JOB REPORT

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Project Name: Biological Survey of the Upper Laguna Madre, Baffin Bay and Pass Area.

Period Covered: June 1, 1958 - July 1, 1959 Job No.: C-2

Objectives: Qualitative and Quantitative Survey of Phytoplankton in Waters Ranging from Brackish to Hypersaline.

Procedure: Phytoplankton samples were collected from stations used in previous surveys and from special stations in the Yarbrough Pass area. A simple sampling procedure was used; water from the surface was dipped up in a bucket and a 60 ml. polyethylene bottle was filled while the water in the bucket was constantly stirred. Two percent formalin or Lugols Iodine was used in fixation. After the samples were brought back to the lab they were processed using molecular filter techniques. This technique, described below, is time consuming, but is very accurate. Equipment includes a vacuum flask, a centered glass filter, a funnel and clamp, and millipore filters. In this instance the filters used were H.A., white, gridded, 47 millimeter diameter, with a pore size of about 0.5 microns. For each sample a millipore filter is placed, grid side up, on the centered glass filter (which fits tightly into the vacuum flask) and the funnel is placed over it. The funnel and the centered glass are then clamped together so that the millipore filter is between them. Portions of the sample, 10-50 ml., are poured into the funnel, a vacuum is applied to the flask and the sample is pulled through. Virtually all of the suspended material, alive or dead, is left on the filter. Salt must be removed, and this is done by washing with filtered sea water of 100, 70, 50, 30 and 10 percent concentrations, and finally distilled water is used. The filter is then dehydrated by pulling through increasing concentrations of ethyl alcohol, ie 10-25-35-50-70-90 and 100 percent. After this has been done stain may be added. Fast green, one percent by weight in ethanol, works well. The stain is not immediately drawn through but is allowed to work for 10-20 minutes; it is then pulled through and the excess stain washed out with absolute ethanol.

After the staining the filter is cleared with Beechwood Creosote. A few drops of creosote are placed on a 50 x 75 millimeter slide, the filter is trimmed of all except the stained portion, and placed, grided side up, on the creosote. In about ten minutes the filter becomes almost transparent leaving the stained particulate matter visible. Care must be taken with the creosote as too little does not clear the slide and too much combines with moisture from the air and with the sealer and a cloudy slide is produced. After the filter is cleared a few drops of Canada Balsam are placed on it

and the whole thing is covered with a glass slip (No. 1, 50 x 50 ml.). The finished slide is allowed to dry two to seven days and is then ready for counting.

Each slide contains 95-105 small squares so each square comprises about one percent of the total area. For counting purposes the entire slide is scanned under low power (100x), and all of the larger organisms are enumerated. Ten squares are then examined under higher power (430-970x) except when extremely high cell concentrations are encountered. Then only two to four squares are examined. Phytoplankton concentrations may be expressed as cells/liter. No correction is necessary for clogged nets, distance covered or variations in towing speed. Results were checked at Scripps Institution of Oceanography by Simmons - (unpublished manuscript) and it was found that when slides were recounted after a period of six months the results agreed within ten percent. When duplicate slides out of the same sample bottle were compared, they agreed within ten percent; and when slides from duplicate bottles from the same station were examined, they agreed within 15 percent.

Results: Freeze (1952) considered pelagic diatoms from the Rockport Bay areas and listed them as Oceanic and Neritic with further subdivisions of Arctic, Temperate and Tropical. He also included Tychopelagic species which are defined as littoral species torn from their means of support and thrown up into the plankton. This basic group is followed here although some colonial forms such as Navicula grevillei Ag. were commonly found in bottom samples. Diatoms of the Upper Laguna Madre for the year 1958-9 are listed in Fig. 1.

Figure 1

Marine Diatoms of the Upper Laguna Madre

OCEANIC

Arctic

Chaetoceros decipiens Cleve

Temperate

Coscinodiscus concinus W. Smith
C. lineatus Ehrenberg
C. radiatus Ehrenberg
Chaetoceros peruvianus Brightwell
Rhizosolenia imbricata Brightwell
Thalassiothrix frauenfeldii (Grum)
T. longissima (Brebisson) Ralfs

Tropical

None

NERITIC

Temperate

Hemiaulus sinensis Greville
Asterionella japonica Hassal
Bidulphia mobiliensis Bailey
Chaetoceros affinis Lauder
Coscinodiscus granii Gough
Coscinosira polychorda
Gyrosigma balticum W. Smith
Nitzschia longissima (Breb.) Ralfs
Pleurosigma angulatum W. Smith
Skeletonema costatum (Greville) Cleve
Stephanopyxis palmeriana (Greville) Grunow
Thalassionema nitzschioides Grunow
Thalassiosira decipiens Grunow
Cyclotella spp.

