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NANOPLANKTON RECORDS OBTAINED FROM CHESAPEAKE BAY

CRUISES OF R/V PATHFINDER AND R/V OBSERVER

JANUARY 1960 -- JANUARY 1961

VIRGINIA INSTITUTE OF MARINE SCIENCE

SPECIAL SCIENTIFIC REPORT NO. 21

1961

NANNOPLANKTON RECORDS OBTAINED FROM CHESAPEAKE BAY
CRUISES OF R/V PATHFINDER AND R/V OBSERVER

JANUARY 1960 - JANUARY 1961

Data on nannoplankton populations obtained on 24 cruises in the lower Chesapeake Bay in connection with a 12-month survey conducted by the Planktology Research Section are reported.

Five stations along the salinity gradient were occupied at approximately biweekly intervals. Station locations (Fig. 1) and mean low water depths were:

- 1) York River, opposite VFL ($37^{\circ}14'$, $76^{\circ}30'$); 30 ft.
- 2) York River, mouth ($37^{\circ}15'$, $76^{\circ}21'$); 30 ft.
- 3) Chesapeake Bay, York Spit Light ($37^{\circ}13'$, $76^{\circ}16'$); 12 ft.
- 4) Chesapeake Bay, off York Spit Channel ($37^{\circ}10'$, $79^{\circ}09'$); 25 ft.
- 5) Chesapeake Bay, north of Inner Middle Ground ($37^{\circ}08'$, $76^{\circ}02'$); 20 ft.

The sampling routine consisted of collection of water samples from surface and bottom, hydrographic determinations, and quantitative plankton tows with a Clarke-Bumpus sampler for net phytoplankton (no. 20 net) and net zooplankton (no. 10 net). The plankton collections are in process of analysis, and the results will be detailed elsewhere. Data obtained for surface and bottom salinity, surface and bottom dissolved oxygen, surface and bottom extinction coefficients, surface nitrate nitrogen, surface phosphorus fractions (dissolved and adsorbed orthophosphate, and dissolved and particulate organic phosphorus), surface total

chlorophyll, surface organic and inorganic seston, and counts of taxa and cells of nannoplankton are reported in VFL Special Scientific Report No. 20.

Water samples for study of the nannoplankton were collected at the surface and refrigerated until examined the same day upon return to the laboratory. Sedgwick-Rafter mounts of unconcentrated, living material were made and the organisms identified (insofar as feasible) and counted. Ciliates were excluded from the analyses, only diatoms and phytoflagellates being recorded. Identifications should be regarded as tentative, and free use of the symbol (?) in the lists understood as an attempt to make something of an exceedingly difficult group of organisms whose proper speciation requires more careful and specialized techniques than those employed. More definitive and more extensive lists of the planktonic flora will be prepared when the preserved samples have been analyzed.

Distribution of this report does not constitute publication, and the data are subject to correction and/or revision.

Bernard C. Patten
17 April 1961

CRUISE DATES

Cruise Designation

A	4 January 1960
B	26 January 1960
C	8 February 1960
D	23 February 1960
E	7 March 1960
F	21 March 1960
G	4 April 1960
H	19 April 1960
I	2 May 1960
J	23 May 1960
K	3 June 1960
L	17 June 1960
M	5 July 1960
N	18 July 1960
O	1 August 1960
P	11 August 1960
Q	26 August 1960
R	19 September 1960
S	3 October 1960
T	21 October 1960
U	14 November 1960
V	28 November 1960
W	19 December 1960
X	11 January 1961

Figure 1. Diagram of the lower Chesapeake Bay, showing locations of stations 1-5.

