculina compta</i>	1	5	2	2	3		3	2
<i>Quinqueloculina jugosa</i>			1					
<i>Quinqueloculina lamarckiana</i>		1	1	1		1		
<i>Quinqueloculina parkeri</i> forma occidentalis	2	2	1		1	1		
<i>Quinqueloculina poeyana</i>							1	
<i>Quinqueloculina polygona</i>								
<i>Quinqueloculina seminula</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-BC-4

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Quinqueloculina sp. A</i>		1						
<i>Quinqueloculina subpoezana</i>	1	2		3	2	1	1	3
<i>Rectobolivina advena</i>		1	2	2	1	3	2	
<i>Reophax arayaensis</i>			1					
<i>Reophax scorpiurus</i>			2	1	1	2	2	1
<i>Reussella atlantica</i>		1				1		1
<i>Rosalina bahamaensis</i>								
<i>Rosalina concinna</i>	2	1		1	2	1	1	1
<i>Rosalina floridensis</i>	3		1			1	2	
<i>Rosalina globularis</i>	10	4	7	11	7	6	9	1
<i>Rosalina subaracana</i>	1							
<i>Saccamina difflugiformis forma atlantica</i>								
<i>Saccamina difflugiformis forma typica</i>								
<i>Sagrina pulchella</i>		1	1	3	2	2	3	2
<i>Siphonaperta sabulosa</i>								
<i>Siphonina pulchra</i>								
<i>Siphotextularia rolshauseni</i>								
<i>Spiroloculina antillarum</i>		2		1	1	2	2	
<i>Spiroloculina soldanii forma typica</i>								
<i>Spiroloculina sp.</i>								
<i>Stetsonia minuta</i>	5	6	6	2	2	5	3	
<i>Textularia agglutinans</i>	1	1	2	1				
<i>Textularia candeiana</i>	5	2	2	3	4	1		
<i>Textularia cf. T. parvula</i>		1				1		
<i>Textularia conica</i>	2	1	3		1	1	1	
<i>Textularia sp.</i>								
<i>Textularia truncata</i>	1				1	1		
<i>Tretomphalus (Cymbaloforeta) atlanticus</i>				1				
<i>Trifarina bradyi</i>								
<i>Triloculina tricarinata</i>					1			
<i>Triloculina trigonula</i>								
<i>Triloculinella circularis</i>								
<i>Triloculinella procera</i>	2	1						2
<i>Trochammina advena</i>	4	1	2	3	4	3	2	2
<i>Trochammina compacta</i>	1	1	1	1		3	1	1
<i>Trochammina inflata</i>		1		1	2	4	1	3
<i>Trochammina ochracea</i>	10	11	13	15	30	27	25	21
<i>Trochammina squamata</i>	2		3	1	2	5		9
<i>Trochamminula lobata</i>				1	1	1	1	
<i>Uvigerina auberiana</i>				1				
<i>Uvigerina peregrina</i>								
<i>Valvulineria cf. V. floridana</i>	6			2		3	2	
<i>Vasiglobulina sp.</i>	2			1	1		1	
<i>Webbinella concava</i>	1		1	2			1	
<i>Wiesnerella auriculata</i>	1		1		1	1		1

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-1

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6
Volume picked (ml)	11	11	11	8.8	9.8	9.2
<i>Ammobaculites dilatatus</i>	2					
<i>Ammobaculites exiguus</i>	7					
<i>Ammodiscus catinus</i>	3					
<i>Ammonia parkinsoniana forma tepida</i>	3					
<i>Ammonia parkinsoniana forma typica</i>	3					
<i>Amphistegina lessonii</i>						
<i>Angulogerina angulosa occidentalis</i>	41	7	13	10	6	5
<i>Articulina carinata</i>						
<i>Articulina pacifica</i>	1				1	
<i>Articulina sagra</i>						
<i>Asterigerina carinata</i>	95	2	3	2	2	
<i>Asterigerinata pulchella</i>	1					
<i>Bigennerina irregularis</i>	1	1		1		1
<i>Bolivina cf. B. lanceolata</i>						
<i>Bolivina cf. B. sublittoralis</i>						
<i>Bolivina lowmani</i>	8	1		1	2	
<i>Bolivina pseudoplicata</i>	2					
<i>Bolivina striatula</i>						
<i>Bolivina tortuosa</i>						
<i>Buccella hannai</i>						
<i>Bulimina aculeata</i>						
<i>Bulimina sp.</i>						
<i>Buliminella elegantissima</i>						
<i>Bulinella sp.</i>						
<i>Caribbeanella polystoma</i>	4				1	3
<i>Carterina spiculotesta</i>						
<i>Cassidulina laevigata</i>	1					
<i>Cibicides bradyi</i>	26	3	4	2	2	7
<i>Cibicides lobatulus</i>	2				1	
<i>Cibicides robustus</i>				1		
<i>Cibicidoides cf. C. io</i>						
<i>Conicospirillina atlantica</i>						
<i>Cornuspira planorbis</i>						
<i>Cornuspira selseyensis</i>						
<i>Discorbinella bertheloti</i>	25	6	1	4	5	9
<i>Edentostomina cultrata</i>						
<i>Eggerella advena</i>	13		2	1	1	
<i>Eggerella sp.</i>						
<i>Elphidium advenum</i>						
<i>Elphidium discoidale forma typicum</i>						
<i>Elphidium excavatum forma clavata</i>	1					
<i>Elphidium excavatum forma selseyensis</i>	1					
<i>Elphidium galvestonense forma mexicanum</i>						
<i>Elphidium limatulum</i>						
<i>Elphidium poeyanum</i>						
<i>Eponides antillarum</i>	1					
<i>Eponides repandus</i>						
<i>Fissurina laevigata</i>						

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-1

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6
<i>Fissurina lucida</i>						
<i>Fissurina stewartii</i>						
<i>Fursenkoina punctata</i>	16	2		2		
<i>Gavelinopsis praegeri</i>	19	6	3	4	14	31
<i>Glabratella lauriei</i>						
<i>Globulina</i> sp.						
<i>Quadryina</i> sp.						
<i>Guttulina austriaca</i>						
<i>Guttulina problema</i>						
<i>Guttulina pulchella</i>	1					
<i>Guttulina rectiornata</i>		1				
<i>Hanzawaia concentrica</i> forma <i>strattoni</i>		2				
<i>Hanzawaia concentrica</i> forma <i>typica</i>	4	2		1		1
<i>Islandiella subglobosa</i>	1	1				
<i>Jaculella acuta</i>		1				
<i>Lagena tenuis</i>						
<i>Lenticulina americana</i>						
<i>Monahysidium politom</i> (Chapman)						
<i>Mychostomina revertens</i>						
<i>Neoconorbina terquemi</i>	8	2				1
<i>Nodobaculariella cassis</i>						
<i>Nodosaria catesbyi</i>						
<i>Nonion</i> sp.						
<i>Nonion grateloupi</i>						
<i>Nonionoides atlanticus</i>	1					
<i>Nonionoides auriculus</i>	3					
<i>Oolina</i> sp.						
<i>Parrina</i> sp.						
<i>Patellina corrugata</i>						
<i>Peneroplis planatus</i>						
<i>Peneroplis proteus</i>	1					
<i>Planorbulina mediterraneensis</i>						
<i>Planulina exorna</i>						
<i>Pyrgo elongata</i>						
<i>Pyrgo</i> sp.						
<i>Pyrgo subsphaerica</i>						
<i>Quinqueloculina agglutinans</i>						
<i>Quinqueloculina bicarinata</i>	2			1		
<i>Quinqueloculina bicostata</i> forma <i>garrettii</i>						
<i>Quinqueloculina bicostata</i> forma <i>typica</i>	1					
<i>Quinqueloculina bosciana</i>						
<i>Quinqueloculina</i> cf. <i>Q. milleti</i>	5					
<i>Quinqueloculina compta</i>	9		1	1	1	
<i>Quinqueloculina jugosa</i>						
<i>Quinqueloculina lamarckiana</i>						
<i>Quinqueloculina parkeri</i> forma <i>occidentalis</i>	2	1	1			
<i>Quinqueloculina poeyana</i>						
<i>Quinqueloculina polygona</i>						
<i>Quinqueloculina seminula</i>						

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-1

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6
<i>Quinqueloculina sp. A</i>	1					
<i>Quinqueloculina subpoeyana</i>	8	1	1	1		
<i>Rectobolivina advena</i>	4			2		
<i>Reophax arayaensis</i>						
<i>Reophax scorpiurus</i>	1					
<i>Reussella atlantica</i>	2	1				
<i>Rosalina bahamaensis</i>	3	1				
<i>Rosalina concinna</i>	7	2	2	3	4	3
<i>Rosalina floridensis</i>						
<i>Rosalina globularis</i>	30	3	4	3	6	17
<i>Rosalina subaraucana</i>	4					
<i>Saccammina difflugiformis forma atlantica</i>						
<i>Saccammina difflugiformis forma typica</i>						
<i>Sagrina pulchella</i>	11			1		
<i>Siphonaperta sabulosa</i>						
<i>Siphonina pulchra</i>						
<i>Siphotextularia rolshauseni</i>	1					
<i>Spiroloculina antillarum</i>	5		1		1	
<i>Spiroloculina soldanii forma typica</i>						
<i>Spiroloculina sp.</i>						
<i>Stetsonia minuta</i>	24	1	1			
<i>Textularia agglutinans</i>						
<i>Textularia candeiana</i>	3					
<i>Textularia cf. T. parvula</i>						
<i>Textularia conica</i>	13	1				
<i>Textularia sp.</i>						
<i>Textularia truncata</i>	2					
<i>Tretomphalus (Cymbaloforeta) atlanticus</i>	10					
<i>Trifarina bradyi</i>						
<i>Triloculina tricarinata</i>						
<i>Triloculina trigonula</i>	1				1	
<i>Triloculinella circularis</i>						
<i>Triloculinella procera</i>	3					
<i>Trochammina advena</i>	3				1	
<i>Trochammina compacta</i>	3	2		1	1	
<i>Trochammina inflata</i>	3				1	
<i>Trochammina ochracea</i>	28	2	1	4	12	5
<i>Trochammina squamata</i>	10	1				
<i>Trochammina lobata</i>	6					
<i>Uvigerina auberiana</i>	4				1	
<i>Uvigerina peregrina</i>						
<i>Valvulineria cf. V. floridana</i>	6		1	1		
<i>Vasiglobulina sp.</i>	1			1		
<i>Webbinella concava</i>						
<i>Wiesnerella auriculata</i>	1					

