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Studies On The Phytoplankton Of The Bayındır Dam Lake

by

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Studies On The Phytoplankton Of The Bayındır Dam Lake

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ABSTRACT

In this study the composition and seasonal variation of phytoplankton in Bayındır Dam Lake were qualitatively and quantitatively investigated between May 1981 to July 1983.

The chlorophyll-a content of phytoplankton and the some physical and chemical properties of the lake water were also studied. Phytoplankton was composed of 71 species belonging to **Bacillariopyhta, Chlorophyta, Cyanophyta, Dinophyta, Cryptophyta, Chrysophyta and Euglenophyta,** The phytoplankton dominated by **Bacillariophyta** became rather poor in Winter but it showed some increases during early Summer and Autumn. Increases in early Summer were caused by *Cyclotella ocellata* and it was *Tetraedron minimum* which was responsible for increases in Autumn. The values of chlorophyll-a were in complience with the amount of total organism.

INTRODUCTION

There have been some works on the algae of inland waters of Turkey in recent years. The first studies on the lakes in the vicinity of Ankara, were based on the composition, density and seasonal variation of phytoplankton in Kurtboğazı Dam Lake (Aykulu and Obalı 1981), phytoplankton in Mogan Lake (Obalı 1984), Phytoplankton and benthic algae of Çubuk-I Dam Lake (Gönülol 1980, Gönülol and Aykulu 1984), Beytepe and Alap artificial lake (Ünal 1980 and 1984). The amount of phytoplankton and its relative densities in all these waters except Beytepe were listed (Aykulu and et al. 1983). Apart from that, there were some studies on the phytoplankton and benthic algae of Konya-Altınapa Dam Lake (Yıldız 1982) and Erzurum-Tortum Lake (Altuner 1984) outside Ankara. Also Marmara Lake in Eegean region was subjected to a comprehensive taxonomic research (Cirik-Altındağ 1982, 1983 and 1984).

The main goal of this study was make a contribution to the largely unknown microflora of Turkey and to examine the compositional and seasonal variations of phytoplankton and to enlighten the factors which govern these variations.

The situation of research site:

The Bayındır Dam is located 10 km away from Ankara and connected to Ankara-Samsun highway by a 500 m road. The dam was built on the Bayındır stream and inaugurated in 1965. The total area of the lake surface is 85 hectares. The lake is also fed by the Kutludüğün and Söğütlüdere streams which dry up in Summer and Kurşunlu,Malak and Kavaklıdere streams which have irregular flow patterns. The landscaping was complated by the plantation of *Pinus nigra* Arn., *P. sylvestris* L., *Picea orientalis* (L.) Link, *Cedrus libani* A. Rich. and *Quercus cerris* L. around the lake. Apart from that there are species of *Populus tremula* L., *Salix alba* L. and *Fraxinus ornus* L. at the streams beds. There are also abundant *Cyprinus carpio* L. and less amount of other fish species such as *Stizostedion luciperca* (L.) and *Silurus glanis* L. in the lake.

The topographic structure of the dam lake was shown in Figure 1.

The research site and the geological units around its immediate vicinity starts with an old paleosoic structure. This paleosoic main structure is known as Elmadağ series. There is a block series consisting of various sized lime blocks and old jura detritics. The research site is in the Anatolian curves in regard to tectonic features (Erentöz 1975, Ketin 1963).

The mean annual amount of rainfall (P), the highest mean temperature of the hottest month (M) and the lowest mean temperature of the coldest month (m) of the research site are 382,5 mm, 29,9 °C and -3,9 °C respectively (from Records of the Bulletin of Extreme Rates of the State Meteorological Service of Turkey 1974). The Emberger's pluviothermic quotient (Q) was found to be 40. According to these values, the region has a semi-arid very cold Mediterranean bioclimate (Akman 1982).

MATERIAL and METHOD

The water samples were taken from the bridge at the west of the lake near the discharge vanes by 0,5 litre capacity Hydro-Bios closed