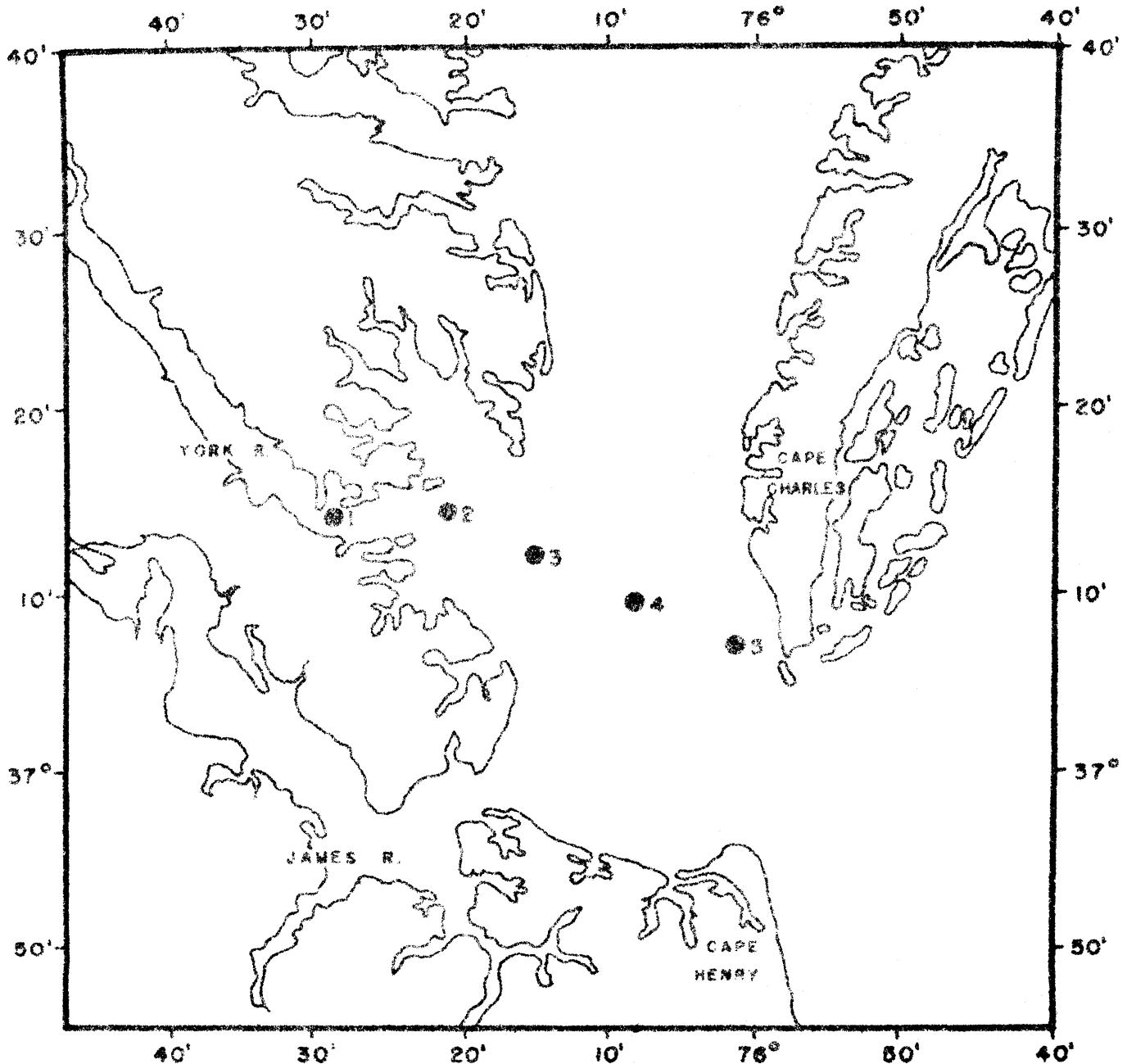


Table 1. List of nannoplankton recorded at station 1, with record of occurrence (x). Dominance is denoted by a, secondary importance by b, and tertiary by c. Codominance is indicated by a_1 , a_2 , ..., a_n , and similarly for secondary and tertiary levels. More than one species in a taxon is indicated by coefficients, for example: 2x.

TABLE 1

A B C D E F G H I J K L M N O P Q R S T U V W X

Phylum EUGLENOPHYTA

Eutreptia sp. Perty

x x x x

Phylum CHLOROPHYTA

Carteria (?) sp DiesingDunaliella (?) sp. TeodorescoHalosphaera (?) viridis SchmitzPeranema (?) sp. EhrenbergPyramimonas sp. SchnardaStichococcus (?) sp. Butcher

x	x			x	x	x	x	x	x
		x							
			x						
				x	x	x	x		
					x	x	x		
x									

Phylum PYRROPHYTA

Amphidinium fusiforme MartinCeratium lineatum EhrenbergCochlodinium vinctum (?) Kofoed and SwezyDinamoebidinium (?) sp.Goniaulax unicornis (?) LebourGymnodinium nelsoni MartinGymnodinium sp. (Stein) Kofoed and SwezyGyrodinium aureum (?) (Conrad) SchillerGyrodinium calyptoglyphe LebourGyrodinium dominans (?) HulbertGyrodinium (?) sp. Kofoed and SwezyMassartia (?) asymmetrica (Massart) SchillerMassartia rotundata (Lohmann) SchillerPeridiniopsis (?) rotunda LebourPeridinium sp. EhrenbergPeridinium triqueta SteinPeridinium trochoideum (Stein) Lemm.