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-2

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
Volume picked (ml)	11	10.4	11.2	11.6	12.2	10	9.6	8.8
<i>Ammobaculites dilatatus</i>			2					
<i>Ammobaculites exiguus</i>	1		2					1
<i>Ammodiscus catinus</i>	1	1	2					
<i>Ammonia parkinsoniana forma tepida</i>	4		2	1				
<i>Ammonia parkinsoniana forma typica</i>	5	1	4	1	1	3		
<i>Amphistegina lessonii</i>								
<i>Angulogerina angulosa occidentalis</i>	9	2	7	3	1			
<i>Articulina carinata</i>								
<i>Articulina pacifica</i>								
<i>Articulina sagra</i>								
<i>Asterigerina carinata</i>	72	38	48	4	1	5	1	
<i>Asterigerinata pulchella</i>								
<i>Bigennerina irregularis</i>	7	4	4					
<i>Bolivina cf. B. lanceolata</i>								
<i>Bolivina cf. B. sublittoralis</i>								
<i>Bolivina lowmani</i>	1	2	1				1	
<i>Bolivina pseudoplicata</i>	5	1	1					
<i>Bolivina striatula</i>	1			1				
<i>Bolivina tortuosa</i>								
<i>Buccella hannai</i>								
<i>Bulimina aculeata</i>	1							
<i>Bulimina sp.</i>								
<i>Buliminella elegantissima</i>								
<i>Bulinella sp.</i>								
<i>Caribbeanella polystoma</i>	2	1	4	1	2	1		
<i>Carterina spiculotesta</i>	1							
<i>Cassidulina laevigata</i>								
<i>Cibicides bradyi</i>	9	19	15	1	4	1		2
<i>Cibicides lobatulus</i>	1		1	2	2			
<i>Cibicides robustus</i>			1					
<i>Cibicidoides cf. C. io</i>	4	2	2					
<i>Conicospirillina atlantica</i>								
<i>Cornuspira planorbis</i>	1							
<i>Cornuspira selseyensis</i>			1					
<i>Discorbinella bertheloti</i>	33	31	28	6	2	2	2	6
<i>Edentostomina cultrata</i>								
<i>Eggerella advena</i>	14	11	15	2	2	3		
<i>Eggerella sp.</i>								
<i>Elphidium advenum</i>						1		
<i>Elphidium discoidale forma typicum</i>		1						
<i>Elphidium excavatum forma clavata</i>		1						
<i>Elphidium excavatum forma selseyensis</i>		1						
<i>Elphidium galvestonense forma mexicanum</i>	5	6	2	1				
<i>Elphidium limatulum</i>	1	2						
<i>Elphidium poeyanum</i>	2	1	1					
<i>Eponides antillarum</i>	1							
<i>Eponides repandus</i>								
<i>Fissurina laevigata</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-2

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Fissurina lucida</i>								
<i>Fissurina stewartii</i>								
<i>Fursenkoina punctata</i>	7	5	3			1		
<i>Gavelinopsis praegeri</i>	17	13	16	2	1	13	1	1
<i>Glabratella lauriei</i>	1							
<i>Globulina sp.</i>								
<i>Guadryina sp.</i>	5	1	1					
<i>Guttulina austriaca</i>								
<i>Guttulina problema</i>	1	2						
<i>Guttulina pulchella</i>	1		1					
<i>Guttulina recticornata</i>			2					
<i>Hanzawaia concentrica forma strattoni</i>			1					
<i>Hanzawaia concentrica forma typica</i>	5	7	2		2	1		
<i>Islandiella subglobosa</i>	2	1						
<i>Jaculella acuta</i>								
<i>Lagena tenuis</i>								
<i>Lenticulina americana</i>								
<i>Monalysidium politum (Chapman)</i>	1	1						
<i>Mychostomina revertens</i>								
<i>Neoconorbina terquemi</i>	12	15	18					
<i>Nodobacularella cassis</i>								
<i>Nodosaria catesbyi</i>	1							
<i>Nonion sp.</i>	1					1		1
<i>Nonion grateloupi</i>	1							
<i>Nonionoides atlanticus</i>	14	7	8	2		1		1
<i>Nonionoides auriculus</i>	40	20	21	3	2	3		
<i>Oolina sp.</i>								
<i>Parrina sp.</i>								
<i>Patellina corrugata</i>		1						
<i>Peneroplis planatus</i>	4		1		1			
<i>Peneroplis proteus</i>	5	3	3	1	2	1		
<i>Planorbulina mediterraneensis</i>								
<i>Planulina exorna</i>	3	1						
<i>Pyrgo elongata</i>								
<i>Pyrgo sp.</i>								
<i>Pyrgo subsphaerica</i>								
<i>Quinqueloculina agglutinans</i>		1	1					
<i>Quinqueloculina bicarinata</i>	5	3		2				
<i>Quinqueloculina bicostata forma garrettii</i>								
<i>Quinqueloculina bicostata forma typica</i>								
<i>Quinqueloculina bosciiana</i>		6						
<i>Quinqueloculina cf. Q. milleti</i>	16	5	8	2				1
<i>Quinqueloculina compta</i>	9	4	7					
<i>Quinqueloculina jugosa</i>								
<i>Quinqueloculina lamarckiana</i>			1					
<i>Quinqueloculina parkeri forma occidentalis</i>	3	3	1	2		1		
<i>Quinqueloculina poeyana</i>	1	3	3					
<i>Quinqueloculina polygona</i>	1			1				
<i>Quinqueloculina seminula</i>	4		4					

Numerical Abundances of All Stained Species (Not Adjusted for Volume)					23-Mile-Rock Area Core 23M-DC-2			
Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Quinqueloculina sp. A</i>		1						
<i>Quinqueloculina subpoeyana</i>	3	1		1				
<i>Rectobolivina advena</i>	5	1	2					
<i>Reophax arayaensis</i>								
<i>Reophax scorpiurus</i>	2	7	1					
<i>Reussella atlantica</i>	3		2					
<i>Rosalina bahamaensis</i>		3	1					
<i>Rosalina concinna</i>	26	26	26	3	2	1	1	3
<i>Rosalina floridensis</i>	4	2	2					
<i>Rosalina globularis</i>	61	18	50	14	16	3	8	3
<i>Rosalina subaracana</i>	8	17	5	1	2		1	
<i>Saccammina difflugiformis forma atlantica</i>								
<i>Saccammina difflugiformis forma typica</i>								
<i>Sagrina pulchella</i>	6	2	6			1		
<i>Siphonaperta sabulosa</i>	1	1	3					
<i>Siphonina pulchra</i>								
<i>Siphotextularia rolshauseni</i>	1							
<i>Spiroloculina antillarum</i>		3	2			1		
<i>Spiroloculina soldanii forma typica</i>		1						
<i>Spiroloculina sp.</i>								
<i>Stetsonia minuta</i>	29	13	12	1	1	1	2	1
<i>Textularia agglutinans</i>	1		1	4				
<i>Textularia candeiana</i>	9	10				1		
<i>Textularia cf. T. parvula</i>			3	1				
<i>Textularia conica</i>	11	12	7	3	2		1	1
<i>Textularia sp.</i>								
<i>Textularia truncata</i>	3	4	2					
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>	11	8	5		1			
<i>Trifarina bradyi</i>								
<i>Triloculina tricarinata</i>	3							
<i>Triloculina trigonula</i>		1						
<i>Triloculinella circularis</i>								
<i>Triloculinella procera</i>	3							
<i>Trochammina advena</i>	5	6	4	1	1	1	1	1
<i>Trochammina compacta</i>	6	4	6	1	1	2		1
<i>Trochammina inflata</i>	3	4	4	1	1	1		
<i>Trochammina ochracea</i>	52	37	43	17	5	9		5
<i>Trochammina squamata</i>	13	3	12				1	1
<i>Trochammina lobata</i>	6	6	6			1	1	
<i>Uvigerina auberiana</i>								
<i>Uvigerina peregrina</i>								
<i>Valvulineria cf. V. floridana</i>	14	7	6		1		1	
<i>Vasiglobulina sp.</i>	3							
<i>Webbinella concava</i>								
<i>Wiesnerella auriculata</i>	16	8	9	2	1			

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-3

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
Volume picked (ml)	11.2	11.2	11	10.4	11	11	10.6	9.8
<i>Ammobaculites dilatatus</i>	2				1		1	1
<i>Ammobaculites exiguus</i>	3			4	5	1	1	2
<i>Ammodiscus catinus</i>				2	1			
<i>Ammonia parkinsoniana forma tepida</i>				1				1
<i>Ammonia parkinsoniana forma typica</i>	3				3	1	1	3
<i>Amphistegina lessonii</i>								
<i>Angulogerina angulosa occidentalis</i>	67	57	31	37	40	20	44	26
<i>Articulina carinata</i>	1		1					
<i>Articulina pacifica</i>	3		2	2	1	1		2
<i>Articulina sagra</i>								
<i>Asterigerina carinata</i>	5	3		26	5	6	72	76
<i>Asterigerinata pulchella</i>								
<i>Bigennerina irregularis</i>	3	2			1		4	1
<i>Bolivina cf. B. lanceolata</i>								
<i>Bolivina cf. B. sublittoralis</i>		3			1		1	
<i>Bolivina lowmani</i>	2	8	2	8	2	4	16	5
<i>Bolivina pseudoplicata</i>	1	6		9	3	3	7	2
<i>Bolivina striatula</i>	2						2	
<i>Bolivina tortuosa</i>								
<i>Buccella hannai</i>							2	1
<i>Bulimina aculeata</i>								
<i>Bulimina sp.</i>								
<i>Buliminella elegantissima</i>								
<i>Bulinella sp.</i>								
<i>Caribbeanella polystoma</i>	4	1	1	9	3	1	6	6
<i>Carterina spiculotesta</i>	1		1	1		1		
<i>Cassidulina laevigata</i>								
<i>Cibicides bradyi</i>	8	20	7	39	10	2	26	14
<i>Cibicides lobatulus</i>	2	1	2	1	1	3		
<i>Cibicides robustus</i>	5	2		3				2
<i>Cibicidoides cf. C. io</i>		3	6	5	3	2	4	4
<i>Conicospirillina atlantica</i>								
<i>Cornuspira planorbis</i>			1					
<i>Cornuspira selseyensis</i>								
<i>Discorbinella bertheloti</i>	5	7	2	8	3		17	7
<i>Edentostomina cultrata</i>			2			1		
<i>Eggerella advena</i>	12	4		6	10	2	3	5
<i>Eggerella sp.</i>	2			4				
<i>Elphidium advenum</i>								
<i>Elphidium discoideale forma typicum</i>					1			
<i>Elphidium excavatum forma clavata</i>								
<i>Elphidium excavatum forma selseyensis</i>								
<i>Elphidium galvestonense forma mexicanum</i>								
<i>Elphidium limatulum</i>								
<i>Elphidium poeyanum</i>								
<i>Eponides antillarum</i>								1
<i>Eponides repandus</i>		1	3	2		1		
<i>Fissurina laevigata</i>	2	1						

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-3

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Fissurina lucida</i>								
<i>Fissurina stewartii</i>	1	1						
<i>Fursenkoina punctata</i>	12	14	2	5	3	3	4	
<i>Gavelinopsis praegeri</i>	39	42	30	25	24	12	25	17
<i>Glabratella lauriei</i>								
<i>Globulina</i> sp.								
<i>Guadryina</i> sp.	1	1	1					
<i>Guttulina austriaca</i>								
<i>Guttulina problema</i>				1			1	2
<i>Guttulina pulchella</i>	1							
<i>Guttulina rectiornata</i>		1					1	
<i>Hanzawaia concentrica</i> forma <i>strattoni</i>				2				1
<i>Hanzawaia concentrica</i> forma <i>typica</i>	2	2		3	1	1	3	2
<i>Islandiella subglobosa</i>	1							
<i>Jaculella acuta</i>								
<i>Lagena tenuis</i>								
<i>Lenticulina americana</i>	1					1		1
<i>Monahysidium politom</i> (Chapman)								
<i>Mychostomina revertens</i>								
<i>Neoconorbina terquemi</i>	5	2	5	10	2	4	4	7
<i>Nodobaculariella cassis</i>								
<i>Nodosaria catesbyi</i>								
<i>Nonion</i> sp.		2		2				
<i>Nonion grateloupi</i>								
<i>Nonionoides atlanticus</i>	1	3						
<i>Nonionoides auriculus</i>		1						1
<i>Oolina</i> sp.	2				3			
<i>Parrina</i> sp.								
<i>Patellina corrugata</i>								
<i>Peneroplis planatus</i>								
<i>Peneroplis proteus</i>	4	1	3	6	4	4	8	7
<i>Planorbulina mediterraneensis</i>	2	7						
<i>Planulina exorna</i>	2			2	2		2	1
<i>Pyrgo elongata</i>								
<i>Pyrgo</i> sp.								
<i>Pyrgo subsphaerica</i>								
<i>Quinqueloculina agglutinans</i>	1				2		4	
<i>Quinqueloculina bicarinata</i>	2	5	1	6	4	2	3	6
<i>Quinqueloculina bicostata</i> forma <i>garrettii</i>								
<i>Quinqueloculina bicostata</i> forma <i>typica</i>								
<i>Quinqueloculina bosciana</i>	1	3	1	1			1	
<i>Quinqueloculina</i> cf. <i>Q. milleti</i>				1				
<i>Quinqueloculina compta</i>	5	12	3	13	16	3	8	2
<i>Quinqueloculina jugosa</i>	1		1	1				
<i>Quinqueloculina lamarckiana</i>	1		4	2			1	2
<i>Quinqueloculina parkeri</i> forma <i>occidentalis</i>	10	5	9	6	2	2	9	2
<i>Quinqueloculina poeyana</i>	2							
<i>Quinqueloculina polygona</i>			2			2		
<i>Quinqueloculina seminula</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-3