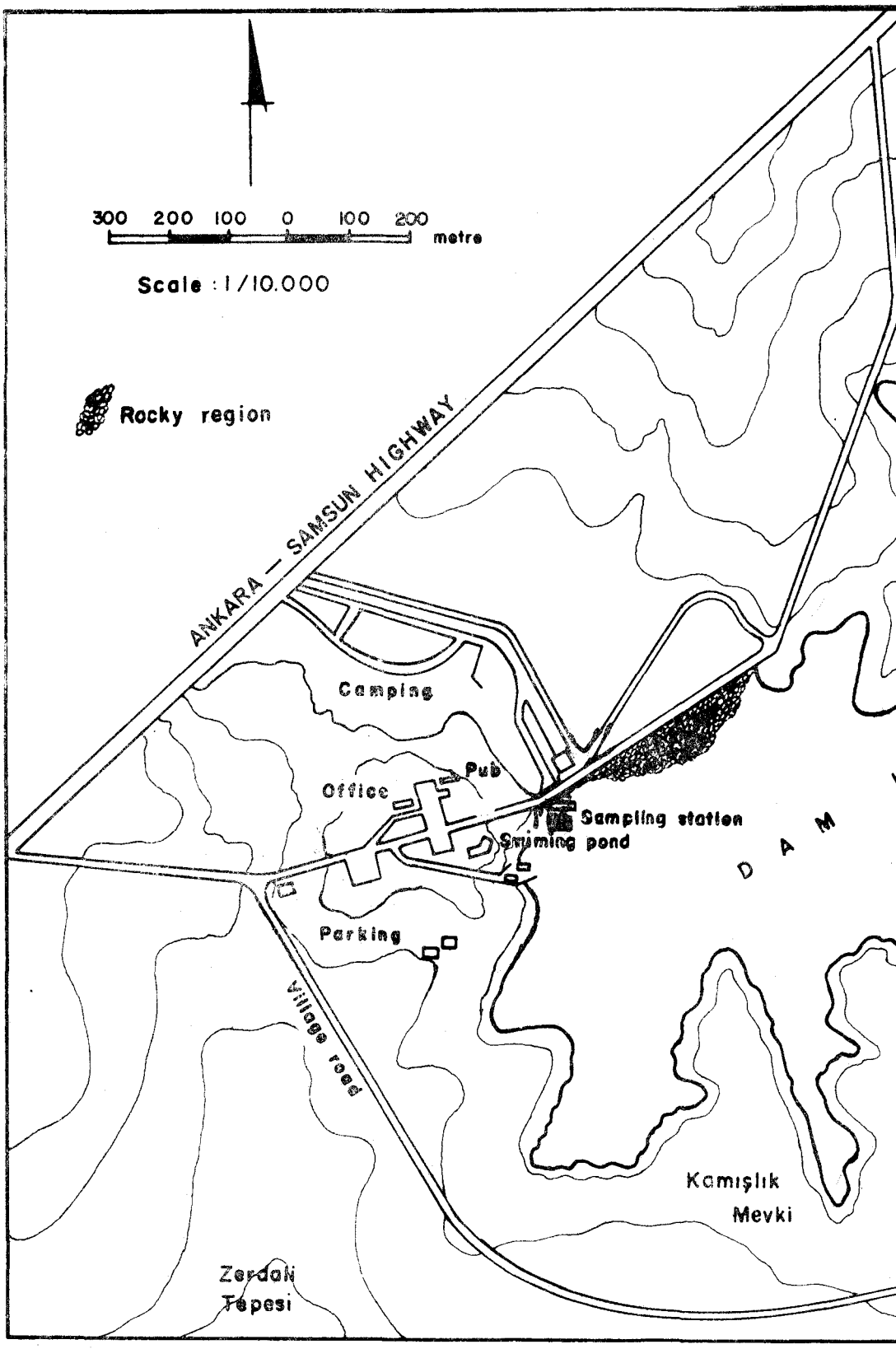
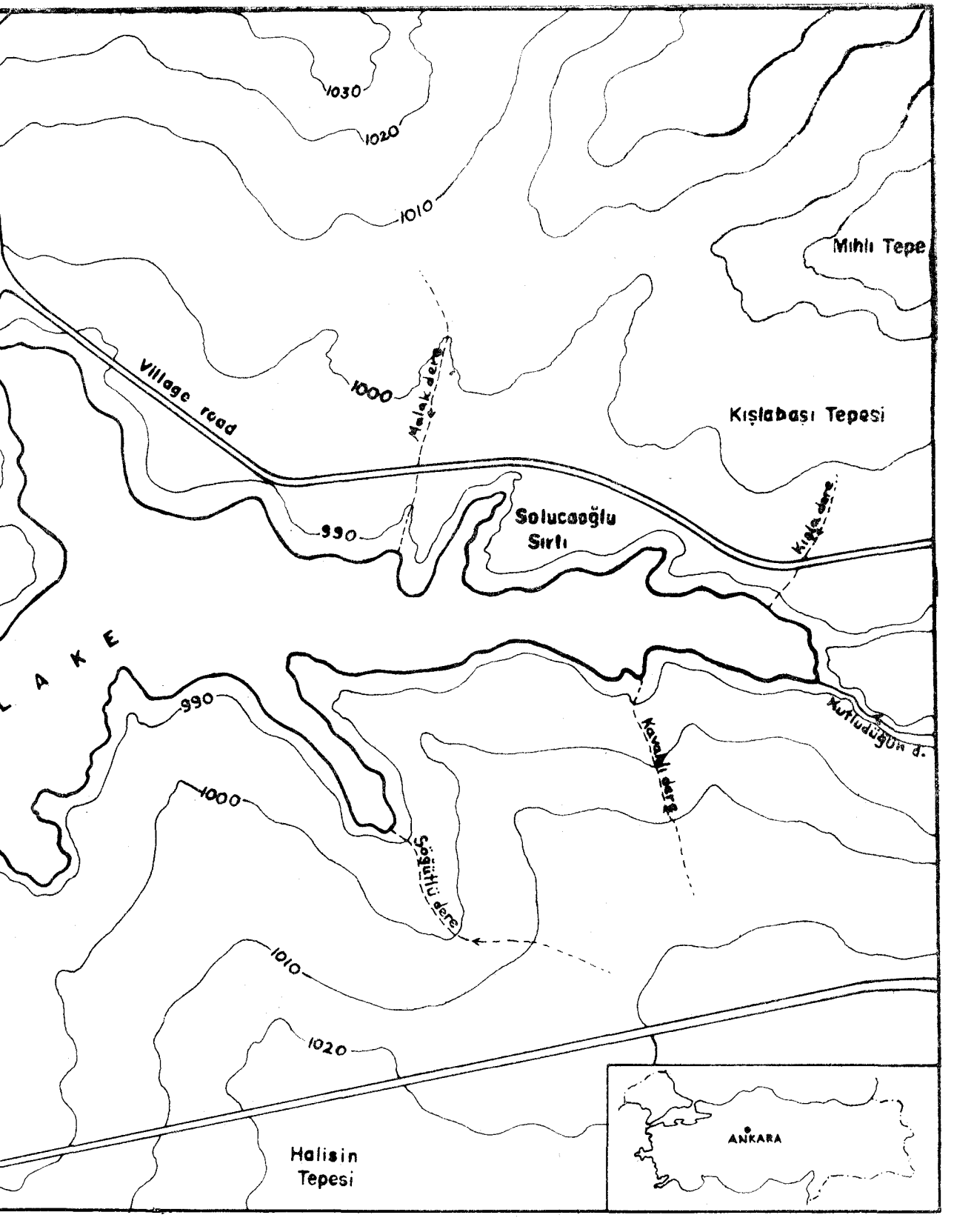