TYCHOPELAGIC

Actinoptychus undulatus (Bailey) Ralfs
Cocconeis spp.
Grammatophora marina (Lyngbye) Kutzing
Licmophora abbreviata Agardh
Melosira distans
M. sulcata Ehr. W. Smith
M. moniliformis
Navicula spp.
N. distans
N. membranacea
Nitzschia closterium Ehr. W. Smith
Synedra superba Kutzing
Plagiogramma vanheurchii Grunow
Tabellaria sp.
Fratillaria sp.
Achnanthes sp.
Surirella gemma Ehrenberg

There were many pennate forms which could not be identified but which resembled Achnanthes spp.

OTHER PHYTOPLANKTON

Blue-green algae did not show up well on the slides unless special stains were employed but the use of Delafield Hematoxylin revealed very large concentrations of Anabema majoralis. Only a few dinoflagellata were found and these were represented chiefly by Prorocentrum micans and Ceratium spp. Probably the most abundant organism in the samples was a small green naked flagellate about 1-2 microns in diameter. These did not preserve but their remains sometimes appeared in the slides.

Seasonal and Areal Distribution: Tables for cell concentration per station per sampling period are presented in an appendix. However,

consideration of all 20 stations would be awkward in this discussion; therefore other means are used. The upper Laguna Madre is divided into two natural regions by the presence of bars north of the entrance to Baffin Bay. Each of these regions could be divided into two zones using presence of attached vegetation, influence of the Baffin Bay system and the landcut, and isolation by spoil banks as criteria. However, the two stations north of the bars are so situated that they are strongly influenced by nearby grassy areas and are thus included with the grassy stations. Therefore only three zones are used. Zone I includes the grassy stations 25,26,27,28,29 plus nearby stations 30 and 31. Zone II includes stations 32, 34 and 37 and the occasional station in the landcut. Zone III includes all of the ten Yarbrough Pass stations which are located in a somewhat isolated basin.

In figure 2 the phytoplanktonic species found in each area are listed with suitable indication of the type organisms. Cell counts are given for each species with the smaller figure representing the least number of cell found at any station and the larger number the greatest concentration. At the bottom of each sampling period is given the mean number of cells of all species for all stations within the zone and the maximum and minimum concentration per station within the zone. All figures are in cells per liter times - 10^3.