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Quinqueloculina sp. A</i>		2						
<i>Quinqueloculina subpoezana</i>	5	6	6	3	7	6		
<i>Rectobolivina advena</i>	6	5	5	14	7	4	9	4
<i>Reophax arayaensis</i>								
<i>Reophax scorpiurus</i>								2
<i>Reussella atlantica</i>	9	2	3	11	5	1	8	3
<i>Rosalina bahamaensis</i>		4		1				1
<i>Rosalina concinna</i>	5			1	3	5	6	3
<i>Rosalina floridensis</i>	2			1	2			
<i>Rosalina globularis</i>	25	18	12	7	12	6	9	12
<i>Rosalina subaraucana</i>	2			3	1		2	1
<i>Saccammina difflugiformis forma atlantica</i>								
<i>Saccammina difflugiformis forma typica</i>		1						
<i>Sagrina pulchella</i>	11	4	2	17	4	8	9	3
<i>Siphonaperta sabulosa</i>	2		1	1		1		
<i>Siphonina pulchra</i>								
<i>Siphotextularia rolshauseni</i>		1						
<i>Spiroloculina antillarum</i>	20	12	5	10	15	2	5	1
<i>Spiroloculina soldanii forma typica</i>								
<i>Spiroloculina sp.</i>								
<i>Stetsonia minuta</i>	27	9	2	10	4		17	5
<i>Textularia agglutinans</i>			2	1	3	1		
<i>Textularia candeiana</i>	15	7	3	11	5	1	9	1
<i>Textularia cf. T. parvula</i>	4	2						3
<i>Textularia conica</i>	9	4	2	10	8	2	7	5
<i>Textularia sp.</i>	2							
<i>Textularia truncata</i>	3	6	5				2	1
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>	4	1		1	1		1	1
<i>Trifarina bradyi</i>			1					
<i>Triloculina tricarinata</i>		1			1			
<i>Triloculina trigonula</i>						2		
<i>Triloculinella circularis</i>	1						1	
<i>Triloculinella procera</i>		3		3				
<i>Trochammina advena</i>		1		1	1		2	1
<i>Trochammina compacta</i>	3	2		1	2	2	4	5
<i>Trochammina inflata</i>	1	2		2		2	2	
<i>Trochammina ochracea</i>	27	30	14	24	8	8	20	12
<i>Trochammina squamata</i>	9	1				2	5	4
<i>Trochamminula lobata</i>	1	2		7	1	1	4	
<i>Uvigerina auberiana</i>	1	2	3	2	3	1		1
<i>Uvigerina peregrina</i>		1	1					
<i>Valvulineria cf. V. floridana</i>	3	2		1	4		4	3
<i>Vasiglobulina sp.</i>						2	1	1
<i>Webbinella concava</i>								
<i>Wiesnerella auriculata</i>		1	2					

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-4

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6
Volume picked (ml)	10.8	10	11.2	12	11.2	11
<i>Ammobaculites dilatatus</i>	1				1	1
<i>Ammobaculites exiguus</i>		3	1			
<i>Ammodiscus catinus</i>			2			
<i>Ammonia parkinsoniana forma tepida</i>	1		1	1		1
<i>Ammonia parkinsoniana forma typica</i>	3	1	4	1		1
<i>Amphistegina lessonii</i>						
<i>Angulogerina angulosa occidentalis</i>	11	23	12	9	5	2
<i>Articulina carinata</i>						
<i>Articulina pacifica</i>			2			
<i>Articulina sagra</i>						
<i>Asterigerina carinata</i>	12	21	55	16	20	9
<i>Asterigerinata pulchella</i>						
<i>Bigenenerina irregularis</i>	3	3	4	4	2	
<i>Bolivina cf. B. lanceolata</i>	1					
<i>Bolivina cf. B. sublittoralis</i>	1	1	2			
<i>Bolivina lowmani</i>	3	5	5	2	1	1
<i>Bolivina pseudoplicata</i>	1	5	2	1		1
<i>Bolivina striatula</i>	1					
<i>Bolivina tortuosa</i>		1				
<i>Buccella hanna</i>						
<i>Bulimina aculeata</i>						
<i>Bulimina sp.</i>						
<i>Buliminella elegantissima</i>						
<i>Bulinella sp.</i>						
<i>Caribbeanella polystoma</i>	12	1	10	2		
<i>Carterina spiculotesta</i>				1	2	
<i>Cassidulina laevigata</i>						
<i>Cibicides bradyi</i>	7	2	24	13	5	2
<i>Cibicides lobatulus</i>	2	2	1	1	1	
<i>Cibicides robustus</i>		1	3	2	4	
<i>Cibicidoides cf. C. io</i>	2		3		1	
<i>Conicospirillina atlantica</i>	2					
<i>Cornuspira planorbis</i>						
<i>Cornuspira selseyensis</i>	1					
<i>Discorbinella bertheloti</i>	10	18	37	24	19	15
<i>Edentostomina cultrata</i>						
<i>Eggerella advena</i>	7	18	4	2	1	
<i>Eggerella sp.</i>						
<i>Elphidium advenum</i>						
<i>Elphidium discoidale forma typicum</i>						
<i>Elphidium excavatum forma clavata</i>						
<i>Elphidium excavatum forma selseyensis</i>						
<i>Elphidium galvestonense forma mexicanum</i>						
<i>Elphidium limatulum</i>			1			
<i>Elphidium poeyanum</i>		1				
<i>Eponides antillarum</i>						
<i>Eponides repandus</i>	3		1		2	3
<i>Fissurina laevigata</i>						

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-4

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6
<i>Fissurina lucida</i>	1					
<i>Fissurina stewartii</i>	1				1	
<i>Fursenkoina punctata</i>	4	1	2		1	
<i>Gavelinopsis praegeri</i>	22	46	38	16	6	2
<i>Glabratella lauriei</i>						
<i>Globulina</i> sp.						
<i>Guadryina</i> sp.		1	1			
<i>Guttulina austriaca</i>			2			
<i>Guttulina problema</i>	2					
<i>Guttulina pulchella</i>			1			
<i>Guttulina rectorinata</i>						
<i>Hanzawaia concentrica</i> forma strattoni		1				
<i>Hanzawaia concentrica</i> forma typica	3	3	7	1	1	4
<i>Islandiella subglobosa</i>			1	1		2
<i>Jaculella acuta</i>						
<i>Lagena tenuis</i>						
<i>Lenticulina americana</i>						
<i>Monalysidium politum</i> (Chapman)						
<i>Mychostomina revertens</i>		1				
<i>Neoconorbina terquemi</i>	8	3	6	8		7
<i>Nodobaculariella cassis</i>			1	1		
<i>Nodosaria catesbyi</i>						
<i>Nonion</i> sp.	3					
<i>Nonion grateloupi</i>						
<i>Nonionoides atlanticus</i>	3	2	8			
<i>Nonionoides auriculus</i>	9	6	4	3		2
<i>Oolina</i> sp.						
<i>Parrina</i> sp.						
<i>Patellina corrugata</i>			1			
<i>Peneroplis planatus</i>						
<i>Peneroplis proteus</i>	7		4	2	4	1
<i>Planorbulina mediterraneensis</i>	1					
<i>Planulina exorna</i>		1	2			1
<i>Pyrgo elongata</i>	1					
<i>Pyrgo</i> sp.						
<i>Pyrgo subsphaerica</i>			1			
<i>Quinqueloculina agglutinans</i>	1	2	1			
<i>Quinqueloculina bicarinata</i>	4	7	11	2	3	1
<i>Quinqueloculina bicostata</i> forma garrettii		1				1
<i>Quinqueloculina bicostata</i> forma typica					2	
<i>Quinqueloculina boschiana</i>		2	2			2
<i>Quinqueloculina</i> cf. <i>Q. milleti</i>	9	2	3			
<i>Quinqueloculina compta</i>	6	10	14	7	5	
<i>Quinqueloculina jugosa</i>			1			1
<i>Quinqueloculina lamarkiana</i>	3		2			
<i>Quinqueloculina parkeri</i> forma occidentalis	4	6	3	3	1	
<i>Quinqueloculina poeyana</i>	9	1				1
<i>Quinqueloculina polygona</i>	2		1			
<i>Quinqueloculina seminula</i>		2		2		

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-4

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6
<i>Quinqueloculina sp. A</i>	1				1	
<i>Quinqueloculina subpoezana</i>	4	2	5	2	1	
<i>Rectobolivina advena</i>	1		4	1	1	
<i>Reophax arayaensis</i>						
<i>Reophax scorpiurus</i>	6	4	2	1		
<i>Reussella atlantica</i>		1		1	1	1
<i>Rosalina bahamaensis</i>	3			3		
<i>Rosalina concinna</i>	15	3	11	5	3	
<i>Rosalina floridensis</i>			4			
<i>Rosalina globularis</i>	29	28	27	26	19	5
<i>Rosalina subaraucana</i>	2	1	1	3		1
<i>Saccamina difflugiformis forma atlantica</i>		1	2			
<i>Saccamina difflugiformis forma typica</i>						
<i>Sagrina pulchella</i>	2	1	4	1		
<i>Siphonaperta sabulosa</i>			1	1		2
<i>Siphonina pulchra</i>						
<i>Siphotextularia rolshauseni</i>		1				
<i>Spiroloculina antillarum</i>			2	3	2	1
<i>Spiroloculina soldanii forma typica</i>				1		
<i>Spiroloculina sp.</i>						
<i>Stetsonia minuta</i>	15	10	10	5	5	1
<i>Textularia agglutinans</i>	3			1	1	
<i>Textularia candeiana</i>	1	1	1			
<i>Textularia cf. T. parvula</i>		1			1	
<i>Textularia conica</i>	7	9	14	11	8	3
<i>Textularia sp.</i>						
<i>Textularia truncata</i>	1	6	3	1		
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>	1					
<i>Trifarina bradyi</i>						
<i>Triloculina tricarinata</i>				2		
<i>Triloculina trigonula</i>						
<i>Triloculinella circularis</i>						1
<i>Triloculinella procera</i>	1					
<i>Trochammina advena</i>	5	3		2	1	1
<i>Trochammina compacta</i>	5	2	7	5		2
<i>Trochammina inflata</i>	1	2	3	1	1	
<i>Trochammina ochracea</i>	17	9	18	16	12	5
<i>Trochammina squamata</i>	2	3	4	1	3	1
<i>Trochammina lobata</i>	12	3	1	5		
<i>Uvigerina auberiana</i>	2		1	1		
<i>Uvigerina peregrina</i>				1		
<i>Valvulineria cf. V. floridana</i>	1	1	5	2	4	
<i>Vasiglobulina sp.</i>				3		
<i>Webbinella concava</i>						
<i>Wiesnerella auriculata</i>	1		3			