Figure 1 —The topographic structure of Bayındır Dam Lake


1030
1020
1010
1000
990
1000
1010
1020
Village road
Melak dere
Mihli Tepe
Kışlabaşı Tepesi
Kışla dere
Solucaoğlu
Sırtı
Kavaklı dere
Kurtuluğun d.
Söğütlü dere
Halisin
Tepesi
ANKARA

water sampling aparatus. Some of the water were poured into 10 cm^3 glass cylinders in the laboratory after being thoughly shaken, than the algae were prepicitated and stained by adding 2 drops of IKI and finally samples were transfered into counting tubes after 12 hours and the planktons were counted and their densities were determined by a plankton microscope. In the counting process every colony and thread like organism were considered as an individual unit (Lund and at al. 1958).

The surface water temperature at the time of sampling was measured by a mercury thermometer. Other physical and chemical analysis were performed by Hach Chemical Co. bag laboratory according standart methods.

A litre of the water samples taken from the lake was filtered from Whatman GF/C glass fibre filter paper for the determination of chlorophyll-a content and the filter papers were left to dry in the dark, then 0,2 gr $MgCO_3$ was added and they were extracted in 15 ml 90 % acetone at + 4 °C in the dark for 24 hours. The clear solution obtained from the filtration of the extract though a GF/A glass fibre filter paper was found to give adsorbtion at 630, 645 and 665 nm wave lengths. The formulas suggested by Richard and Thompson (1952) and corrected according to the adsorbtion coefficients by Parsons and Strickland (1963) were employed in the calculation of chlorophyll-a density.

In the determination of algae the papers of Bourelly (1966, 1968, 1970), Pestalozzi (1968, 1976), Prescott (1973), Tiffany and Britton (1971), Nygaard (1949), Geitler (1925) and Ruzicka (1977) were consulted and they were classified according to system of Round (1973).

The structure of some algae present in phytoplankton was pictured by Lietz Dialux research microscope and presented in Figure: 6-8 at the end of paper.

RESULTS

The physical and chemical properties of the lake water were tabulated in Table: 1 and seasonal variation of temperature dissolved oxygen and pH were shown in Figure: 2.

Table : 1 - Some physical and chemical analysis conducted on the surface water of Bayındır Dam Lake.

Analysis / Date of Sampling	Dissolved oxygen (mg/lt)	pH	Total Alkalinity (mg/lt $CaCO_3$	Total Hardness (mg/lt $CaCO_3$)	Ca Hardness (mg/lt $MgCO_3$)	Mg Hardness (mg/lt $MgCO_3$)	Silisium (Mg/lt $Si0_2$)	Phosphate (mg/lt)	Total Nitrogen (mg/lt)	Sulphate (mg/lt)	Turbidity (FTU)
28. 5.1981	9	7.5	150	150	120	30	18.1	0.01	0.008	5	10
16. 6.1981	11	7.7	140	110	110	30	8.1	0.05	0.0005	5	5
7. 7.1981	11	8.3	120	110	100	10	5.1	0.1	0.0009	4	—
28. 7.1981	11	8.9	140	120	100	20	5.6	0.2	0.001	20	00
18. 8.1981	13	8.5	120	140	100	40	6.4	0.2	0.001	6	00
10. 9.1981	11	8.0	130	140	100	40	6.4	0.18	0.0009	15	00
2.10.1981	12	8.4	120	120	90	30	7.4	0.15	0.0008	22	1
25.10.1981	15	8.4	120	140	110	30	10.2	0.0003	0.0003	23	1
15.11.1981	17	8.5	140	150	100	50	11.4	0.05	0.005	25	3
5.12.1981	13	8.4	140	150	100	50	29.4	0.18	0.0007	0.1	7
25.12.1981	—	—	—	—	—	—	—	—	—	—	—
15. 1.1982	—	—	—	—	—	—	—	—	—	—	—
5. 2.1982	—	—	—	—	—	—	—	—	—	—	—
25. 2.1982	—	—	—	—	—	—	—	—	—	—	—
15. 3.1982	13	8.6	150	170	130	40	34.4	0.1	0.0008	23	00
5. 4.1982	15	8.7	150	170	140	30	29.0	0.4	0.0006	15	00
25. 4.1982	14	8.2	150	180	130	50	29.4	0.8	0.006	2	00
15. 5.1982	15	8.6	130	180	140	40	21.4	0.05	0.005	6	2
4. 6.1982	12	8.0	140	140	110	30	14.4	0.05	0.005	5	5
24. 6.1982	10	8.4	120	120	100	20	7.4	0.1	0.001	10	00
17. 7.1982	13	8.8	140	120	100	20	5.4	0.2	0.0015	20	00
10. 8.1982	14	8.3	130	160	110	50	7.8	0.01	0.0001	—	00
31. 8.1982	14	7.6	130	140	110	30	8.6	0.01	0.0001	—	00
20. 9.1982	15	8.0	130	140	120	20	12.4	0.02	0.0001	—	00
13.10.1982	15	8.1	120	150	120	30	14.4	0.02	0.0001	—	00
5.11.1982	17	8.5	140	140	100	40	14.4	0.05	0.003	—	5
25.11.1982	15	8.2	150	140	110	30	19.4	0.2	0.0005	—	10
15.12.1982	15	8.6	130	160	120	40	39.4	0.18	0.0007	—	00
5. 1.1983	—	—	—	—	—	—	—	—	—	—	—
25. 1.1983	—	—	—	—	—	—	—	—	—	—	—
18. 2.1983	—	—	—	—	—	—	—	—	—	—	—
30. 3.1983	—	—	—	—	—	—	—	—	—	—	—
1. 4.1983	15	7.7	160	150	130	20	29.4	0.05	0.0015	—	40
20. 4.1983	13	8.7	120	160	110	50	24.4	0.15	0.002	—	10
10. 5.1983	9	8.6	140	140	120	20	14.4	0.01	0.0005	—	5
1. 6.1983	11	8.0	140	130	110	20	8.6	0.05	0.0005	—	00
21. 6.1983	10	8.4	130	120	100	20	7.4	0.2	0.0009	—	00
10. 7.1983	12	8.8	130	140	110	20	5.1	0.05	0.0015	—	00