	x	x	x						
			x						
				x	x	x	x		
					x	x	a ₁		
x									
	x	x	2x						
		x							
	x	x	a	a					
								a ₃	x
x								x	
	x								
		x							

Table 1 continued (2)

Phylum PYRROPHYTA

Pronoctiluca pelagica Fabre-Domergue
Prorocentrum micans Ehrenberg
Prorocentrum triangulatum Martin

Phylum CHRYSOPHYTA

Class Chrysophyceae

Chilomonas (?) sp. Ehrenberg
Cryptomonas sp. Ehrenberg
Dinobryon (?) setularia Ehrenberg
Prymnesium sp. Massart
Rhodomonas (?) sp. Karsten
Unidentified Chrysophycean I
Unidentified Chrysophycean II

Class Bacillariophyceae

Asterionella formosa Hass.
Asterionella japonica Cleve
Chaetoceros affinis Lauder
Chaetoceros decipiens Cleve
Chaetoceros gracilis Schütt
Chaetoceros pendulus Karsten
Chaetoceros similis Cleve
Chaetoceros sp. Ehrenberg
Chaetoceros subtilis Cleve
Coscinodiscus asteromphalus Ehrenberg
Coscinodiscus sp. Ehrenberg
Gyrosigma sp. Hassal
Leptocylindricus danicus Cleve
Licmopatra abbreviata Agardh
Navicula sp. Bory

The figure displays a collection of data points, each marked with an 'x'. These points are organized into several groups:

- A top-left group containing four points labeled '12a' and '12b'.
- A middle-left group containing five points.
- A bottom-left group containing three points.
- Three isolated points located on the right side of the plot area.

Table 1 continued (3)

Class Bacillariophyceae

Nitzschia closterium (Ehrenberg) W. Smith
Nitzschia longissima (Brebisson) Ralfs
Nitzschia seriata Cleve
Nitzschia sp. Hassall
Rhizosolenia alata Brightwell
Rhizosolenia calcar-avis M. Schultze
Rhizosolenia fragillima Bergon
Rhizosolenia imbricata Cleve
Rhizosolenia setigera Brightwell
Skeletonema costatum (Greville) Cleve
Thalassionema nitzschioides Grunow
Thalassiosira condensata (Cleve) Grunow
Thalassiosira gravida Cleve
Thalassiosira nana (?) Lohmann
Thalassiosira nordenskioldii Cleve
Thalassiosira rotula Meunier
Thalassiothrix longissima Cleve and Grunow

Table 2. List of nannoplankton recorded at station 2, with record of occurrence (x). Dominance is denoted by a, secondary importance by b, and tertiary by c. Codominance is indicated by a_1 , a_2 , ..., a_n , and similarly for secondary and tertiary levels. More than one species in a taxon is indicated by coefficients, for example: 2x.

TABLE 2

Phylum EUGLENOPHYTA

Eutreptia sp. Perty

A B C D E F G H I J K L M N O P Q R S T U V W X

x x x x x x

Phylum CHLOROPHYTA

Carteria (?) sp. Diesing

x

Chlamydomonas sp. EhrenbergDunaliella (?) sp. TeodorescoPeranema (?) sp. EhrenbergPyramimonas sp. Schmarda

x	x	x	x	x	x	b ₁	x	2x a ₁	x
x	x	x x x x x x	x	x	x	x	x x x		

Phylum PYRROPHYTA

Amphidinium fusiforme Martinb₂Cochlodinium vinctum (?) Kofoed and Swezy

x

Dinamoebidinium (?) sp.