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-5

Depth (cm) below sediment-water interface	0-1	1-2
Volume picked (ml)	9.8	7.6
<i>Ammobaculites dilatatus</i>		
<i>Ammobaculites exiguus</i>		
<i>Ammodiscus catinus</i>	1	1
<i>Ammonia parkinsoniana forma tepida</i>		2
<i>Ammonia parkinsoniana forma typica</i>		1
<i>Amphistegina lessonii</i>		
<i>Angulogerina angulosa occidentalis</i>	1	1
<i>Articulina carinata</i>		
<i>Articulina pacifica</i>		
<i>Articulina sagra</i>		
<i>Asterigerina carinata</i>	31	10
<i>Asterigerinata pulchella</i>		
<i>Bigenerina irregularis</i>	2	
<i>Bolivina cf. B. lanceolata</i>		
<i>Bolivina cf. B. sublittoralis</i>		
<i>Bolivina lowmani</i>	1	
<i>Bolivina pseudoplicata</i>		
<i>Bolivina striatula</i>		
<i>Bolivina tortuosa</i>		
<i>Buccella hannai</i>		
<i>Bulimina aculeata</i>		
<i>Bulimina sp.</i>		
<i>Buliminella elegantissima</i>		
<i>Bulinella sp.</i>		1
<i>Caribbeanella polystoma</i>	8	2
<i>Carterina spiculotesta</i>		
<i>Cassidulina laevigata</i>		
<i>Cibicides bradyi</i>	13	2
<i>Cibicides lobatulus</i>		
<i>Cibicides robustus</i>		
<i>Cibicides cf. C. io</i>	4	
<i>Conicospirillina atlantica</i>		
<i>Cornuspira planorbis</i>	1	
<i>Cornuspira selseyensis</i>		
<i>Discorbinella bertheloti</i>	29	18
<i>Edentostomina cultrata</i>		
<i>Eggerella advena</i>		3
<i>Eggerella sp.</i>		
<i>Elphidium advenum</i>		
<i>Elphidium discoidale forma typicum</i>		
<i>Elphidium excavatum forma clavata</i>		
<i>Elphidium excavatum forma selseyensis</i>		
<i>Elphidium galvestonense forma mexicanum</i>	1	
<i>Elphidium limatulum</i>		
<i>Elphidium poeyanum</i>		
<i>Eponides antillarum</i>		
<i>Eponides repandus</i>	1	
<i>Fissurina laevigata</i>		

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-5

Depth (cm) below sediment-water interface	0-1	1-2
<i>Fissurina lucida</i>		
<i>Fissurina stewartii</i>		
<i>Fursenkoina punctata</i>		
<i>Gavelinopsis praegeri</i>	51	4
<i>Glabratella lauriei</i>		
<i>Globulina</i> sp.		
<i>Guadryina</i> sp.		
<i>Guttulina austriaca</i>		
<i>Guttulina problema</i>		
<i>Guttulina pulchella</i>		
<i>Guttulina rectorinata</i>		
<i>Hanzawaia concentrica</i> forma <i>strattoni</i>	1	
<i>Hanzawaia concentrica</i> forma <i>typica</i>	2	
<i>Islandiella subglobosa</i>		
<i>Jaculella acuta</i>		
<i>Lagena tenuis</i>		
<i>Lenticulina americana</i>		
<i>Monalysidium politum</i> (Chapman)		
<i>Mychostomina revertens</i>		
<i>Neoconorbina terquemi</i>	7	3
<i>Nodobaculariella cassis</i>		
<i>Nodosaria catesbyi</i>		
<i>Nonion</i> sp.		
<i>Nonion grateloupi</i>	1	
<i>Nonionoides atlanticus</i>		
<i>Nonionoides auriculus</i>	2	1
<i>Oolina</i> sp.		
<i>Parrina</i> sp.		
<i>Patellina corrugata</i>		
<i>Peneroplis planatus</i>		
<i>Peneroplis proteus</i>	3	
<i>Planorbulina mediterraneensis</i>		
<i>Planulina exorna</i>		
<i>Pyrgo elongata</i>		
<i>Pyrgo</i> sp.		
<i>Pyrgo subsphaerica</i>		
<i>Quinqueloculina agglutinans</i>		
<i>Quinqueloculina bicarinata</i>	6	
<i>Quinqueloculina bicostata</i> forma <i>garrettii</i>	1	
<i>Quinqueloculina bicostata</i> forma <i>typica</i>		1
<i>Quinqueloculina bosciana</i>		
<i>Quinqueloculina</i> cf. <i>Q. milleti</i>	4	
<i>Quinqueloculina compta</i>	7	1
<i>Quinqueloculina jugosa</i>	1	
<i>Quinqueloculina lamarckiana</i>		
<i>Quinqueloculina parkeri</i> forma <i>occidentalis</i>	3	2
<i>Quinqueloculina poeyana</i>		
<i>Quinqueloculina polygona</i>		
<i>Quinqueloculina seminula</i>		

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-5

Depth (cm) below sediment-water interface	0-1	1-2
<i>Quinqueloculina sp. A</i>	1	
<i>Quinqueloculina subpoeyana</i>	1	
<i>Rectobolivina advena</i>		
<i>Reophax arayaensis</i>		
<i>Reophax scorpiurus</i>		
<i>Reussella atlantica</i>		
<i>Rosalina bahamaensis</i>	2	1
<i>Rosalina concinna</i>	4	5
<i>Rosalina floridensis</i>		
<i>Rosalina globularis</i>	36	2
<i>Rosalina subarauca</i>		
<i>Saccammina difflugiformis forma atlantica</i>		
<i>Saccammina difflugiformis forma typica</i>		
<i>Sagrina pulchella</i>		
<i>Siphonaperta sabulosa</i>	2	
<i>Siphonina pulchra</i>		
<i>Siphotextularia rolshauseni</i>		
<i>Spiroloculina antillarum</i>		
<i>Spiroloculina soldanii forma typica</i>	1	
<i>Spiroloculina sp.</i>		
<i>Stetsonia minuta</i>	3	4
<i>Textularia agglutinans</i>		
<i>Textularia candeiana</i>	1	
<i>Textularia cf. T. parvula</i>		
<i>Textularia conica</i>	2	1
<i>Textularia sp.</i>		
<i>Textularia truncata</i>		
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>		
<i>Trifarina bradyi</i>		
<i>Triloculina tricarinata</i>		
<i>Triloculina trigonula</i>	2	
<i>Triloculinella circularis</i>		
<i>Triloculinella procera</i>		
<i>Trochammina advena</i>	4	2
<i>Trochammina compacta</i>	4	4
<i>Trochammina inflata</i>	3	2
<i>Trochammina ochracea</i>	24	3
<i>Trochammina squamata</i>	3	
<i>Trochammina lobata</i>	3	3
<i>Uvigerina auberiana</i>		
<i>Uvigerina peregrina</i>		
<i>Valvulineria cf. V. floridana</i>	3	1
<i>Vasiglobulina sp.</i>		
<i>Webbinella concava</i>		2
<i>Wiesnerella auriculata</i>		

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-6

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4
Volume picked (ml)	9.2	9.8	11.8	11
<i>Ammobaculites dilatatus</i>				
<i>Ammobaculites exiguus</i>	1			
<i>Ammodiscus catinus</i>				
<i>Ammonia parkinsoniana forma tepida</i>	1	1	1	
<i>Ammonia parkinsoniana forma typica</i>	4	8	7	
<i>Amphistegina lessonii</i>				
<i>Angulogerina angulosa occidentalis</i>	16	9	11	3
<i>Articulina carinata</i>		1		
<i>Articulina pacifica</i>	1	2		
<i>Articulina sagra</i>		1	2	
<i>Asterigerina carinata</i>	107	103	35	57
<i>Asterigerinata pulchella</i>				
<i>Bigennerina irregularis</i>	13	12	8	2
<i>Bolivina cf. B. lanceolata</i>				
<i>Bolivina cf. B. sublittoralis</i>		1		
<i>Bolivina lowmani</i>	3	2	1	3
<i>Bolivina pseudoplicata</i>	3	1		
<i>Bolivina striatula</i>				
<i>Bolivina tortuosa</i>				1
<i>Buccella hannaï</i>				1
<i>Bulimina aculeata</i>				
<i>Bulimina sp.</i>				
<i>Buliminella elegantissima</i>				
<i>Bulinella sp.</i>				
<i>Caribbeanella polystoma</i>	5	8	8	15
<i>Carterina spiculotesta</i>				
<i>Cassidulina laevigata</i>				
<i>Cibicides bradyi</i>	22	20	18	12
<i>Cibicides lobatulus</i>		2	1	1
<i>Cibicides robustus</i>			1	
<i>Cibicidoides cf. C. io</i>	7	7	1	5
<i>Conicospirillina atlantica</i>				
<i>Cornuspira planorbis</i>	1	1	4	
<i>Cornuspira selseyensis</i>	2			
<i>Discorbinella bertheloti</i>	12	16	16	21
<i>Edentostomina cultrata</i>				
<i>Eggerella advena</i>	5	3	2	1
<i>Eggerella sp.</i>	1	3		
<i>Elphidium advenum</i>				
<i>Elphidium discoidale forma typicum</i>			1	
<i>Elphidium excavatum forma clavata</i>	6	3	1	
<i>Elphidium excavatum forma selseyensis</i>				
<i>Elphidium galvestonense forma mexicanum</i>	5		7	1
<i>Elphidium limatulum</i>	2	2		
<i>Elphidium poeyanum</i>	4	1	2	
<i>Eponides antillarum</i>				
<i>Eponides repandus</i>				
<i>Fissurina laevigata</i>				

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-6

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4
<i>Fissurina lucida</i>				
<i>Fissurina stewartii</i>	4		1	
<i>Fursenkoina punctata</i>	1	4		
<i>Gavelinopsis praegeri</i>	49	33	18	14
<i>Glabratella lauriei</i>			1	
<i>Globulina sp.</i>				
<i>Guadryina sp.</i>	2			
<i>Guttulina austriaca</i>				
<i>Guttulina problema</i>		1	2	
<i>Guttulina pulchella</i>		1		
<i>Guttulina rectiorinata</i>	1	1		
<i>Hanzawaia concentrica forma strattoni</i>	1			1
<i>Hanzawaia concentrica forma typica</i>	6	7	3	
<i>Islandiella subglobosa</i>	1	1	1	
<i>Jaculella acuta</i>				
<i>Lagenia tenuis</i>				
<i>Lenticulina americana</i>			1	
<i>Monatysidium politom (Chapman)</i>				
<i>Mychostomina revertens</i>				
<i>Neoconorbina terquemi</i>	24	20	19	2
<i>Nodobacularella cassis</i>				
<i>Nodosaria catesbyi</i>				
<i>Nonion sp.</i>	2			
<i>Nonion grateloupi</i>				
<i>Nonionoides atlanticus</i>	16	15	8	
<i>Nonionoides auriculus</i>	25	25	19	
<i>Oolina sp.</i>				
<i>Parrina sp.</i>		5	3	
<i>Patellina corrugata</i>	2			
<i>Peneroplis planatus</i>	5	1		
<i>Peneroplis proteus</i>	14	13	9	2
<i>Planorbulina mediterraneensis</i>				
<i>Planulina exorna</i>	2	1	1	3
<i>Pyrgo elongata</i>				
<i>Pyrgo sp.</i>				
<i>Pyrgo subsphaerica</i>		1		
<i>Quinqueloculina agglutinans</i>		3	1	
<i>Quinqueloculina bicarinata</i>	8	4	2	3
<i>Quinqueloculina bicostata forma garrettii</i>		1		1
<i>Quinqueloculina bicostata forma typica</i>				
<i>Quinqueloculina bosciana</i>	1	3	2	
<i>Quinqueloculina cf. Q. milleti</i>	4	13	9	
<i>Quinqueloculina compta</i>	9	10	2	1
<i>Quinqueloculina jugosa</i>			2	
<i>Quinqueloculina lamarckiana</i>	2		1	3
<i>Quinqueloculina parkeri forma occidentalis</i>	8	5		1
<i>Quinqueloculina poeyana</i>	1	3	1	
<i>Quinqueloculina polygona</i>	2		1	
<i>Quinqueloculina seminula</i>	7	5	1	