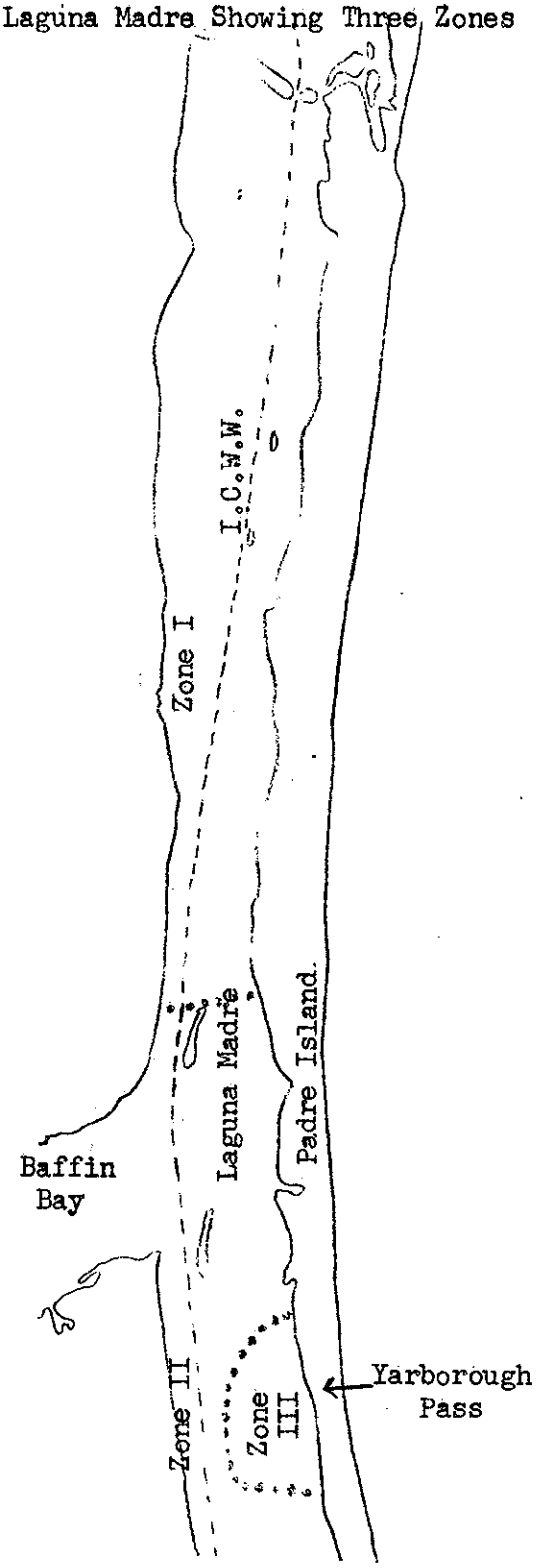
June, 1958

Cells/l. x 10^3

Species	Zone I	Zone II	Zone III
Melosira spp. (Ty.)	35-535	300-400	300-1225
Coscinosira polycpolychorda (Ty.)	1-166	0	0
Thalassiosira (NT)	1-142	0	0
Navicula sp. (TY)	15-73	0	<1
Coscinodiscus granii (NT)	-1-4	<1	<1-1
Melosira moniliformis (TY)	1-10	0	0
Synedra (Ty)	<1	0	0
Plagiogramma vanheurchii (Ty)	<1	0	0
Navicula membranacea (Ty)	<1	< 1	<1
Gyrosigma balticum (NT)	<1	< 1	<1
Chaetoceros affinis (NT)	1-5	0	0
Asterionella japonica (NT)	1-5	0	0
Surirella gemma (TY)	< 1	0	0
Licmophora abbreviata (TY)	<1	0	0
Thalassionema nitzschioides (NT)	-1	0	0
Unid. Pennates	10-80	0-15	< 1
Blue greens	100-500	100-200	100-300
Flagellates	----	----	Many
Ceratium furca	0	< 1	<1
Prorocentrum micans	0	< 1	0
X All diatom species/l	205	246	542
Min. diatom species/l	60	1	<1
Max. diatom species/l	650	400	400

Figure I

Upper Laguna Madre Showing Three Zones



September, 1958

Cells/l x 10^3

Species	Zone I	Zone II	Zone III
Melosira sp. (Ty)	1000-7000	60-683	332
Cyclotella spp. (NT)	5-500	0-4	5
Coscinosira (NT)	0-50	0	0
Unid. Pennates	8-212	5-8	6
Chaetoceros affinis (NT)	0-76	<1	0
Coseinodiscus radiatus (OT)			
C. lineatus (OT)			
C. concinus (OT)	<1-7	<1-4	2.5
Cocconeis spp. (TY)	1-7	1-8	0
Navicula spp. (TY)	0-10	1-5	0
Prorocentrum spp.	<1-1	0-1	0
Ceratium spp.	0	0	<1
Gonyaulax sp.	0	0-4	0
Flagellates	20-25	4-40	50
Blue greens	400-20000	20000	10000-20000
Diatoms X Cell/l	2525	870	328
Minimum	207	65	300
Maximum	7080	1880	333