– The dates in which analysis were not performed.

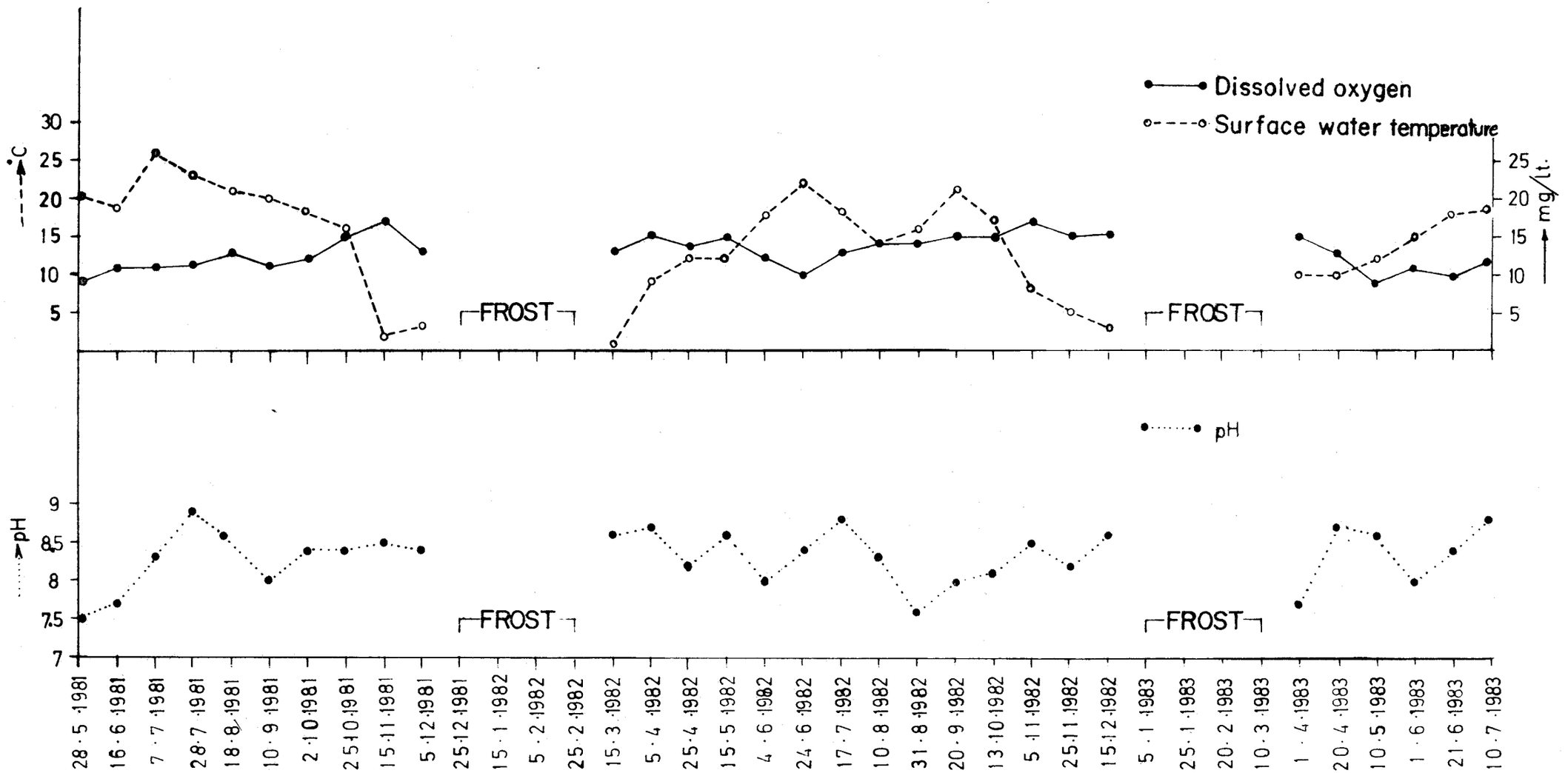


Figure 2.— The seasonal variation of the temperature of the surface water (o---o) dissolved oxygen (•—•) and pH (•·····•) in Bayındır Dam Lake.