x x

Goniaulax unicornis (?) Lebour

x x x x

Gymnodinium nelsoni Martin

x

Gymnodinium simplex (?) (Lohmann)Gymnodinium sp. (Stein) Kofoed and Swezyx x x x x x b₂ x xGyrodinium aureum (?) (Conrad) Schiller

x x

Gyrodinium calyptoglyphe Lebour

x

Gyrodinium dominans (?) Hulbert

x

Gyrodinium (?) sp. Kofoed and Swezy

x

Massartia rotundata (Lohmann) Schillera₁ xOxyrrhis marina Dujardina₂Peridinium pyriforme (?) Paulsen

x

Peridinium sp. Ehrenberg

x

Pronoctiluca pelagica Fabre-Domergue

x

Prorocentrum micans Ehrenbergx x a x x x x x x a₂Prorocentrum triangulatum Martin

x x

Table 2 continued (2)

**Phylum CHRYSOPHYTA
Class Chrysophyceae**

Table 2 continued (3)

Class Bacillariophyceae

Rhizosolenia alata Brightwell
Rhizosolenia calcar-avis M. Schultze
Rhizosolenia fragillima Bergon
Rhizosolenia imbricata Cleve
Rhizosolenia setigera Brightwell
Skeletonema costatum (Greville) Cleve
Thalassionema nitzschiooides Grunow
Thalassiosira gravida Cleve
Thalassiosira nana (?) Lohmann
Thalassiosira nordenskioldii Cleve
Thalassiosira rotula Meunier
Thalassiosira sp. Cleve
Thalassiothrix longissima Cleve and Grunow
Tropidoneis lepidoptera (Greg.) Cleve

Table 3. List of nannoplankton recorded at station 3, with record of occurrence (x). Dominance is denoted by a, secondary importance by b, and tertiary by c. Codominance is indicated by a_1 , a_2 , ..., a_n , and similarly for secondary and tertiary levels. More than one species in a taxon is indicated by coefficients, for example: 2x.

TABLE 3

A B C D E F G H I J K L M N O P Q R S T U V W X

Phylum EUGLENOPHYTA

Eutreptia sp. Perty x

Phylum CHLOROPHYTA

Carteria (?) sp. Diesing

x x x x x x x x x x x x x x x

Dunaliella (?) sp. TeodorescoHalosphaera (?) viridis SchmitzPeranema (?) sp. EhrenbergPyramimonas sp. Schmarda

x x x x x x x x x x x x x x x

Phylum PYRROPHYTA

Amphidinum fusiforme Martin

x x x x x x x x x x x x x x x

Ceratum furca (Ehrenberg)

x x x x x x x x x x x x x x x

Ceratium lineatum Ehrenberg

x x x x x x x x x x x x x x x

Dinamoebidinium (?) sp.

x x x x x x x x x x x x x x x

Goniaulax orientalis (?) Lindemann

x x x x x x x x x x x x x x x

Goniaulax sp. Diesing

x x x x x x x x x x x x x x x

Goniaulax unicornis (?) Lebour

x x x x x x x x x x x x x x x

Gymnodinium simplex (?) Lohmann

x x x x x x x x x x x x x x x

Gymnodinium sp. (Stein) Kofoid and Swezy

x x x x x x x x x x x x x x x

Gyrodinium aureum (?) (Conrad) Schiller

x x x x x x x x x x x x x x x

Gyrodinium calyptoglyphe Lebour

x x x x x x x x x x x x x x x

Gyrodinium (?) sp. Kofoid and Swezy

x x x x x x x x x x x x x x x

Massartia rotundata (Lohmann) Schiller

a x x x x x x x x x x x x x x

Peridinium breve Paulsen

b x x x x x x x x x x x x x x

Peridinium divaricatum Meunier

x x x x x x x x x x x x x x x

Peridinium trochoideum (Stein) Lemm.

x x x x x x x x x x x x x x x

Prorocentrum micans Ehrenberg

x x x x x x x x x x x x x x x

Prorocentrum triangulatum Martin

x x x x x x x x x x x x x x x

Unidentified Pyrrophyte x

Table 3 continued (2)

Phylum CHYSOPHYTA
 Class Chrysophyceae

Chilomonas (?) sp. Ehrenberg
Cryptomonas sp. Ehrenberg
Dinobryon (?) setularia Ehrenberg
Prymnesium sp. Massart
 Unidentified Chrysophycean