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-6

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4
<i>Quinqueloculina sp. A</i>				
<i>Quinqueloculina subpoezana</i>		2	3	
<i>Rectobolivina advena</i>	3	4	1	2
<i>Reophax arayaensis</i>		1		
<i>Reophax scorpiurus</i>	8	4	2	3
<i>Reussella atlantica</i>	3	1		
<i>Rosalina bahamaensis</i>		2	1	
<i>Rosalina concinna</i>	17	7	10	5
<i>Rosalina floridensis</i>				
<i>Rosalina globularis</i>	34	27	18	18
<i>Rosalina subaraucana</i>	4	2		
<i>Saccammina difflugiformis forma atlantica</i>				
<i>Saccammina difflugiformis forma typica</i>				
<i>Sagrina pulchella</i>		1		1
<i>Siphonaperta sabulosa</i>				1
<i>Siphonina pulchra</i>				
<i>Siphotextularia rolshauseni</i>	1			
<i>Spiroloculina antillarum</i>		1		
<i>Spiroloculina soldanii forma typica</i>	1	2		
<i>Spiroloculina sp.</i>				
<i>Stetsonia minuta</i>	14	13	7	1
<i>Textularia agglutinans</i>	2			1
<i>Textularia candeiana</i>	14	6	1	1
<i>Textularia cf. T. parvula</i>				
<i>Textularia conica</i>	4	5		4
<i>Textularia sp.</i>				
<i>Textularia truncata</i>	4	5	3	
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>	6	5	1	
<i>Trifarina bradyi</i>				
<i>Triloculina tricarinata</i>	2			
<i>Triloculina trigonula</i>	7	2	2	
<i>Triloculinella circularis</i>	2			
<i>Triloculinella procera</i>	1			
<i>Trochammina advena</i>	4	4	1	9
<i>Trochammina compacta</i>	6	15	13	
<i>Trochammina inflata</i>	1	6	3	1
<i>Trochammina ochracea</i>	28	23	19	11
<i>Trochammina squamata</i>	4	1	1	1
<i>Trochammina lobata</i>	8	16	15	2
<i>Uvigerina auberiana</i>	1			
<i>Uvigerina peregrina</i>				
<i>Valvulineria cf. V. floridana</i>	9	5	6	6
<i>Vasiglobulina sp.</i>	1	2	3	
<i>Webbinella concava</i>		1		
<i>Wiesnerella auriculata</i>	1			

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-7

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
Volume picked (ml)	11.2	10.4	10.6	10.7	10.9	11	10.2	10.6
<i>Ammobaculites dilatatus</i>			2		1			
<i>Ammobaculites exiguus</i>					1			
<i>Ammodiscus catinus</i>		1			1			
<i>Ammonia parkinsoniana forma tepida</i>								
<i>Ammonia parkinsoniana forma typica</i>		1						
<i>Amphistegina lessonii</i>								
<i>Angulogerina angulosa occidentalis</i>	8	6	2	1	1	3	1	7
<i>Articulina carinata</i>								
<i>Articulina pacifica</i>								
<i>Articulina sagra</i>								
<i>Asterigerina carinata</i>	24	9	9	16	33	30	12	19
<i>Asterigerinata pulchella</i>	4	2		5				
<i>Bigennerina irregularis</i>	1	1			1			
<i>Bolivina cf. B. lanceolata</i>		1						
<i>Bolivina cf. B. sublittoralis</i>	1					1		
<i>Bolivina lowmani</i>	6	3	2			3	3	3
<i>Bolivina pseudoplicata</i>	1			2	1		1	
<i>Bolivina striatula</i>		3	1		1			
<i>Bolivina tortuosa</i>								
<i>Buccella hannai</i>								
<i>Bulimina aculeata</i>								
<i>Bulimina sp.</i>								
<i>Buliminella elegantissima</i>								
<i>Bulinella sp.</i>								
<i>Caribbeanella polystoma</i>	1	2	1	5		1		2
<i>Carterina spiculotesta</i>								
<i>Cassidulina laevigata</i>								
<i>Cibicides bradyi</i>	8	8	3	11	9	8	2	8
<i>Cibicides lobatulus</i>				1				
<i>Cibicides robustus</i>								
<i>Cibicides cf. C. io</i>						1		
<i>Conicospirillina atlantica</i>								
<i>Cornuspira planorbis</i>	2		1					
<i>Cornuspira selseyensis</i>								
<i>Discorbinella bertheloti</i>	16	16	2	9	4	9	8	5
<i>Edentostomina cultrata</i>	1		1					
<i>Eggerella advena</i>	3	2			1			
<i>Eggerella sp.</i>								
<i>Elphidium advenum</i>								
<i>Elphidium discoidale forma typicum</i>	2			1				
<i>Elphidium excavatum forma clavata</i>	1							
<i>Elphidium excavatum forma selseyensis</i>								
<i>Elphidium galvestonense forma mexicanum</i>	1	1			1			
<i>Elphidium limatulum</i>	1							
<i>Elphidium poeyanum</i>	2	1	1			1		
<i>Eponides antillarum</i>	1							
<i>Eponides repandus</i>								3
<i>Fissurina laevigata</i>								

Numerical Abundances of All Stained Species (Not Adjusted for Volume)		23-Mile-Rock Area Core 23M-DC-7						
Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Fissurina lucida</i>								
<i>Fissurina stewartii</i>			1					
<i>Fursenkoina punctata</i>	6		3	2		1	1	1
<i>Gavelinopsis praegeri</i>	14	16	12	14	9	15	4	8
<i>Glabratella lauriei</i>								
<i>Globulina sp.</i>								
<i>Guadryina sp.</i>								
<i>Guttulina austriaca</i>								
<i>Guttulina problema</i>	4	5	1	1				
<i>Guttulina pulchella</i>								
<i>Guttulina rectiornata</i>		1				1		1
<i>Hanzawaia concentrica forma strattoni</i>							1	
<i>Hanzawaia concentrica forma typica</i>	4	2	1	1	1		1	2
<i>Islandiella subglobosa</i>								
<i>Jaculella acuta</i>								
<i>Lagena tenuis</i>								
<i>Lenticulina americana</i>								
<i>Monalysidium politom(Chapman)</i>								
<i>Mychostomina revertens</i>								
<i>Neoconorbina terquemi</i>	4	3	2	4	1		1	4
<i>Nodobacularella cassis</i>								
<i>Nodosaria catesbyi</i>								
<i>Nonion sp.</i>	4	1						1
<i>Nonion grateloupi</i>	1							
<i>Nonionoides atlanticus</i>	35	6	7	2	4	4	1	2
<i>Nonionoides auriculus</i>	48	16	13	5	8	5	1	1
<i>Oolina sp.</i>								
<i>Parrina sp.</i>								
<i>Patellina corrugata</i>								
<i>Peneroplis planatus</i>			2					
<i>Peneroplis proteus</i>	3		2	3	1	3	7	
<i>Planorbulina mediterraneensis</i>								
<i>Planulina exorna</i>			1					1
<i>Pyrgo elongata</i>								
<i>Pyrgo sp.</i>								
<i>Pyrgo subsphaerica</i>								
<i>Quinqueloculina agglutinans</i>		1						
<i>Quinqueloculina bicarinata</i>	6	3	1			1		
<i>Quinqueloculina bicostata forma garrettii</i>								
<i>Quinqueloculina bicostata forma typica</i>								
<i>Quinqueloculina bosciana</i>	1		1	1				1
<i>Quinqueloculina cf. Q. milleti</i>	15	8	1	1		1	2	2
<i>Quinqueloculina compta</i>	2	7		3				
<i>Quinqueloculina jugosa</i>			1					
<i>Quinqueloculina lamarckiana</i>								
<i>Quinqueloculina parkeri forma occidentalis</i>	4	1			2			2
<i>Quinqueloculina poeyana</i>	9	1		2				
<i>Quinqueloculina polygona</i>								
<i>Quinqueloculina seminula</i>								

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-7

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Quinqueloculina sp. A</i>								
<i>Quinqueloculina subpoezana</i>								
<i>Rectobolivina advena</i>		4	1	1	1	2		
<i>Reophax arayaensis</i>								
<i>Reophax scorpiurus</i>	5	2		2		1	1	3
<i>Reussella atlantica</i>	2	2	2	1		1		2
<i>Rosalina bahamaensis</i>	1							
<i>Rosalina concinna</i>	16	4	2	3	4	2	2	3
<i>Rosalina floridensis</i>						1		
<i>Rosalina globularis</i>	21	9	17	16	17	4	3	6
<i>Rosalina subarauca</i>	2		1	2		1		1
<i>Saccammina difflugiformis forma atlantica</i>								
<i>Saccammina difflugiformis forma typica</i>								
<i>Sagrina pulchella</i>	7	4	4				2	
<i>Siphonaperta sabulosa</i>	1							
<i>Siphonina pulchra</i>								
<i>Siphotextularia rolshauseni</i>	4					1		
<i>Spiroloculina antillarum</i>								
<i>Spiroloculina soldanii forma typica</i>	2		1					
<i>Spiroloculina sp.</i>								
<i>Stetsonia minuta</i>	24	39	13	9	9	6	1	1
<i>Textularia agglutinans</i>						1	1	
<i>Textularia candeiana</i>	2	1	2		1	1	1	1
<i>Textularia cf. T. parvula</i>			1					
<i>Textularia conica</i>				1	1			
<i>Textularia sp.</i>								
<i>Textularia truncata</i>								
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>					1			
<i>Trifarina bradyi</i>								
<i>Triloculina tricarinata</i>								
<i>Triloculina trigonula</i>	2				1			
<i>Triloculinella circularis</i>								
<i>Triloculinella procera</i>	2	1						
<i>Trochammina advena</i>		5	3	1	4	4		
<i>Trochammina compacta</i>	6	3	2	5	1		3	2
<i>Trochammina inflata</i>			1	1	2			
<i>Trochammina ochracea</i>	47	49	33	27	15	9	12	8
<i>Trochammina squamata</i>	15	17	10	4	8	7		3
<i>Trochammina lobata</i>	5	4	2	1	1	1		
<i>Uvigerina auberiana</i>								
<i>Uvigerina peregrina</i>								
<i>Valvulinaria cf. V. floridana</i>	6	4	1	2	3	2	2	5
<i>Vasiglobulina sp.</i>	1	1				1		2
<i>Webbinella concava</i>	3	3	1			1	1	1
<i>Wiesnerella auriculata</i>	23	6	4	2	2	4	2	3