November, 1958

Cells/l x 10^3

Species	Zone I	Zone II	Zone III
Chaetoceros affinis (NT)			
C. peruvianus (OT)			
C. decipiens (OA)	295-1000	0	<1
T. nitzschioides (NT)	7-145	<1-1	0
Unid. Pennates	7-25	20-50	30-50
Melosira spp. (TY)	0-20	1-26	1-45
T. frauenfeldii (OT)	5-50	<1	0
S. costatum (NT)	40-80	0	0
Cyclotella sp. (NT)	0-17	0	0
Navicula spp. (TY)	1-2	1-10	0
Pleurosigma sp. (NT)	<1-5	0	0
Coscinodiscus sp.	<1-1	<1	<1
Surirella sp.	<1-15	0	0
Gyrosigma balticum (NT)	1-2	0	0
Licmophora sp. (TY)	<1	<1	<1
Nitzschia closterium (TY)	<1	0	0
Prorocentrum micans	<1	<1	1-2
Ceratium spp.	<1	<1	<1
Flagellates	0	1-3	20-25
X Diatom Cells/l	511	21	42
Minimum	18	1	1
Maximum	1209	56	122

January, 1959

Cells/l x 10^3

Species	Zone I	Zone II	Zone III
Unid. Pennates	12-216	1-60	3-30
Melosira spp. (TY)	12-172	<1-86	<1-47
Cocconeis sp. (TT)	15-30	10-20	1-50
T. frauenfeldii (OT)	1-54	<1-6	<1
T. longissima (NT)	<1	0	0
S. costatum (NT)	1-10	0	0
G. balticum (NT)	<1-16	0-4	<1
Licmophora sp. (TY)	<1-4	<1-8	<1-2
Thalassionema nitzschioides	<1-10	<1	<1
Coscinodiscus spp.	<1-2	<1	<1
Tabellaria spp. (TY)	<1-7	<1	<1
Bidulphia mobiliensis (NT)	<1-2	0	<1
Fragillaria spp. (TY)	<1-2	<1	0
Synedra superba (TY)	<1	0	0
Actinoptychus sp.	<1	<1	<1
Pleurosigma sp. (NT)	<1	<1	<1
Surirella sp. (TY)	0	0-4	0
Nitzschia longissima (OT)	0	0	<1
Hemiaulus sp. (TY)	0	0	<1
Flagellates	<1-20	<1-10	1-24
Ceratium sp.	<1	<1	<1
X Diatom Cell/l	203	112	125
Min.	51	79	2
Max.	417	148	460

February, 1959

Cells/l x 10^3

Species	Zone I	Zone II	Zone III
Melosira sp. (TY)	63-270	----	51-540
Unid. Pennate	26-535	----	<1-70
Cocconeis sp. (TY)	25	----	43-210
T. nitzschioides (NT)	<1-25	----	1-40
Navicula sp. (TY)	<1-40	----	10-40
G. balticum (NT)	<1-15	----	5-25
Coscinodiscus sp.	<1-40	----	<1-15
Licmophora sp. (TY)	15	----	<1-20
Tabellaria sp. (TY)	<1-15	----	<1-5
Actinoptychus sp. (TY)	<1-2	----	<1
Chaetoceros sp.	0-10	----	<1
B. mobiliensis (NT)	0	----	<1
Flagellates	<1 - many	----	<1
X Diatom cell/l	467	----	256
Minimum	153	----	174
Maximum	955	----	910

March, 1959

Cells/l x 10^3

Species	Zone I	Zone II	Zone III
Unid. Pennates	<1-10	<1	<1-1
Coscinodiscus sp.	<1-2	<1	<1-1
Pleurosigma sp. (NT)	<1-2	0	0
Cocconeis sp. (TY)	<1-16	<1	<1
Navicula sp. (TY)	<1-4	<1	<1
Tabellaria sp. (TY)	<1	<1	<1
Licmophora sp. (TY)	<1	0	<1
Melosira distans (TY)	<1	<1	<1
G. balticum (NT)	<1	0	0
T. frauenfeldii (OT)	<1	0	0
Actinoptychus sp. (TY)	<1	0	<1
Unid. flagellates	<1-7	<1	0
Gonyaulax sp.	<1-2	0	0
Peridinium sp.	<1	0	0
Ceratium sp.	<1	0	0
X Diatom cells/l	5	1	2.7
Minimum	1	<1	1
Maximum	34	1.5	6

May, 1959

Cells/l x 10^3

Species	Zone I	Zone II	Zone III
Unid. Pennates	<1	<1	<1
Navicula sp. (TY)	<1-1	0	0
Tabellaria sp. (TY)	<1	0	0
Coscinodiscus sp.	<1	<1	<1
Cocconeis sp. (TY)	<1-2	<1	<1
Melosira sp. (TY)	<1-3	<1-25	3-22
Licmophora (TY)	<1	0	0
T. nitzschioides (NT)	0	<1	<1
Flagellates	<1	<1	<1
X Diatom cells/l	3	14	13.5
Minimum	1	2.5	5.0
Maximum	4.5	25.0	24.0

It can be readily seen from the foregoing tables that the Upper Laguna Madre is strongly dominated by Tychopelagic species and that Melosira sp., usually M. distans, is dominant among these.