A B C D E F G H I J K L M N O P Q R S T U V W X

Class Bacillariophyceae

<u>Asterionella japonica</u> Cleve		x	x																		x x
<u>Chaetoceros affinis</u> Lauder	a ₂	a	a																	x	x
<u>Chaetoceros curvisetus</u> Cleve	x																				
<u>Chaetoceros decipiens</u> Cleve	b	x		x	x																
<u>Chaetoceros filiformis</u> (?) Meunier																			x		
<u>Chaetoceros fragilis</u> (?) Meunier	x	x	x	b	x	x	x											x			
<u>Chaetoceros gracilis</u> Schütt	x	x	x	b	x	x	x											x			
<u>Chaetoceros pendulus</u> Karsten	x	x																x			
<u>Chaetoceros similis</u> Cleve	x																	x	x x		
<u>Chaetoceros</u> sp. Ehrenberg	x						x	x									x				
<u>Chaetoceros subtilis</u> Cleve									x	x x							x x x				
<u>Coscinodiscus asteromphalus</u> Ehrenberg											x							x			
<u>Coscinodiscus</u> sp. Ehrenberg											x										
<u>Coscinodiscus subtilis</u> Cleve	x	x																			
<u>Gyrosigma</u> sp. Hassal	x	x																			
<u>Leptocylindricus danicus</u> Cleve	x			x	x	x	x					x				x		x x x			
<u>Melosira</u> sp. Agardh																	x		x		
<u>Melosira sulcata</u> (Ehrenberg) Kützing	x	x	x																x		
<u>Navicula</u> sp. Bory	x	x	x													x x x	2	x x x	.	x	
<u>Nitzschia closterium</u> (Ehrenberg) W. Smith											x					x	x		x	x	
<u>Nitzschia longissima</u> (Brebisson) Ralfs	x	x																			
<u>Nitzschia seriata</u> Cleve	x	x	x	x	x	x															
<u>Rhizosolenia calcar-avis</u> M. Schultze	x	x	x	x	x																
<u>Rhizosolenia fragillima</u> Bergon	x	x	x	a	a	a	a									x x		x x x			

Table 3 continued (3)

Class Bacillariophyceae

Table 4. List of nannoplankton recorded at station 4, with record of occurrence (x). Dominance is denoted by a, secondary importance by b, and tertiary by c. Codominance is indicated by a_1 , a_2 , ..., a_n , and similarly for secondary and tertiary levels. More than one species in a taxon is indicated by coefficients, for example: 2x.

Table 4 continued (2)

Phylum CHYSOPHYTA

Class Chrysophyceae

Chilomonas (?) sp. Ehrenbergx x x b₁b a₂ x x x x a a x a*Cryptomonas* sp. Ehrenberg

x x b x x x x x x

Dinobryon (?) *setularia* Ehrenberg

x

Unidentified Chrysophycean

x

Class Bacillariophyceae

Asterionella japonica Cleve

x x x x x x x x x x x x

Chaetoceros affinis Lauder

x

Chaetoceros curvisetus Cleve

x x x x x x x x x x x x

Chaetoceros decipiens Cleve

x

Chaetoceros fragilis (?) Meunier

x x

Chaetoceros gracilis Schütt

x x x x x x x x x x x x

Chaetoceros pendulus Karsten

x x

Chaetoceros similis Cleve

x

Chaetoceros sp. Ehrenberg

x x x x x x x x x x x x

Chaetoceros subtilis Cleve

x

Corethron criophilum Castracane

x

Coscinodiscus subtilis Cleve

x

Fragillaria sp. (Lyngbye) Agardh

x x x x x x x x x x x x

Gyrosigma sp. Hassal

x

Guinardia flaccida (Castracane) H. Peragallo

x x x x x x x x x x x x

Leptocylindricus danicus Cleve

x x x x x x x x x x x x

Melosira sp. Agardh

x

Melosira sulcata (Ehrenberg) Kützing

x x x x x x x x x x x x

Navicula sp. Bory

x x x x x x x x x x x x

Nitzschia closterium (Ehrenberg) W. Smith

x

Nitzschia seriata Cleve

x x x x x x x x x x x x

Nitzschia sp. Hassal

x

Rhizosolenia alata Brightwell

x x x x x x x x x x x x

Rhizosolenia calcar-avis M. Schultze

x x x x x x x x x x x x

Rhizosolenia fragillima Bergon

x x x x x x x x x x x x

Table 4 continued (3)