1. The composition of phytoplankton:

The phytoplankton of Bayındır Dam Lake consisted of 71 species belonging to seven groups of **Chlorophyta, Bacillariophyta, Euglenophyta, Cyanophyta, Dinophyta, Cryptophyta, and Chrysophyta.**

The list of recorded species are given below

BACILLARIOPHYTA

Centrales: *Cyclotella kützingiana* Thwaites; *C. ocellata* Pant.; *Melosira varians* C.A. Agardh.

Pennales: *Amphora ovalis* Kütz.; *Caloneis silicula* (Ehr.) Cleve.; *Cocconeis placentula* (Ehr.) Cleve.; *Cymatopleura elliptica* (Breb.) W. Smith; *Cymbella naviculiformis* Auerswald; *C. tumidula* Grun.; *C. ventricosa* Kütz.; *Diatoma vulgare* Bory; *Epithemia sorex* Kütz.; *Eucocconeis flexella* (Kütz.) Grun.; *Fragilaria intermedia* Grun.; *Gomphonema olivaceum* (Lyngbye) Kütz.; *Hantzschia amphioxys* (Ehr.) Grun.; *Navicula cryptocephala* Kütz.; N. *dicephala* (Ehr.) W. Smith; *N. graciloides* A. Mayer; *N. hungarica* Grun.; *Neidium dubium* (Ehr.) Cleve.; *Nitzschia acuminata* (W. Smith) Grun.; *N. palea* (Kütz.) W. Smith; *N. sigma* (Kütz.) W. Smith; *N. sigmoidea* (Ehr.) W. Smith; *N. sinuata* (W. Smith) Grun. var. *tabellaria* Grun.: *N. vitrea* Norman: *Rhoicosphenia curvata* (Kütz.) Grun.; *Surirella smithii* (Ralfs) W. Smith; *S. ovata* Kütz.; *Synedra ulna* (Nitzsch) Ehr.; *S. ulna* var. danica (Kütz.) Grun.

CHLOROPHYTA

Chlorococcles: *Ankistrodesmus falcatus* (Corda) Ralfs; *Botryococcus braunii* Kuetzing; *Coelastrum microporum* Neageli; *Crucigenia quadrata* Morren; *C. tetrapedia* (Kirchner) W. and G.S. West; *Nephrocytium agardhianum* Naegeli; *Oocystis borgei* Snow; *Pediastrum boryanum* (Turpin) Meneghini; *P. duplex* Meyen; *Scenedesmus ecornis* (Ralfs) Chodat; *S. acutus* Meyen; *S. ovalternus* Chodat; *Sphaerocystis schroeteri Chodat; Tetraedron minimum* (A. Braun) Hansgirg.

Desmidiales: *Closterium acutum* (Lyngbye) Breb.; *C. strigosum* Breb.; *Cosmarium granatum* Breb.; *C. formosulum* Hoffmann; *Staurastrum gracile* Ralfs.

Volvocales: *Chlamydomonas globosa* Snow; *Pandorina morum* (Muell.) Bory; *Phacotus lenticularis* (Ehr.) Stein.

CHRYSOPHYTA : *Dinobryon sertularia* Ehrenberg.

CRYPTOPHYTA : *Cryptomonas ovata* Ehrenberg.

CYANOPHYTA

Chroococcales: *Chroococcus turgidus* (Kuetzing) Neageli; *Merismopedia glauca* (Ehrenberg) Neageli; *M. elegans* A. Braun; *Microcystis aeruginosa* Kütz.

Hormogonales : *Oscillatoria tenuis* C. A. Agardh.

DINOPHYTA : *Ceratium hirundinella* (O. F. Muell.) Dujardin; *Peridinium cinctum* (Muell.) Ehrenberg.

EUGLENOPHYTA

Euglenales : *Euglena gracilis* Klebs; *E. oxyuris* Schamarda; *Lepocinclis fusiformis* (Carter) Lemm.; *Phacus longicauda* (Ehrenberg) Dujardin; *Phacus* sp.; *Trachelomonas hispida* (Perty) Stein; *T. volvocina* Ehrenberg.

The frequency ratio of some of algae composing phytoplankton was shown in Table: 2.

II. Seasonal variation of phytoplankton:

The seasonal variation was decided to be examined in four stages Spring, Summer, Autumn, Winter by taking the prolonged duration of the research and the variations shown by phytoplankton, into account.

a - Spring months

May 1981: The total amount of organism was found to be 3266 org/cm^3 which consisted of 97 % of centric diatome *Cyclotella ocellata.*

March 1982 - May 1982: *Cyclotella ocellata* began to grow after the ice layer covering the lake surface had melted and reached the 99 % of total 1861 org/cm^3 at the beginning of April The total organism decreased at the end of April (50 org/cm^3).