Except for the preponderance of Melosira sp. in the Laguna Madre, the area showed striking similarity to the bays around Rockport reported by Freeze (op cit.). In his survey pelagic diatoms were found to be much more abundant in the channels and bayous than in the back bays; in the

Laguna Madre very few pelagic forms (oceanic) were found in zones II and III, areas analogious to the back bays. For instance, in November, 1958 there was a noticeable decrease in total cell concentration in zones II and III and of tychopelagic species in zone I. However, the total cell concentration in zone II was about 15-25 times that in the lower zones, a direct result of the presence of neritic temperate and oceanic species. These forms were probably brought in by southward traveling water being moved by early northers.

Freeze indicated that near Rockport the winter months were very favorable for diatom growth. In the Laguna Madre this was not so pronounced. There was one "bloom" in September, 1958 when heavy local rainfall lowered salinity and possibly flushed nutrients into the bay. High tides coincided and nutrients on the flats, dry in summer, probably became available. There were pronounced low concentrations in March and May, 1959, times when areas to the north show maximum cell concentrations.

The relative abundance of Melosira sp. is probably a function of water depth, wind action and of attached vegetation. This genus was more abundant in almost all instances in zones I and III than in zone II. The first zone is shallow with abundant attached vegetation, the third is deep in the center but has parameters of shallow flats while the third is relatively deep up to the shoreline.

In spite of relatively high concentrations of diatoms in certain seasons the high phytoplankton production is probably due primarily to blue-green algae and small flagellates.

Prepared by Ernest G. Simmons. Approved by Howard T. Lee

Howard T. Lee

Marine Biologist. Date Approved 25 August 1959

June, 1958

Cells/1 x 10^3

Species	Stations																
	25	26	27	28	29	30	31	32	34	37	20	YP1	YP2	YP3	YP8	YP10	YP6
Unid. Pennates	80	81		28			25			15							
Cocconeis sp.	0																
Melosira sp.	535	535	35	65		35	55	<1		305		400				400	1235
Thalassiothrix frauenfeldii	<1																
Navicula sp.	2		73	1		15	15	<1							✓		✓
Skeletonema costatum	0																
Gyrosigma balticum	0	<1				<1		<1		<1							
Licmophora abreviata	<1																
Thalassionema nitzschioides	<1																
Coscinodiscos sp.	<1		6.8	1	<1	9	6	1	<1	<1		<1			<1		<1
Melosira distans	0																
Synedra superba	0		<1														
Nitzschia	0		<1														
Plagiogramma vanheurchii	0		<1														
Flagellates			4						1								
Ceratium sp.								3									
N. membranacea				<1								<1					
Surirella				7			4										
Blue-green					475	400				200							
Chae. affinis						<1											
Prorocentum										<1							
Totals*	900	650	117	101	<1	60		4		1			400				1236

*Does not include flagellates or blue-greens.

✓Indicates too few specimens to count.

September, 1958

Cells/l x 10^3

Species	Stations													
	25	26	27	28	29	30	31	32	34	37	YP1	YP6	YP8	YP10
Coscinosira polychorda	✓				50			0				0		
Cyclotella sp.	0	15		462	10		5	4			5	0		
Coscinodiscus*	✓	✓	—	6		✓		4		✓	2	✓	✓	
Cocconeis sp.	7							0				0		
Chaetoceros sp.	0				✓		76	0		✓		0		
C. affinis	0	6		8				0				0		
Melosira sp.	172	1241	1010	1675	140	3000	1310	423	60	865	322	0	0	400
Navicula sp.	10	✓	✓					0		✓		0	✓	✓
Ceratium sp.	0				✓			0		1		0		
Gonyaulax sp.	0							0		4		0		✓
Prorocentrum micans							110	0		1				
Pennates	18	8	40	212	20			9	5		6	0		
Flagellates	0	25	—	—	20	21	—	40	4		50	Many	Many	Many
Blue-green	500	15000		11000	15600	15000	15000	0	—	20000	Many	0	Many	Many
Totals*	207	1250	1050	2305	7040	3021	1410	440	65	870	342	1	1	400