Class Bacillariophyceae

Rhizosolenia imbricata Cleve
Rhizosolenia setigera Brightwell
Rhizosolenia stolterfothii Peragallo
Skeletonema costatum (Greville) Cleve
Thalassionema nitzschiooides Grunow
Thalassiosira condensata (Cleve) Grunow
Thalassiosira decipiens Grunow
Thalassiosira gravida Cleve
Thalassiosira nana (?) Lohmann
Thalassiosira nordenskioldii Cleve
Thalassiosira rotula Meunier
Thalassiothrix longissima Cleve and Grunow
 Unidentified Bacillariophycean

A diagram showing a grid of 'x' marks with labels 'a', 'b', 'b₂', and 'c'. The grid has 10 columns and 10 rows. Labels are placed at specific intersections: 'a' at (1,1), 'b' at (1,3) and (2,2), 'b₂' at (5,6), and 'c' at (9,10).

Table 5. List of nannoplankton recorded at station 5, with record of occurrence (x). Dominance is denoted by a, secondary importance by b, and tertiary by c. Codominance is indicated by a_1 , a_2 , ..., a_n , and similarly for secondary and tertiary levels. More than one species in a taxon is indicated by coefficients, for example: 2x.

TABLE 5

A B C D E F G H I J K L M N O P Q R S T U V W X

Phylum EUGLENOPHYTA

Phacus sp.

x

Phylum CHLOROPHYTA

Carteria (?) sp. Diesing

x

Dunaliella (?) sp. Teodoresco

x x

Pyramimonas sp. Schmarda

x x x x x

x x

Stichococcus (?) sp. Butcher

x

Unidentified Chlorophyte

x x x

Phylum PYRROPHYTA

Amphidinium fusiforme Martin

x x

Amphidinium sphenoides Wulff

x

Ceratium furca (Ehrenberg)

x

Dinamoebidinium (?) sp.

x

Dinophysis acuminata Claparede and Lachmann

x

Goniaulax unicornis (?) Lebour

x x

Gymnodinium sp. (Stein) Kofoed and Swezy

x a x x x

x 2x

Gyrodinium dominans (?) Hulbert

x

Gyrodinium (?) sp. Kofoed and Swezy

x

Gyrodinium spirale Bergh

x

Massartia rotundata (Lohmann) Schiller

x x

x x

Peridiniopsis (?) rotunda Lebour

x

x x

Peridinium sp. Ehrenberg

x x

Peridinium trochoideum (Stein) Lemm.

x

Prorocentrum micans Ehrenberg

x x

x x

Prorocentrum triangulatum Martin

x x x

x x

Table 5 continued (2)

Phylum CHRYSPHYTA

Class Chrysophyceae

Chilomonas (?) sp. Ehrenberg*Cryptomonas* sp. Ehrenberg

Unidentified Chrysophycean

Class Bacillariophyceae

Amphora (?) sp. Cleve*Asterionella japonica* Cleve*Chaetoceros affinis* Lauder*Chaetoceros curvisetus* Cleve*Chaetoceros decipiens* Cleve*Chaetoceros filiformis* (?) Meunier*Chaetoceros gracilis* Schütt*Chaetoceros pendulus* Karsten*Chaetoceros similis* Cleve*Chaetoceros socialis* Lauder*Chaetoceros* sp. Ehrenberg*Corethron criophilum* Castracane*Coscinodiscus asteromphalus* Ehrenberg*Coscinodiscus* sp. Ehrenberg*Coscinodiscus subtilis* Cleve*Ditylum brightwellii* (West)*Fragillaria* sp. (Lyngbye) Agardh*Gyrosigma* sp. Hassal*Guinardia flaccida* (Castracane) Peragallo*Leptocylindricus danicus* Cleve*Lithodesmium undulatum* Ehrenberg*Melosira* sp. Agardh*Melosira sulcata* (Ehrenberg) Kützing*Navicula* sp. Bory*Nitzschia closterium* (Ehrenberg) W. Smith*Nitzschia longissima* (Brebisson) Ralfs*Nitzschia seriata* Cleve