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-8

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Volume picked (ml)	11	9.2	9.4	10	11.6	11.2	9
<i>Ammobaculites dilatatus</i>				1			
<i>Ammobaculites exiguus</i>	2	2	1				
<i>Ammodiscus catinus</i>	2	2			1	1	
<i>Ammonia parkinsoniana forma tepida</i>							
<i>Ammonia parkinsoniana forma typica</i>			1				
<i>Amphistegina lessonii</i>							
<i>Angulogerina angulosa occidentalis</i>	17	4	5	4	5	1	
<i>Articulina carinata</i>		1					
<i>Articulina pacifica</i>							
<i>Articulina sagra</i>							
<i>Asterigerina carinata</i>	56	29	27	13	19	11	6
<i>Asterigerinata pulchella</i>	1						
<i>Bigennerina irregularis</i>	2	2	2	1	1	1	1
<i>Bolivina cf. B. lanceolata</i>							
<i>Bolivina cf. B. sublittoralis</i>			1				
<i>Bolivina lowmani</i>	19	3	4			1	
<i>Bolivina pseudoplicata</i>	2	1		1	2		
<i>Bolivina striatula</i>	2		1				
<i>Bolivina tortuosa</i>							
<i>Buccella hannai</i>							
<i>Bulimina aculeata</i>							
<i>Bulimina sp.</i>							
<i>Buliminella elegantissima</i>	1				1		
<i>Bulinella sp.</i>							
<i>Caribbeanella polystoma</i>	4	2	5	2	2		1
<i>Carterina spiculotesta</i>							
<i>Cassidulina laevigata</i>							
<i>Cibicides bradyi</i>	33	11	12	8	4	3	3
<i>Cibicides lobatulus</i>	1						
<i>Cibicides robustus</i>	2						
<i>Cibicidoides cf. C. io</i>	4	1	1	1			
<i>Conicospirillina atlantica</i>			1		1		
<i>Cornuspira planorbis</i>	3				1		
<i>Cornuspira selseyensis</i>							
<i>Discorbinella bertheloti</i>	23	8	7	5	10	4	3
<i>Edentostomina cultrata</i>	1						
<i>Eggerella advena</i>	4	1	2		1		
<i>Eggerella sp.</i>							
<i>Elphidium advenum</i>					2		
<i>Elphidium discoidale forma typicum</i>							
<i>Elphidium excavatum forma clavata</i>	1						
<i>Elphidium excavatum forma selseyensis</i>							
<i>Elphidium galvestonense forma mexicanum</i>		2	1		2		
<i>Elphidium limatulum</i>							
<i>Elphidium poeyanum</i>		1				1	
<i>Eponides antillarum</i>		1					
<i>Eponides repandus</i>			1				
<i>Fissurina laevigata</i>							

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-8

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7
<i>Fissurina lucida</i>							
<i>Fissurina stewartii</i>	1	1					
<i>Fursenkoina punctata</i>	7	2	1		3	1	
<i>Gavelinopsis praegeri</i>	38	16	14	11	9	8	2
<i>Glabratella lauriei</i>							
<i>Globulina</i> sp.							
<i>Guadryina</i> sp.					1		
<i>Guttulina austriaca</i>							
<i>Guttulina problema</i>	2				3		
<i>Guttulina pulchella</i>	2						
<i>Guttulina rectiornata</i>	2						
<i>Hanzawaia concentrica forma strattoni</i>	2		1		1		
<i>Hanzawaia concentrica forma typica</i>	12	2	3	1	2	2	1
<i>Islandiella subglobosa</i>	1						
<i>Jaculella acuta</i>							
<i>Lagen</i> <i>tenuis</i>							
<i>Lenticulina americana</i>	2				1		
<i>Monahysidium politom</i> (Chapman)							
<i>Mychostomina revertens</i>							
<i>Neoconorbina terquemi</i>	15	6	4	1	4	1	2
<i>Nodobaculariella cassis</i>							
<i>Nodosaria catesbyi</i>							
<i>Nonion</i> sp.	1	2	2	1			
<i>Nonion grateloupi</i>							
<i>Nonionoides atlanticus</i>	45	3	8	4	5	6	2
<i>Nonionoides auriculus</i>	42	13	10	1	14	8	2
<i>Oolina</i> sp.							
<i>Parrina</i> sp.							
<i>Patellina corrugata</i>							
<i>Peneroplis planatus</i>	1						
<i>Peneroplis proteus</i>	12	3	1		2	1	1
<i>Planorbulina mediterraneensis</i>							
<i>Planulina exorna</i>	4		1				
<i>Pyrgo elongata</i>							
<i>Pyrgo</i> sp.							
<i>Pyrgo subsphaerica</i>							
<i>Quinqueloculina agglutinans</i>					3		
<i>Quinqueloculina bicarinata</i>	31	2		1	5		
<i>Quinqueloculina bicostata forma garrettii</i>							
<i>Quinqueloculina bicostata forma typica</i>							
<i>Quinqueloculina bosciana</i>							
<i>Quinqueloculina</i> cf. <i>Q. milleti</i>	9	2	3		2	1	
<i>Quinqueloculina compta</i>	6	1	3		2	2	
<i>Quinqueloculina jugosa</i>	1						
<i>Quinqueloculina lamarckiana</i>	1	1	1				
<i>Quinqueloculina parkeri forma occidentalis</i>	5	2		1			
<i>Quinqueloculina poeyana</i>	23	2		2	1	1	
<i>Quinqueloculina polygona</i>							
<i>Quinqueloculina seminula</i>				1			

Numerical Abundances of All Stained
Species (Not Adjusted for Volume)

23-Mile-Rock Area
Core 23M-DC-8

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7
<i>Quinqueloculina sp. A</i>							
<i>Quinqueloculina subpoezana</i>	2						
<i>Rectobolivina advena</i>	2				1		
<i>Reophax arayaensis</i>	2						
<i>Reophax scorpiurus</i>	12	2	1	1	2	1	
<i>Reussella atlantica</i>	3						
<i>Rosalina bahamaensis</i>	2	1		1	2	3	
<i>Rosalina concinna</i>	20	7	4	1	3		
<i>Rosalina floridensis</i>	4	1		1	1		
<i>Rosalina globularis</i>	77	21	21	6	12	13	2
<i>Rosalina subarauca</i>	7	6			3	2	
<i>Saccamina difflugiformis forma atlantica</i>			1				
<i>Saccamina difflugiformis forma typica</i>				1			
<i>Sagrina pulchella</i>	17	4	4		4	1	1
<i>Siphonaperta sabulosa</i>							
<i>Siphonina pulchra</i>							
<i>Siphonotextularia rolschhauseni</i>			1				
<i>Spiroloculina antillarum</i>		1					
<i>Spiroloculina soldanii forma typica</i>					1		
<i>Spiroloculina sp.</i>							
<i>Stetsonia minuta</i>	46	17	12	4	11	1	2
<i>Textularia agglutinans</i>						1	
<i>Textularia candeiana</i>	18	2	1		5		
<i>Textularia cf. T. parvula</i>	1						
<i>Textularia conica</i>	2					1	1
<i>Textularia sp.</i>							
<i>Textularia truncata</i>	4		1				
<i>Tretomphalus (Cymbaloforetta) atlanticus</i>	2				2	2	
<i>Trifarina bradyi</i>							
<i>Triloculina tricarinata</i>							
<i>Triloculina trigonula</i>	1						
<i>Triloculinella circularis</i>							
<i>Triloculinella procera</i>							
<i>Trochammina advena</i>	5	3	3	4	2		
<i>Trochammina compacta</i>	11	1	2	3	4	1	
<i>Trochammina inflata</i>		2	3			1	
<i>Trochammina ochracea</i>	61	12	23	17	14	11	3
<i>Trochammina squamata</i>	13	2	10	4	3		
<i>Trochammina lobata</i>	18	3	7	3	3	1	1
<i>Uvigerina auberiana</i>							
<i>Uvigerina peregrina</i>							
<i>Valvulineria cf. V. floridana</i>	8	7	8	1	6	2	2
<i>Vasiglobulina sp.</i>	2	1		2		1	
<i>Webbinella concava</i>	9	4	8	2	2	1	
<i>Wiesnerella auriculata</i>	20	1	5	2	2	2	

APPENDIX F

NUMERICAL ABUNDANCES OF DOMINANT SPECIES

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-BC-1

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	7	5	2	1	9	7	5	
<i>Asterigerina carinata</i>	5		2	1		8	3	3
<i>Bigerina irregularis</i>								
<i>Bolivina lowmani</i>	1							
<i>Caribbeanella polystoma</i>		2	2	3	2	2		3
<i>Cibicides bradyi</i>	2	5	5	5	7	7	8	3
<i>Cibicidoides cf. C. io</i>		3	3	3				
<i>Discorbinella bertholoti</i>	2	3	11	3	6	13	8	3
<i>Eggerella advena</i>								
<i>Fursenkoina punctata</i>	4	2	3		2			
<i>Gavelinopsis praegeri</i>	26	6	27	40	37	40	29	57
<i>Hanzawaia concentrica forma typica</i>					2			
<i>Neoconorbina terquemi</i>	1		6			2		
<i>Nonionoides atlanticus</i>				1	2	2	3	
<i>Nonionoides auriculus</i>					2			
<i>Peneroplis proteus</i>	4							
<i>Quinqueloculina bicarinata</i>	1							
<i>Quinqueloculina compta</i>								
<i>Quinqueloculina cf. Q. milleti</i>	1							
<i>Quinqueloculina parkeri forma occidentalis</i>							5	
<i>Rectobolivina advena</i>								
<i>Rosalina concinna</i>	1			1	2			
<i>Rosalina globularis</i>	9	13	5			2	5	
<i>Sagrina pulchella</i>								
<i>Stetsonia minuta</i>	5			1				
<i>Textularia candeiana</i>	1					2		
<i>Textularia conica</i>								
<i>Trochammina advena</i>	2	2	2	1	4	3		
<i>Trochammina compacta</i>	1	2		1			5	
<i>Trochammina inflata</i>		3	5	3	2			3
<i>Trochammina ochracea</i>	22	9	5	10	9	12	13	7
<i>Trochammina squamata</i>		2		1				
<i>Trochammina lobata</i>	1				2		3	
<i>Valvulineria cf. V. floridana</i>								

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-BC-2

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	11	15	33	64	14	33	14	14
<i>Asterigerina carinata</i>	19	8	98	250	81	26	24	53
<i>Bigerina irregularis</i>		1		2	2			
<i>Bolivina lowmani</i>	2		6	18	4	6	2	4
<i>Caribbeanella polystoma</i>	1		6	12	2		1	
<i>Cibicides bradyi</i>	8	3	12	32	11	1	8	8
<i>Cibicoides cf. C. io</i>	2	1	4	16	2			4
<i>Discorbinella bertholoti</i>	1	8	16	44	10	9	2	9
<i>Eggerella advena</i>	3		1	6	3			1
<i>Fursenkoina punctata</i>	8	8	9	6	9	13	18	2
<i>Gavelinopsis praegeri</i>	11	24	44	76	33	16	17	22
<i>Hanzawaia concentrica forma typica</i>	3		1	2	3			2
<i>Neoconorbina terquemii</i>	2	6	10	36	3		3	8
<i>Nonionoides atlanticus</i>		1	4	6	1	3	1	2
<i>Nonionoides auriculus</i>	6	1	1	2	3	1	6	1
<i>Peneroplis proteus</i>		1		2	1	1		
<i>Quinqueloculina bicarinata</i>	1	1	3	2	6	3	3	2
<i>Quinqueloculina compta</i>	1		7	16	9	5	1	4
<i>Quinqueloculina cf. Q. milletti</i>	2	1	3	14	4			2
<i>Quinqueloculina parkeri forma occidentalis</i>			1	4	1	1	1	1
<i>Rectobolivina advena</i>	2		8	14	13	1	2	7
<i>Rosalina concinna</i>	1		2	14	1	1	2	2
<i>Rosalina globularis</i>	6	10	14	68	13	8	7	12
<i>Sagrina pulchella</i>	3	1	1	4	1			2
<i>Stetsonia minuta</i>	6		13	26	13	3	3	9
<i>Textularia candeiana</i>	5	4	9	32	9	1	2	6
<i>Textularia conica</i>	5		16	24	4		1	2
<i>Trochammina advena</i>		1	6	18	4	1	1	2
<i>Trochammina compacta</i>				2				
<i>Trochammina inflata</i>	2	3	8		5		1	3
<i>Trochammina ochracea</i>	13	14	31	46	13	13	10	15
<i>Trochammina squamata</i>	2		1	4	2		1	2
<i>Trochammina lobata</i>	2	4	3	4	1		1	
<i>Valvulineria cf. V. floridana</i>	1	4	1	14	6	4	3	2