*Does not include flagellates or blue-green algae

*C. radiatus
*C. lineatus
*C. concinnus

November, 1958

Cells/l x 10^3

Species	Stations									MK 201	YP1	YP6
	25	26	27	28	30	31	32	34	37			
Chaetoceros affinis	290	640	225)		⌐	⌐	0	0	0	0	⌐	0
C. decipiens	5		5)		0	0	0	0	0	0	0	0
C. percvianus	⌐	⌐	5)	1000	0	0	0	0	0	0	0	0
Cyclothella sp.	0	0	0	0	16	0	0	0	0	0	0	0
Coscinodiscus sp.	⌐	0	0	1	⌐	1	⌐	0	⌐	0	0	⌐
Gyrosigma balticum	0	0	0	2	0	0	0	0	0	⌐	0	⌐
Licmophora sp.	0	0	0	⌐	⌐	1	0	0	0	0	0	0
Melosira sp.	0	13	0	15	0	20	26	1	0	2	45	1
Navicula sp.	0	0	0	0	⌐	2	10	⌐	⌐	0	⌐	0
Nitzschia closterium	0	0	0	0	0	⌐	0	0	0	0	0	0
Pleurostigma sp.	0	5	0	⌐	0	⌐	0	0	0	0	0	0
Skeletonema costatum	0	0	0	5	0	0	0	0	0	0	0	0
Surirella sp.	5	7	10		⌐	2	0	0	0	0	⌐	0
Thalassionema nitzschioides	15	70	7	145	1	0	0	0	1	0	0	0
Thalassiothrix frauenfeldii	⌐	⌐	20	30	0	0	0	0	0	⌐	0	0
Ceratium sp.	0	0	0	0	⌐	⌐	0	0	⌐	0	0	0
Prorocentrum micans	0	0	0	0	0	⌐	0	0	1	⌐	3	0
Flagellates	—	—	⌐	—	—	⌐	—	—	2	1	25	⌐
Unid. pennates	25	25	30	10		8	20	⌐	⌐		50	—
Totals	350	760	302	1209	18	35	56	<2	4	5	125	1.4

January, 1959

Cells/l x 10^3

Species	Stations															
	25	26	27	28	29	30	31	32	34	37	YP1	YP5	YP6	YP7	YP9	YP10
Actinoptychus undulatus	0	0	0	0	0	✓	0	0	✓	✓	✓	✓	0	0	0	✓
Bidulphia mobiliensis	0	0	0	2	0	✓	✓	0	0	0	✓	0	0	0	✓	0
Cocconeis sp.	26	14	30	15	24	21	16	0	0	0	20	0	0	✓	50	10
Coscinodiscus sp.	2	1	1	1	✓	2	1	✓	1	✓	1	✓	✓	✓	✓	1
Fragillaria sp.	0	0	✓	0	✓	1	✓	✓	0	0	0	0	0	0	0	0
Gyrosigma balticum	16	✓	✓	✓	✓	✓	✓	0	4	0	✓	0	✓	✓	✓	✓
Licmophora sp.	4	1	3	1	✓	2	✓	✓	8	✓	✓	✓	✓	✓	✓	✓
Melosira sp.	40	15	50	12	30	172	22	68	56	86	22	1	✓	✓	6	30
Nitzschia longissima	0	0	0	0	0	0	0	0	0	0	✓	0	0		0	0
Navicula	40	12	10	8	10	8	0	✓	✓	1	17	0	0	✓	–	3
Pleurosigma sp.	0	0	0	0	0	✓	0	0	✓	✓	✓	0	0	✓	0	0
Skeletonema costatum	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Synedra superba	0	0	0	0	✓	0	0	0	0	0	0	0	0	0	0	0
Surirella sp.	0	0	0	0	0	0	0	4	0	0	2	0	0	0	0	0
Thalassionema nitzschioides	10	1	0	0	✓	✓	✓	✓	0	0	✓	0	✓	0	0	0
Thalassiothrix frauenfeldii	54	8	0	0	0	✓	0	0	6	2	8	✓	0	0	0	0
T. longissima	✓	0	0	0	0	✓	0	0	0	0	0	0	✓	0	0	0
Tabellaria sp.	0	7	1	0	✓	1	✓	✓	1	✓	1	✓	✓	✓	✓	0
Hemiaulus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	✓	0
Ceratium sp.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Flagellates	0	0	0	✓	24	1	✓	6	10	12	–	–	–	1	24	0
Pennates	132	17	196	12	16	216	14	40	1	60		✓	✓	✓	30	30
Gontaulax sp.	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0
Cyclotella sp.	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Achnanthes sp.	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
Totals*	334	173	294	51	86	417	64	110	79	148	460	2	1	2	80	74