Table: 2-The frequency ratio of some algae composing phytoplankton (The percentage of the number of samples in which organisms were found to the total number of samples) % 100-80 Constantly present, % 60-40 Generally present, % 80-60 Largely present, % 40-20 Sometimes present, % 20-1 Seldom present.

Organisms / The sample number		Frequency ratio (%) 30
BACILLARIOPHYTA	Centrales:	
	Cyclotella ocellata	97
	Pennales:	
	Cymbella spp.	32
	Navicula cryptocephala	16
	Nitzschia spp.	26
	Synedra ulna	26
CHLOROPHYTA	Chlorococcales:	
	Ankistrodesmus falcatus	35
	Oocystis borgei	26
	Pediastrum boryanum	23
	Scenedesmus ecornis	52
	Tetraedron minimum	71
	Desmidiales:	
	Closterium acutum	19
	Cosmarium spp.	13
	Volvocales:	
	Chlamydomonas globosa	19
	Pandorina morum	10
	Phacotus lenticularis	26
CHRYSOPHYTA	Dinobryon sertularia	13
CRYPTOPHYTA	Cryptomonas ovata	26
CYANOPHYTA	Chroococcus turgidus	3
	Merismopedia glauca	6
DINOPHYTA	Ceratium hirundinella	13
	Peridinium cinctum	74
EUGLENOPHYTA	Euglena spp.	48
	Lepocinclis fusiformis	3
	Trachelomonas spp.	3

March 1983 - May 1983: The phytoplankton became rather poor and the growth of algae was delayed due to very harsh Winter and coverage of the lake surface by ice. The total 827 org/cm^3 in May consisted of 95 % *Cyclotella ocellata* and 5 % *Synedra ulna.*

The predominating organism in Spring was *Cyclotella ocellata.* Apart from the *C. ocellata* insignificant amount of species *Cymbella ventricosa, Diatoma vulgare, Gomphonema olivaceum, Navicula cryptocephala* from **Pennat Diatoms;** *Chlamydomonas globosa, Phacotus lenticularis, Ankistrodesmus falcatus, Scenedesmus ecornis, Tetraedron minumum* and *Cosmarium formosulum* from **Chlorophyta;** *Euglena gracilis* and *Trachelomonas hispida* from **Euglenophyta;** *Peridinium cinctum, Ceratium hirundinella* from **Dinophyta** and finally *Cryptomonas ovata* from **Cryptophyta** were recorded.

b - Summer months

June 1981 - August 1981: In June 97 % of *Cyclotella ocellata* was found in 955 org/cm^3 total amount of organism. In July, the amount of *Scenedesmus ecornis* increased and the total amount of 1932 org/cm^3 consisted 50 % of *Cyclotella ocellata* and 48 % of *Scenedesmus ecornis.* In August there was a decrease in total amount of organism but the predominating organisms remained unchanged.

June 1982 - August 1982 : The predominating organism in June was observed to be *Cyclotella ocellata* and at the end of June the total 1835 org/cm^3 consisted of 66 % *Cyclotella ocellata,* 29 % *Scenedesmus ecornis* and 3 % *Tetraedron minimum.* This situation continued all thorough July as well. In spite of some decrease in total organism in August, *Tetraedron minimum* was found to be the dominant organism.

June 1983 - July 1983: *Cyclotella ocellata* was the dominating organism during this period. The total amount of organism which consisted of 85 % *Cyclotella ocellata* diminished to 258 org/cm^{3}in July.

The total amount of organism during the Summer months was observed to be high at the end of June and begining of July but decreased in August. The dominant organism was *Cyclotella ocellata* when the total amount of organism was high but when this amount was low, the dominating organisms were found to be *Cyclotella ocellata, Scenedesmus ecornis* and *Tetraedron minimum. Cymbella naviculiformis, Caloneis silicula, Nitzschia palea, N. sigmoidea* from **Pennat Diatoms;**

Pandorina morum, *Oocystis borgei*, *Pediastrum boryanum*, *P. duplex* *Closterium acutum*, *Cosmarium granatum from* **Chlorophyta**; *Merismopedia glauca*, *Chroococcus turgidus* from **Cyanophyta** and *Dinobryon sertularia* from **Chrysophyta** were the other organisms found in low number in Spring months in addition to those mentioned above.

c - Autumn months

September 1981 - November 1981: *Tetraedron minimum* was the dominant species by forming 52 % of total amount of 108 org/cm^3 in September. Also in this month *Cryptomonas ovata* and *Cyclotella ocellata* consisted the % 24 and 15 % of the total amount respectively. The situation remained the same in October. But in November *Tetraedron minimum* was found to be consisting 94 % of total amount of 1181 org/cm^3

September 1982 - November 1982: The dominant organism was *Tetraedron minimum*. But at the end of November **Chlorophyta** members decreased in both amount and number of species and *Cyclotella ocellata* became the dominant organism by forming 71 % of total 374 org/cm^3.

In general the amount of total organism increased in September and reached to its highest value in November. The members of **Chlorophyta** dominated in both amount and number of species and members of **Bacillariophyta** showed a marked decrease.

d - Winter months

December 1981 - February 1982: In December *Cyclotella ocellata* was the dominant species consisting of 78 % of total amount of 447 org/cm^3. The surface of the lake was covered with ice during January and February.