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-BC-3

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	13	3	2	3	1		3	
<i>Asterigerina carinata</i>	70	27	40	22		11	30	16
<i>Bigerina irregularis</i>	4	1						
<i>Bolivina lowmani</i>	7			1				2
<i>Caribbeanella polystoma</i>	25	2	7	1			1	
<i>Cibicides bradyi</i>	64	17	23	17	3	12	11	15
<i>Cibicidoides cf. C. io</i>	5		1	2	1		1	
<i>Discorbinella bertholoti</i>	14	3	5	2		1	3	
<i>Eggerella advena</i>	5							
<i>Fursenkoina punctata</i>	4	1						1
<i>Gavelinopsis praegeri</i>	25	4	2	3		4	5	4
<i>Hanzawaia concentrica forma typica</i>	12					2		2
<i>Neoconorbina terquemi</i>	1			1				2
<i>Nonionoides atlanticus</i>	7							
<i>Nonionoides auriculus</i>	3							
<i>Peneroplis proteus</i>	14	1	3	1	2	1	6	
<i>Quinqueloculina bicarinata</i>	4		1	2				1
<i>Quinqueloculina compta</i>	8	1	1	1			1	
<i>Quinqueloculina cf. Q. milletti</i>	4			1				
<i>Quinqueloculina parkeri forma occidentalis</i>	1	1	3	2				
<i>Rectobolivina advena</i>	3		1				1	1
<i>Rosalina concinna</i>	7			1	1	1	2	
<i>Rosalina globularis</i>	41	5	6	2		2	4	4
<i>Sagrina pulchella</i>	6		2	1			2	
<i>Stetsonia minuta</i>	8	3	1	1				1
<i>Textularia candeiana</i>	8	1	3	1				
<i>Textularia conica</i>	3	1						
<i>Trochammina advena</i>	7	1	1	4				2
<i>Trochammina compacta</i>	3	1	1				1	
<i>Trochammina inflata</i>	3						1	
<i>Trochammina ochracea</i>	48	8		5		3	4	2
<i>Trochammina squamata</i>	3	1	1			1		1
<i>Trochammina lobata</i>	4	1		1			1	
<i>Valvulineria cf. V. floridana</i>	12		4	1		2	3	1

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-BC-4

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	12	15	14	17	15	15	20	17
<i>Asterigerina carinata</i>	42	11	50	8	9	25	8	9
<i>Bigerina irregularis</i>	1	2	1	1	3		1	
<i>Bolivina lowmani</i>	2	2	1			1	1	1
<i>Caribbeanella polystoma</i>	1	3	2	2	2	3	1	2
<i>Cibicides bradyi</i>	4	5	9	8	8	8	6	7
<i>Cibicoides cf. C. io</i>		1		3	1	1	3	1
<i>Discorbinella bertholoti</i>		1	2	4	3	2	2	4
<i>Eggerella advena</i>		1	1	1	1	1		
<i>Fursenkoina punctata</i>	3	25	7	7	9	16	6	10
<i>Gavelinopsis praegeri</i>	16	21	19	21	14	21	19	9
<i>Hanzawaia concentrica forma typica</i>	2		1			1		3
<i>Neoconorbina terquemi</i>	4	4	1	1	2	4	5	
<i>Nonionoides atlanticus</i>		3	2	1		2	2	
<i>Nonionoides auriculus</i>		5	1	2	1		6	4
<i>Peneroplis proteus</i>	1	1	4	2		4	3	1
<i>Quinqueloculina bicarinata</i>	4	2	1	4		1	1	2
<i>Quinqueloculina compta</i>	1	5	2	2	3		3	2
<i>Quinqueloculina cf. Q. milleti</i>	1	3	2		1		1	
<i>Quinqueloculina parkeri forma occidentalis</i>	2	2	1		1	1		
<i>Rectobolivina advena</i>		1	2	2	1	2	2	
<i>Rosalina concinna</i>	2	1		1	2	1	1	1
<i>Rosalina globularis</i>	9	4	7	10	6	5	8	1
<i>Sagrina pulchella</i>		1	1	3	2	2	3	2
<i>Stetsonia minuta</i>	5	5	6	2	2	4	3	
<i>Textularia candeiana</i>	5	2	2	3	3	1		
<i>Textularia conica</i>	2	1	3		1	1	1	
<i>Trochammina advena</i>	4	1	2	3	3	2	2	2
<i>Trochammina compacta</i>	1	1	1	1		2	1	1
<i>Trochammina inflata</i>		1		1	2	3	1	3
<i>Trochammina ochracea</i>	9	10	13	14	25	22	21	18
<i>Trochammina squamata</i>	2		3	1	2	4		8
<i>Trochammina lobata</i>				1	1	1	1	
<i>Valvulineria cf. V. floridana</i>	6			2		2	2	

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-DC-1

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6
<i>Angulogerina angulosa occidentalis</i>	37	6	12	11	6	5
<i>Asterigerina carinata</i>	86	2	3	2	2	
<i>Bigerina irregularis</i>	1	1		1		1
<i>Bolivina lowmani</i>	7	1		1	2	
<i>Caribbeanella polystoma</i>	4				1	3
<i>Cibicides bradyi</i>	24	3	4	2	2	8
<i>Cibicidoides cf. C. io</i>						
<i>Discorbinella bertholoti</i>	23	5	1	5	5	10
<i>Eggerella advena</i>	12		2	1	1	
<i>Fursenkoina punctata</i>	15	2		2		
<i>Gavelinopsis praegeri</i>	17	5	3	5	14	34
<i>Hanzawaia concentrica forma typica</i>	4	2		1		1
<i>Neonorbina terquemi</i>	7	2				1
<i>Nonionoides atlanticus</i>	1					
<i>Nonionoides auriculus</i>	3					
<i>Peneroplis proteus</i>	1					
<i>Quinqueloculina bicarinata</i>	2			1		
<i>Quinqueloculina compta</i>	8		1	1	1	
<i>Quinqueloculina cf. Q. milleti</i>	5					
<i>Quinqueloculina parkeri forma occidentalis</i>	2	1	1			
<i>Rectobolivina advena</i>	4			2		
<i>Rosalina concinna</i>	6	2	2	3	4	3
<i>Rosalina globularis</i>	27	3	4	3	6	18
<i>Sagrina pulchella</i>	10			1		
<i>Stetsonia minuta</i>	22	1	1			
<i>Textularia candeiana</i>	3					
<i>Textularia conica</i>	12	1				
<i>Trochammina advena</i>	3				1	
<i>Trochammina compacta</i>	3	2		1	1	
<i>Trochammina inflata</i>	3				1	
<i>Trochammina ochracea</i>	25	2	1	5	12	5
<i>Trochammina squamata</i>	9	1				
<i>Trochammina lobata</i>	5					
<i>Valvulineria cf. V. floridana</i>	5		1	1		

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-DC-2

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	8	2	6	3	1			
<i>Asterigerina carinata</i>	65	37	43	3	1	5	1	
<i>Bigerina irregularis</i>	6	4	4					
<i>Bolivina lowmani</i>	1	2	1				1	
<i>Caribbeanella polystoma</i>	2	1	4	1	2	1		
<i>Cibicides bradyi</i>	8	18	13	1	3	1		2
<i>Cibicoides cf. C. io</i>	4	2	2					
<i>Discorbinella bertholoti</i>	30	30	25	5	2	2	2	7
<i>Eggerella advena</i>	13	11	13	2	2	3		
<i>Fursenkoina punctata</i>	6	5	3			1		
<i>Gavelinopsis praegeri</i>	15	13	14	2	1	13	1	1
<i>Hanzawaia concentrica forma typica</i>	5	7	2		2	1		
<i>Neonorbina terquemi</i>	11	14	16					
<i>Nonionoides atlanticus</i>	13	7	7	2		1		1
<i>Nonionoides auriculus</i>	36	19	19	3	2	3		
<i>Peneroplis proteus</i>	5	3	3	1	2	1		
<i>Quinqueloculina bicarinata</i>	5	3		2				
<i>Quinqueloculina compta</i>	8	4	6					
<i>Quinqueloculina cf. Q. milleti</i>	15	5	7	2				1
<i>Quinqueloculina parkeri forma occidentalis</i>	3	3	1	2		1		
<i>Rectobolivina advena</i>	5	1	2					
<i>Rosalina concinna</i>	24	25	23	3	2	1	1	3
<i>Rosalina globularis</i>	55	17	45	12	13	3	8	3
<i>Sagrina pulchella</i>	5	2	5			1		
<i>Stetsonia minuta</i>	26	13	11	1	1	1	2	1
<i>Textularia candeiana</i>	8	10				1		
<i>Textularia conica</i>	10	12	6	3	2		1	1
<i>Trochammina advena</i>	5	6	4	1	1	1	1	1
<i>Trochammina compacta</i>	5	4	5	1	1	2		1
<i>Trochammina inflata</i>	3	4	4	1	1	1		
<i>Trochammina ochracea</i>	47	36	38	15	4	9		6
<i>Trochammina squamata</i>	12	3	11				1	1
<i>Trochammina lobata</i>	5	6	5			1	1	
<i>Valvulineria cf. V. floridana</i>	13	7	5		1		1	

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-DC-3

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	60	51	28	36	36	18	42	27
<i>Asterigerina carinata</i>	4	3		25	5	5	68	78
<i>Bigerina irregularis</i>	3	2			1		4	1
<i>Bolivina lowmani</i>	2	7	2	8	2	4	15	5
<i>Caribbeanella polystoma</i>	4	1	1	9	3	1	6	6
<i>Cibicides bradyi</i>	7	18	6	38	9	2	25	14
<i>Cibicidoides cf. C. io</i>		3	5	5	3	2	4	4
<i>Discorbinella bertholoti</i>	4	6	2	8	3		16	7
<i>Eggerella advena</i>	11	4		6	9	2	3	5
<i>Fursenkoina punctata</i>	11	13	2	5	3	3	4	
<i>Gavelinopsis praegeri</i>	35	38	27	24	22	11	24	17
<i>Hanzawaia concentrica forma typica</i>	2	2		3	1	1	3	2
<i>Neoconorbina terquemi</i>	4	2	5	10	2	4	4	7
<i>Nonionoides atlanticus</i>	1	3						
<i>Nonionoides auriculus</i>		1						1
<i>Peneroplis proteus</i>	4	1	3	6	4	4	8	7
<i>Quinqueloculina bicarinata</i>	2	4	1	6	4	2	3	6
<i>Quinqueloculina compta</i>	4	11	3	13	15	3	8	2
<i>Quinqueloculina cf. Q. milletti</i>				1				
<i>Quinqueloculina parkeri forma occidentalis</i>	9	4	8	6	2	2	8	2
<i>Rectobolivina advena</i>	5	4	5	13	6	4	8	4
<i>Rosalina concinna</i>	4			1	3	5	6	3
<i>Rosalina globularis</i>	22	16	11	7	11	5	8	12
<i>Sagrina pulchella</i>	10	4	2	16	4	7	8	3
<i>Stetsonia minuta</i>	24	8	2	10	4		16	5
<i>Textularia candeiana</i>	13	6	3	11	5	1	8	1
<i>Textularia conica</i>	8	4	2	10	7	2	7	5
<i>Trochammina advena</i>		1		1	1		2	1
<i>Trochammina compacta</i>	3	2		1	2	2	4	5
<i>Trochammina inflata</i>	1	2		2		2	2	
<i>Trochammina ochracea</i>	24	27	13	23	7	7	19	12
<i>Trochammina squamata</i>	8	1				2	5	4
<i>Trochammina lobata</i>	1	2		7	1	1	4	
<i>Valvulineria cf. V. floridana</i>	3	2		1	4		4	3

