PHYTOPLANKTON ANALYSES OF DATA COLLECTED ON ALBATROSS III CRUISE 48, 24 APRIL - 8 MAY 1953

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Summer Assistant, 1961

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INTRODUCTION

The Hardy plankton recorder has the advantage of collecting continuous samples over a long range, thereby enabling more accurate geographical distributions to be determined than from spot sampling with conventional gear. Because the mesh size (0.33 mm.) of the recorder silk is larger than many phytoplankton species, bias sampling results. Nevertheless, in comparing monthly records from the same general area, much can be learned about the phytoplankton.

Three transects from the Gulf of Maine-Georges Bank area were chosen (fig. 1); one to represent a north-south distribution and the others to represent a northern and southern east-west distribution.

The objectives of the study were to obtain the following information: (1) species composition, (2) geographical distribution, and (3) relative abundance.

METHODS AND ANALYSES

Alternate gauge sections representing five miles of tow were analyzed from each transect. The silks were washed clean of phytoplankton by shaking in 500 ml. of water. A 1-ml. aliquot was then removed and the phytoplankton counted in a Sedgewick-Rafter counting chamber using the method of Pratt (1959).

RESULTS

Species Composition and Distribution

Table 1 lists the species counted for the three transects. The distribution of dominant species along transect C-D was quite variable as indicated in figure 2. Chaetoceros debilis and Ceratium lineatum were quite abundant along the first half of the transect when they became co-dominant with Nitzschia seriata and Ceratium longipes. The last three samples in the transect were dominated by Chaetoceros compressus.

Along transect E-F, Fragilaria oceania was extremely abundant in the beginning and later replaced by Chaetoceros compressus.

Nitzschia seriata and Thalassionema nitzschioides predominated the entire transect A-B.

Abundance

Percent dominance (Tab. 1) was found by taking the number of times the most numerous species were found and dividing this number by the total number of samples in the transect. Nitzschia seriata and Thalassionema nitzschioides were the only two phytoplankton that were dominant in all three transects. From the actual counts (data with plankton project), a bloom of Nitzschia seriata appeared about half way along transect A-B. The northernmost transect (C-D) contained more dominants than the other two transects.

Table 1

Percent Dominance and Frequency of Phytoplankton in Transects C-D, E-F, and A-B, Gulf of Maine, Albatross III Cruise No. 48, April 24-May 8, 1953

Species	Transect C-D		Transect E-F		Transect A-B	
	% Dominance	% Frequency	% Dominance	% Frequency	% Dominance	% Frequency
Asterionella japonica		0		0		13
Biddulphia aurita		4		0		0
Ceratium fusus		22		7		67
Ceratium lineatum		26		14		7
Ceratium longipes	22	65		43	13	93
Ceratium maceroceros		4		14		20
Ceratium tripos	22	74		50		60
Chaetoceros atlanticus		13		29		60
Chaetoceros compressus	13	13	36	57		13
Chaetoceros concavicornis		74		79		53
Chaetoceros debilis	57	87		29		33
Chaetoceros decipiens		26		70		13
Corethron hystrix		4		0		7
Coscinodiscus sp.		17		14		40
Dinophysis norvegica		0		0		13
Ditylum brightwellii		0		0		7
Fragilaria oceania		4	57	64	20	33
Grammataphora angulosa		9		0		7
Lauderia borealis		0		0		7
Leptocylindricus danicus		4		0		7
Leptocylindricus minimus		13		0		7
Melosira sulcata		4		0		0
Nitzschia closterium		13		70		13
Nitzschia seriata	40	100	70	100	87	100
Peridinium sp.		30		50		53
Pleurosigma nicobaricum		0		14		0
Prorocentrum gracilis		0		0		7
Rhizosolenia alata		4		7		20
Rhizosolenia calcar		0		0		13
Rhizosolenia hebetata var. semispina		91		70		80
Rhizosolenia stolterfothii		0		7		0
Rhizosolenia styliformis		4		14		0
Skeletonema costatum		4		0		0
Thalassionema nitzschioides	4	74	86	100	70	100
Thalassiosira decipiens	13	96		79		27
Thalassiosira granida		0		0		27
Thalassiosira nordenskiöldii		52		43	13	70
Thalassiosira rotula		4		0		7
Thalassiothrix frauenfeldii		0		36		40
Total no. of different kinds of species counted		29		24		33

Percent frequency was determined by counting the number of times a species occurred in the entire sample and dividing this number by the total number of samples in the transect, e. g. if a species occurred in half of the entire samples then the frequency would be 50 percent. This number does not indicate the actual abundance, but only occurrence or absence (Cain and Castro, 1959). From table 1, then, occurrence of species can be compared. Dinoflagellates were present more of the time in transects C-D and A-B.