December 1982 - February 1983: In December total amount of 360 org/cm^{3}consisted of 51 % *Cyclotella ocellata*, 37 % *Cyyptomonas ovata*, 8 % *Peridinium cinctum* and 3 % *Tetraedron minimum*.

During Winter months while the amount of total organism decreased, the dominant organism was still found to be *Cyclotella ocellata*. Apart from this species, there were **Euglenophyta** and **Dinophyta** members in phytoplankton.

The variation of phytoplankton and some climatic values were tabulated in Figure: 3 and the seasonal changes in the most predominant 3 algae groups were shown in Figure: 4.

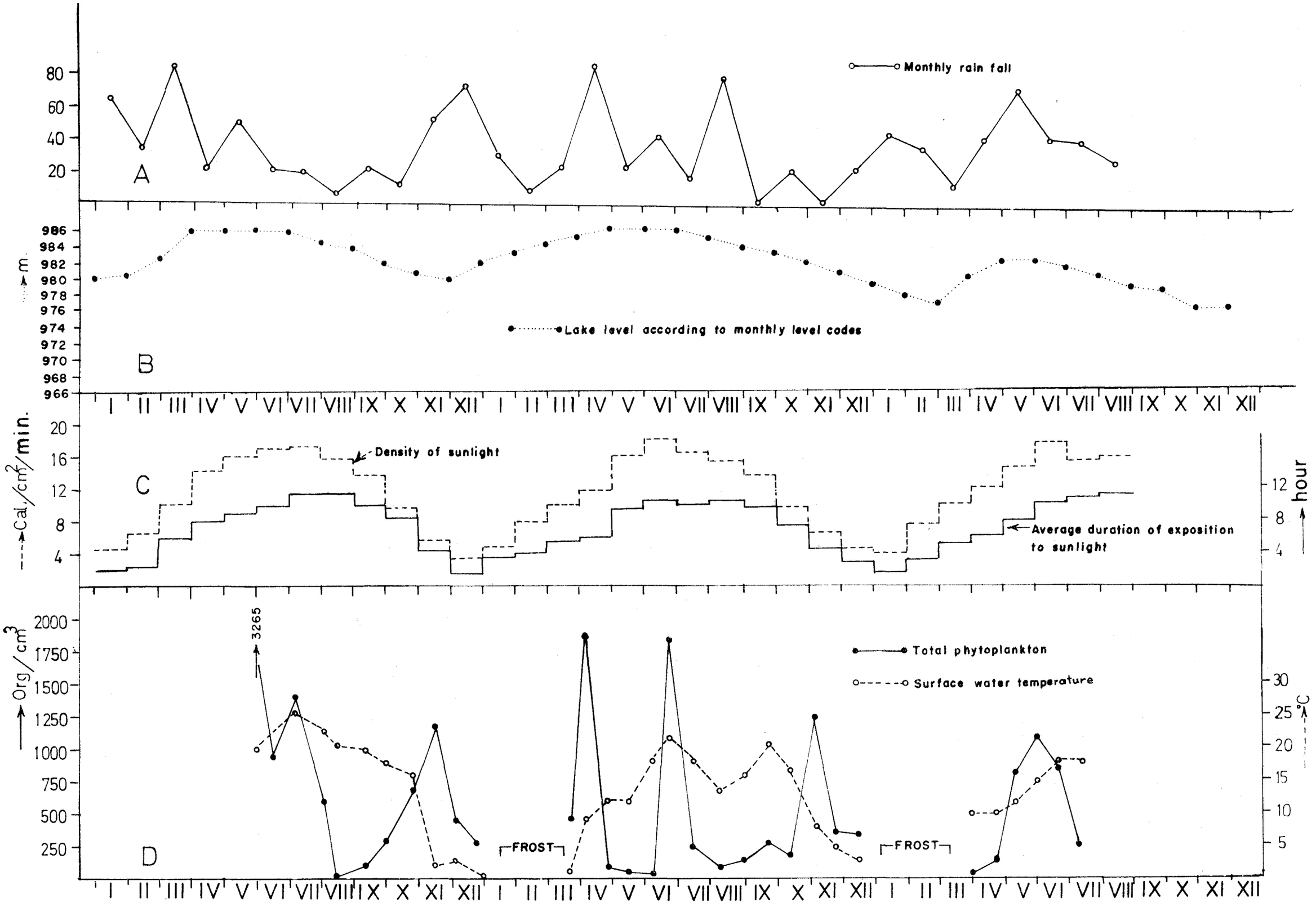
III. The seasonal variation in the amount of chlorophyll-a:

The chlorophyll-a contents determined during the course of this research were in compliance with the seasonal variations in total amounts of organism. It was high in the reproductions dominated by *Cyclotella ocellata* and ranged between 14,7 - 16,7 mg/M^3. It decreased in line with the decreasing amount of organism in July and August. The chlorophyll-a a contents measured during late October and November during which *Tetraedron minimum* dominated were similar to those obtained in June. There were small increases in December, March and April during which the total amounts of organism were very low. The lowest chlorophyll-a content was measured in March 1982 as 0,003 mg/M^3.

The seasonal variations in total organism and chlorophyll-a contents in lake water were shown in Figure: 5.