*Not including flagellates or blue-greens

February, 1959

Cells/l x 10^3

Species	Stations										
	25	27	30	YP1	YP2	YP4	YP5	YP7	YP8	YP9	YP10
Actinoptychus undulatus	1	0	2			⌐	⌐		⌐	⌐	⌐
Cocconeis sp.	⌐	220	25	210	3	60	40	26	25		⌐
Coscinodiscus sp.	⌐	40	0	15	1	⌐	⌐	1	1	1	⌐
Gyrosigma balticum	⌐	15	⌐	5	10	⌐	⌐		20	25	
Licmophora sp.	15	15	0	0	0	⌐			20	15	
Melosira distrus	257	270	63	540	122	230	92	182	135	180	195
Navicula sp.	0	40	25	40	10	40	⌐	30	20	20	25
Pleurosigma sp.	0										
Tabellaria sp.	1	30		5	⌐						
T. nitzschioides	⌐	25			1	⌐		1	1	1	⌐
Gonyaulax sp.	0							⌐	⌐		
Peridinium sp.	0							⌐	⌐		
Ceratium sp.	0										
Flagellates	0			Many	11				⌐	⌐	
Pennates	25	150	36	70	12	1	35	30	1	2	40
Chaetocus sp.	0	10		15		⌐					
Total*	295	955	153	910	174	324	183	407	224	222	260

*Not including flagellates and blue-greens

March, 1959

Cells/l x 10^3

Species	Stations											
	25	26	27	28	29	34	37	YP1	4	5	8	9
Actinoptychus undulatus					+				+	+		+
Bidulphia sp.		0								+		
Chaetoceros sp.		+								0		
Coscinodiscus sp.	+	2	+	+	+	1	+	+	2	1	+	
Cocconeis		16	1		+	+	+	1	+	+		+
G. balticum					+							
Licmophora sp.			+		+	+		+	+	+	+	+
Melosira sp.							+	+	+	+	+	1
Navicula sp.		4	+			+		+	+		+	+
Tabellaria sp.			+		+							
Thalassionema nitzschioides					+				1	+	+	
Pennates	2	11	+	3		+		+				
Flagellates	7	1	+	2	+		1					
Gonyaulax sp.	2											
Peridinium	+											
Ceratium sp.	+			+								
Prorocentrum	2											
Totals	6.7	34	2.6	9	1.4	1	1	1.6	5.5	3	1	1.5

May, 1959

Cells/l x 10^3

Species	Stations									
	25	27	28	29	31	34	MK 201	YP1	YP3	YP9
Cocconeis sp.	⌐	⌐	1	⌐	1	⌐	⌐	⌐	⌐	⌐
Coscinodiscus sp.	⌐	0	⌐	⌐	⌐	1	⌐	⌐	⌐	⌐
Licmophora sp.	0	0	⌐	⌐	0					
Melosira sp.	⌐	⌐	⌐		3	⌐	25	22	9	3
Navicula sp.	1	⌐	⌐	⌐	0					
T. nitzschioides	0	0	0		0		⌐	⌐	⌐	⌐
Tabellaria sp.	⌐	⌐	⌐	⌐	0					
Flagellates	⌐	0	⌐	⌐	3	⌐	⌐	⌐	⌐	⌐
Pennate	⌐	⌐	⌐	⌐	⌐	⌐	⌐	⌐	⌐	⌐
Total	3.0	1.1	3.5	2.5	4.5	2.5	25.1	24.0	11.0	5.0

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