Table 2 gives the total density of the phytoplankton and the number of different kinds of species found in each of their respective sampling units. It can be seen that no correlation exists between numbers of phytoplankton and number of different kinds of species. In other words, more kinds of different species do not necessarily mean more abundance.

Figures 3 and 4 show the density for the phytoplankton along their respective transects. It is quite evident that the total phytoplankton assemblage was composed almost entirely of the diatoms. Generally, more phytoplankton were found at the northernmost transect (C-D), but the greatest fluctuation was found here also. Further, more phytoplankton were found inshore than out and more in the southern range of transect A-B.

Temperature did not appear to influence the distribution or density of the phytoplankton in the three transects studied.

Table 2.

Total numbers of Phytoplankton/m^3 and numbers of individual species/sample for three transects of Albatross III, Cruise 48, April 24-May 8, 1953

Transect C-D		Transect E-F		Transect A-B	
No./m^3	No. species	No./m^3	No. species	No./m^3	No. species
2,886,430	11	305,085	14	143,939	13
1,012,671	9	369,402	17	466,211	15
1,069,992	6	593,591	13	1,015,218	12
984,647	9	466,211	11	3,229,142	18
1,278,895	13	630,530	13	2,101,770	15
964,266	11	467,484	11	936,243	18
1,011,397	11	561,745	9	182,150	10
394,878	9	157,951	12	188,522	11
138,844	9	188,522	10	203,808	11
96,808	10	129,928	12	137,571	9
373,223	10	127,380	13	171,963	12
968,088	10	197,439	10	156,677	12
641,995	10	212,724	11	108,273	10
402,521	9	219,094	11	10,190	4
73,881	8			14,011	4
86,619	10				
87,892	14				
43,309	9				
82,797	12				
420,354	12				
606,329	10				
308,260	10				
324,819	8				

Fig. 4 Transect A-B

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Semi-Logarithmic 5 Cycles X 10 to the inch.
5th lines accented.
MADE IN U.S.A.