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-DC-4

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6
<i>Angulogerina angulosa occidentalis</i>	10	23	11	8	4	2
<i>Asterigerina carinata</i>	11	21	49	13	18	8
<i>Bigerina irregularis</i>	3	3	4	3	2	
<i>Bolivina lowmani</i>	3	5	4	2	1	1
<i>Caribbeanella polystoma</i>	11	1	9	2		
<i>Cibicides bradyi</i>	6	2	21	11	4	2
<i>Cibicidoides cf. C. io</i>	2		3		1	
<i>Discorbinella bertholoti</i>	9	18	33	20	17	14
<i>Eggerella advena</i>	6	18	4	2	1	
<i>Fursenkoina punctata</i>	4	1	2		1	
<i>Gavelinopsis praegeri</i>	20	46	34	13	5	2
<i>Hanzawaia concentrica forma typica</i>	3	3	6	1	1	4
<i>Neoconorbina terquemi</i>	7	3	5	7		6
<i>Nonionoides atlanticus</i>	3	2	7			
<i>Nonionoides auriculus</i>	8	6	4	3		2
<i>Peneroplis proteus</i>	6		4	2	4	1
<i>Quinqueloculina bicarinata</i>	4	7	10	2	3	1
<i>Quinqueloculina compta</i>	6	10	13	6	4	
<i>Quinqueloculina cf. Q. milletti</i>	8	2	3			
<i>Quinqueloculina parkeri forma occidentalis</i>	4	6	3	3	1	
<i>Rectobolivina advena</i>	1		4	1	1	
<i>Rosalina concinna</i>	14	3	10	4	3	
<i>Rosalina globularis</i>	27	28	24	22	17	5
<i>Sagrina pulchella</i>	2	1	4	1		
<i>Stetsonia minuta</i>	14	10	9	4	4	1
<i>Textularia candeiana</i>	1	1	1			
<i>Textularia conica</i>	6	9	13	9	7	3
<i>Trochammina advena</i>	5	3		2	1	1
<i>Trochammina compacta</i>	5	2	6	4		2
<i>Trochammina inflata</i>	1	2	3	1	1	
<i>Trochammina ochracea</i>	16	9	16	13	11	5
<i>Trochammina squamata</i>	2	3	4	1	3	1
<i>Trochammina lobata</i>	11	3	1	4		
<i>Valvulineria cf. V. floridana</i>	1	1	4	2	4	

**Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)**

**23-Mile-Rock Area
Core 23M-DC-5**

Depth (cm) below sediment-water interface	0-1	1-2
<i>Angulogerina angulosa occidentalis</i>	1	1
<i>Asterigerina carinata</i>	32	13
<i>Bigerina irregularis</i>	2	
<i>Bolivina lowmani</i>	1	
<i>Caribbeanella polystoma</i>	8	3
<i>Cibicides bradyi</i>	13	3
<i>Cibicidoides cf. C. io</i>	4	
<i>Discorbinella bertholoti</i>	30	24
<i>Eggerella advena</i>		4
<i>Fursenkoina punctata</i>		
<i>Gavelinopsis praegeri</i>	52	5
<i>Hanzawaia concentrica forma typica</i>	2	
<i>Neoconorbina terquemi</i>	7	4
<i>Nonionoides atlanticus</i>		
<i>Nonionoides auriculus</i>	2	1
<i>Peneroplis proteus</i>	3	
<i>Quinqueloculina bicarinata</i>	6	
<i>Quinqueloculina compta</i>	7	1
<i>Quinqueloculina cf. Q. milletti</i>	4	
<i>Quinqueloculina parkeri forma occidentalis</i>	3	3
<i>Rectobolivina advena</i>		
<i>Rosalina concinna</i>	4	7
<i>Rosalina globularis</i>	37	3
<i>Sagrina pulchella</i>		
<i>Stetsonia minuta</i>	3	5
<i>Textularia candeiana</i>	1	
<i>Textularia conica</i>	2	1
<i>Trochammina advena</i>	4	3
<i>Trochammina compacta</i>	4	5
<i>Trochammina inflata</i>	3	3
<i>Trochammina ochracea</i>	24	4
<i>Trochammina squamata</i>	3	
<i>Trochammina lobata</i>	3	4
<i>Valvulineria cf. V. floridana</i>	3	1

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-DC-6

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4
<i>Angulogerina angulosa occidentalis</i>	17	9	9	3
<i>Asterigerina carinata</i>	116	105	30	52
<i>Bigerina irregularis</i>	14	12	7	2
<i>Bolivina lowmani</i>	3	2	1	3
<i>Caribbeanella polystoma</i>	5	8	7	14
<i>Cibicides bradyi</i>	24	20	15	11
<i>Cibicoides cf. C. io</i>	8	7	1	5
<i>Discorbinella bertholoti</i>	13	16	14	19
<i>Eggerella advena</i>	5	3	2	1
<i>Fursenkoina punctata</i>	1	4		
<i>Gavelinopsis praegeri</i>	53	34	15	13
<i>Hanzawaia concentrica forma typica</i>	7	7	3	
<i>Neoconorbina terquemi</i>	26	20	16	2
<i>Nonionoides atlanticus</i>	17	15	7	
<i>Nonionoides auriculus</i>	27	26	16	
<i>Peneroplis proteus</i>	15	13	8	2
<i>Quinqueloculina bicarinata</i>	9	4	2	3
<i>Quinqueloculina compta</i>	10	10	2	1
<i>Quinqueloculina cf. Q. milletti</i>	4	13	8	
<i>Quinqueloculina parkeri forma occidentalis</i>	9	5		1
<i>Rectobolivina advena</i>	3	4	1	2
<i>Rosalina concinna</i>	18	7	8	5
<i>Rosalina globularis</i>	37	28	15	16
<i>Sagrina pulchella</i>		1		1
<i>Stetsonia minuta</i>	15	13	6	1
<i>Textularia candeiana</i>	15	6	1	1
<i>Textularia conica</i>	4	5		4
<i>Trochammmina advena</i>	4	4	1	8
<i>Trochammmina compacta</i>	7	15	11	
<i>Trochammmina inflata</i>	1	6	3	1
<i>Trochammmina ochracea</i>	30	23	16	10
<i>Trochammmina squamata</i>	4	1	1	1
<i>Trochamminula lobata</i>	9	16	13	2
<i>Valvulineria cf. V. floridana</i>	10	5	5	5

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-DC-7

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
<i>Angulogerina angulosa occidentalis</i>	7	6	2	1	1	3	1	7
<i>Asterigerina carinata</i>	21	9	8	15	30	27	12	18
<i>Bigerina irregularis</i>	1	1			1			
<i>Bolivina lowmani</i>	5	3	2			3	3	3
<i>Caribbeanella polystoma</i>	1	2	1	5		1		2
<i>Cibicides bradyi</i>	7	8	3	10	8	7	2	8
<i>Cibicidoides cf. C. io</i>						1		
<i>Discorbinella bertholoti</i>	14	15	2	8	4	8	8	5
<i>Eggerella advena</i>	3	2			1			
<i>Fursenkoina punctata</i>	5		3	2		1	1	1
<i>Gavelinopsis praegeri</i>	13	15	11	13	8	14	4	8
<i>Hanzawaia concentrica forma typica</i>	4	2	1	1	1		1	2
<i>Neonorbina terquemi</i>	4	3	2	4	1		1	4
<i>Nonionoides atlanticus</i>	31	6	7	2	4	4	1	2
<i>Nonionoides auriculus</i>	43	15	12	5	7	5	1	1
<i>Peneroplis proteus</i>	3		2	3	1	3	7	
<i>Quinqueloculina bicarinata</i>	5	3	1			1		
<i>Quinqueloculina compta</i>	2	7		3				
<i>Quinqueloculina cf. Q. milleti</i>	13	8	1	1		1	2	2
<i>Quinqueloculina parkeri forma occidentalis</i>	4	1			2			2
<i>Rectobolivina advena</i>		4	1	1	1	2		
<i>Rosalina concinna</i>	14	4	2	3	4	2	2	3
<i>Rosalina globularis</i>	19	9	16	15	16	4	3	6
<i>Sagrina pulchella</i>	6	4	4				2	
<i>Stetsonia minuta</i>	21	38	12	8	8	5	1	1
<i>Textularia candeiana</i>	2	1	2		1	1	1	1
<i>Textularia conica</i>				1	1			
<i>Trochammina advena</i>		5	3	1	4	4		
<i>Trochammina compacta</i>	5	3	2	5	1		3	2
<i>Trochammina inflata</i>			1	1	2			
<i>Trochammina ochracea</i>	42	47	31	25	14	8	12	8
<i>Trochammina squamata</i>	13	16	9	4	7	6		3
<i>Trochammina lobata</i>	4	4	2	1	1	1		
<i>Valvulineria cf. V. floridana</i>	5	4	1	2	3	2	2	5

Numerical Abundances of Dominant
Species (Adjusted to 10 ml Volume)

23-Mile-Rock Area
Core 23M-DC-8

Depth (cm) below sediment-water interface	0-1	1-2	2-3	3-4	4-5	5-6	6-7
<i>Angulogerina angulosa occidentalis</i>	15	4	5	4	4	1	
<i>Asterigerina carinata</i>	51	32	29	13	16	10	7
<i>Bigerina irregularis</i>	2	2	2	1	1	1	1
<i>Bolivina lowmani</i>	17	3	4			1	
<i>Caribbeanella polystoma</i>	4	2	5	2	2		1
<i>Cibicides bradyi</i>	30	12	13	8	3	3	3
<i>Cibicidoides cf. C. io</i>	4	1	1	1			
<i>Discorbinella bertholoti</i>	21	9	7	5	9	4	3
<i>Eggerella advena</i>	4	1	2		1		
<i>Fursenkoina punctata</i>	6	2	1		3	1	
<i>Gavelinopsis praegeri</i>	35	17	15	11	8	7	2
<i>Hanzawaia concentrica forma typica</i>	11	2	3	1	2	2	1
<i>Neoconorbina terquemi</i>	14	7	4	1	3	1	2
<i>Nonionoides atlanticus</i>	41	3	9	4	4	5	2
<i>Nonionoides auriculus</i>	38	14	11	1	12	7	2
<i>Peneroplis proteus</i>	11	3	1		2	1	1
<i>Quinqueloculina bicarinata</i>	28	2		1	4		
<i>Quinqueloculina compta</i>	5	1	3		2	2	
<i>Quinqueloculina cf. Q. milletti</i>	8	2	3		2	1	
<i>Quinqueloculina parkeri forma occidentalis</i>	5	2		1			
<i>Rectobolivina advena</i>	2				1		
<i>Rosalina concinna</i>	18	8	4	1	3		
<i>Rosalina globularis</i>	70	23	22	6	10	12	2
<i>Sagrina pulchella</i>	15	4	4		3	1	1
<i>Stetsonia minuta</i>	42	18	13	4	9	1	2
<i>Textularia candeiana</i>	16	2	1		4		
<i>Textularia conica</i>	2					1	1
<i>Trochammina advena</i>	5	3	3	4	2		
<i>Trochammina compacta</i>	10	1	2	3	3	1	
<i>Trochammina inflata</i>		2	3			1	
<i>Trochammina ochracea</i>	55	13	24	17	12	10	3
<i>Trochammina squamata</i>	12	2	11	4	3		
<i>Trochammina lobata</i>	16	3	7	3	3	1	1
<i>Valvulineria cf. V. floridana</i>	7	8	9	1	5	2	2