A B C D E F G H I J K L M N O P Q R S T U V W X

a	x	x	a	b ₁	x	a	a	x	x	x	x	a	x
x	a	x	x		x	x	x	x	x	x	x	x	x
					x								

		x											
		x	x	x						x	x	x	x
a	a	a	a		x			x		x	x	x	x
	x							x		x	x	x	x
x	x	x	x					x		x	x	x	x
x	x	x	x					x		x	x	x	x
								x		x	x	x	x
x	x	x	x					x		x	x	x	x
x	x	x	x					x		x	x	x	x
		x						x		x	x	x	x
x	x	x	x					x		x	x	x	x
	x							x		x	x	x	x
x	x	x	x					x		x	x	x	x
x	x	x	x					x		x	x	x	x
		x						x		x	x	x	x
x	x	x	x					x		x	x	x	x
x	x	x	x					x		x	x	x	x

Table 5 continued (3)

Class Bacillariophyceae

Nitzschia sigma (?) (Kützing) W. Smith
Rhizosolenia alata Brightwell
Rhizosolenia calcar-avis M. Schultze
Rhizosolenia fragillima Bergon
Rhizosolenia setigera Brightwell
Rhizosolenia stolterfothii Peragallo
Skeletonema costatum (Greville) Cleve
Surirella sp. Turpin
Thalassionema nitzschiooides Grunow
Thalassiosira condensata (Cleve) Grunow
Thalassiosira decipiens Grunow
Thalassiosira gravida Cleve
Thalassiosira nana (?) Lohmann
Thalassiosira rotula Meunier
Thalassiothrix mediterranea Pavillard
Tropidoneis lepidoptera (Gregory) Cleve

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
																		x						
	x	x																						
			x															x						
			x	x	x	a	x	a ₂	x			x	x					x	x	x	x	x		
				x														x	x		x		x	
			b	x	b	x		x		x				x		x	a	x	x	x	x	x		
				x																				
					x				x		x		x		x		x			x	x	x		
						x				x			x					x			x	x		
							x											x			x		x	
								x										x	x	x	x	x		
									x									x	x	x	x	x		
										x								x	x	x	x	x		
											x							x	x	x	x	x		

Table 6. Total cell counts, in units (cells, chains or colonies)
per ml.

TABLE 6

Cruise	Station 1	Station 2	Station 3	Station 4	Station 5
A	3154	4524	3284	3828	-
B	3001	2737	5026	2374	2026
C	2305	3507	6380	2001	4368
D	1812	3447	2769	2220	2283
E	1025	1427	2165	1387	823
F	2996	1530	1198	1209	1043
G	1512	2128	1141	1197	1287
H	2461	3741	3585	3246	1948
I	509	4519	5336	3267	1669
J	1656	2050	2168	3003	4518
K	3812	3750	986	1251	640
L	363	1809	2502	711	1394
M	2384	2454	1765	655	1043
N	3434	720	1837	244	412
O	1968	273	1210	910	565
P	723	677	828	572	680
Q	161	808	1008	1026	446
R	926	2254	1213	1218	1907
S	-	-	-	-	-
T	375	488	231	300	399
U	802	982	2233	2277	1309
V	1345	1643	2760	5700	3503
W	787	1839	1231	1058	168
X	1293	946	1294	1627	1308
<u>X</u>	1687	2098	2267	1795	1534

Table 7. Number of taxa recorded, exclusive of ciliates.

TABLE 7

Cruise	Station 1	Station 2	Station 3	Station 4	Station 5
A	7	4	6	3	-
B	6	9	9	5	6
C	11	12	5	6	6
D	15	14	16	10	14
E	16	14	24	20	14
F	14	9	11	11	6
G	20	15	10	10	13
H	14	11	10	11	7
I	7	10	7	8	8
J	16	8	7	10	7
K	13	11	3	5	7
L	6	10	7	8	11
M	13	13	10	10	5
N	14	11	15	5	3
O	7	8	11	6	7
P	9	13	13	8	14
Q	5	12	11	18	8
R	10	17	16	15	15
S	-	-	-	-	-
T	5	5	6	6	12
U	11	9	17	20	17
V	11	15	14	17	17
W	11	13	13	10	6
X	11	12	14	13	16
\bar{x}	11.0	11.1	11.1	10.2	9.5