Fig. 3 Transect E-F

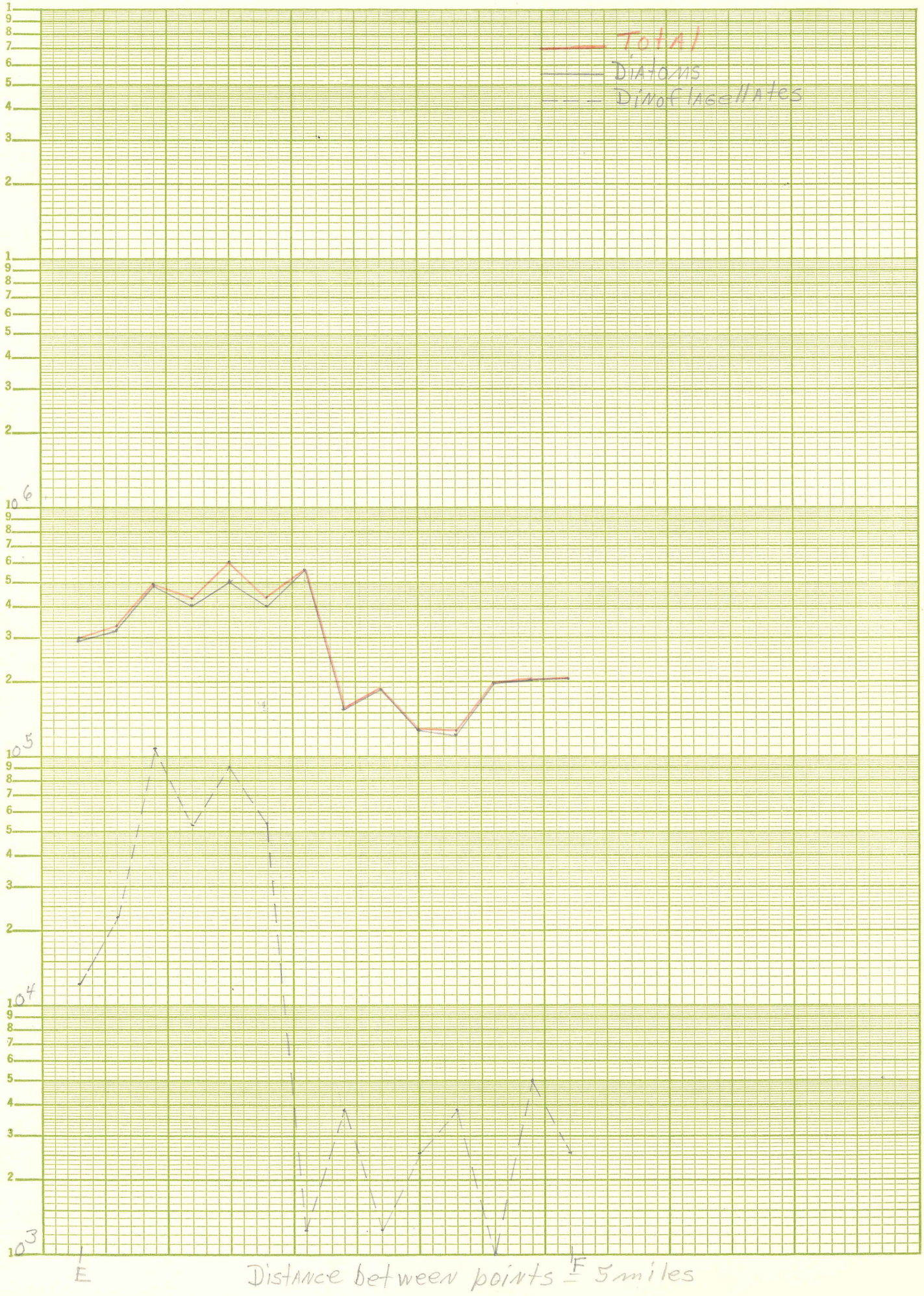

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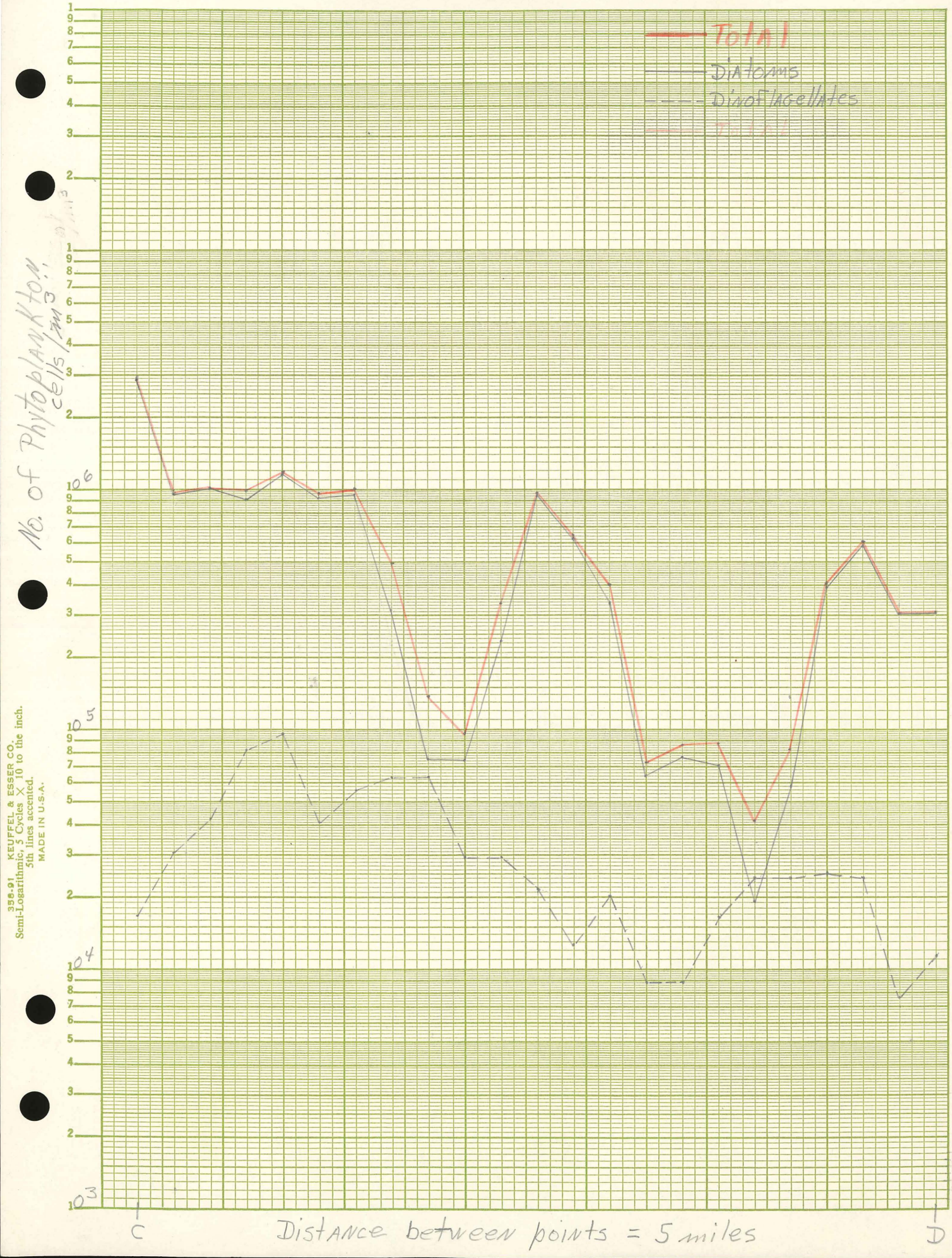
FIG. 2 TRANSECT C-D



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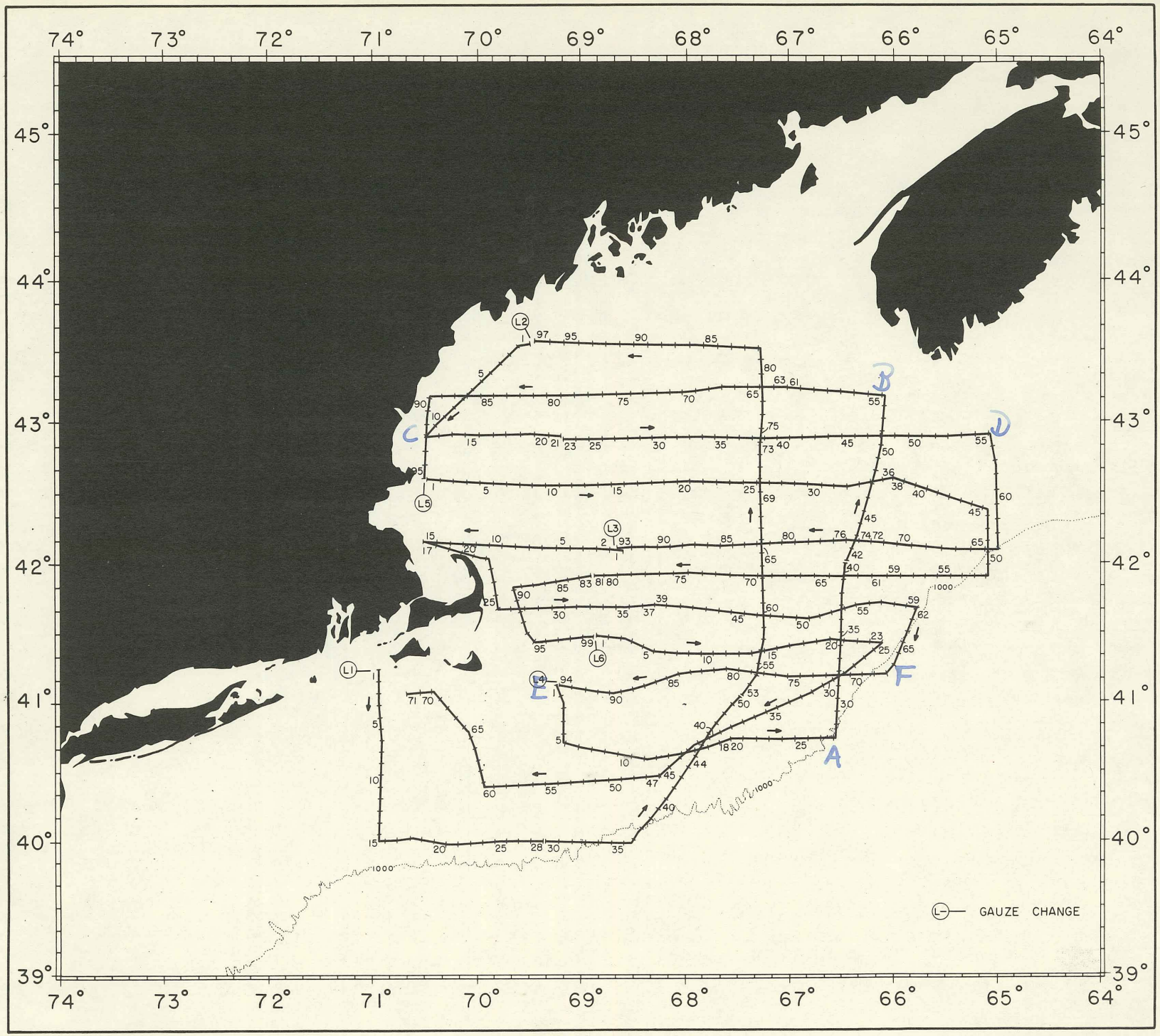

Figure I. Albatross III cruise 48, ~~March - April~~ April 24, - May 8, 1953

CONCLUSIONS

1. For all three transects, species composition remained very similar.

2. Numerical dominance of the phytoplankton species were limited to a few species.

3. Generally, density was higher inshore for all transects. The northernmost transect (C-D) had the largest abundance of phytoplankton.

4. Diatoms made up, by far, the largest percent of the phytoplankton.

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