DISCUSSION

There is a **Centrales – Chlorococcales** type phytoplankton in Bayındır Dam Lake. *Cyclotella ocellata* belonging to **Centric Diatoms** was found to be dispersely and significantly present in Bayındır, Çubuk-I (Gönülol and Aykulu 1984), Kurtboğazı (Aykulu and Obalı 1981) Dam Lakes and in Beytepe and Alap (Ünal 1984) artificial lakes (except Mogan Lake). *Cyclotella kützingiana* was found to be dominant organism in Tortum Lake (Altuner 1982). In Kurtboğazı (Aykulu and Obalı 1981) phytoplankton *Stephanodiscus astrea* exhibited significant growth especially in the period of Spring. **Pennat Diatoms** were always present in very low amounts in phytoplankton. In Altınapa (Yıldız 1982) and Çubuk-I (Gönülol and Aykulu 1984) lakes and Beytepe and Alap (Ünal 1984) artificial lakes the drifting algae by the waves were understood to be important for phytoplankton but this situation was not observed in Kurtboğazı (Aykulu and Obalı 1981) and Tortum (Altuner 1982) lakes which have deeper benthic zone.


A
Monthly rain fall
80
60
40
20
B
m
986
984
982
980
978
976
974
972
970
968
966
Lake level according to monthly level codes
I II III IV V VI VII VIII IX X XI XII I II III IV V VI VII VIII IX X XI XII I II III IV V VI VII VIII IX X XI XII
C
Cal./cm²/min.
20
16
12
8
4
Density of sunlight
Average duration of exposition to sunlight
hour
12
8
4
D
Org/cm³
2000
1750
1500
1250
1000
750
500
250
3265
FROST
FROST
Total phytoplankton
Surface water temperature
°C
30
25
20
15
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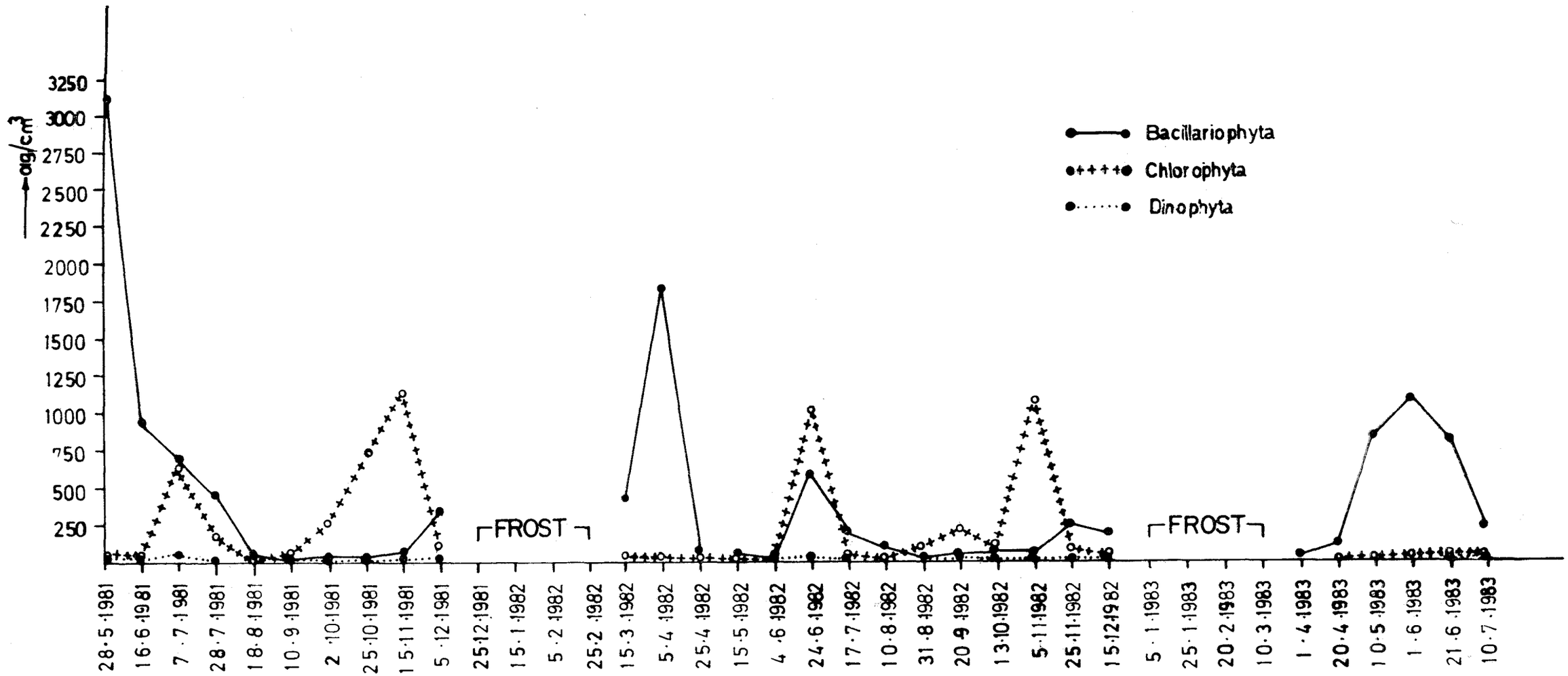

Figure 4._ The seasonal variation of three dominant algae groups in phytoplankton of Bayındır Dam Lake.

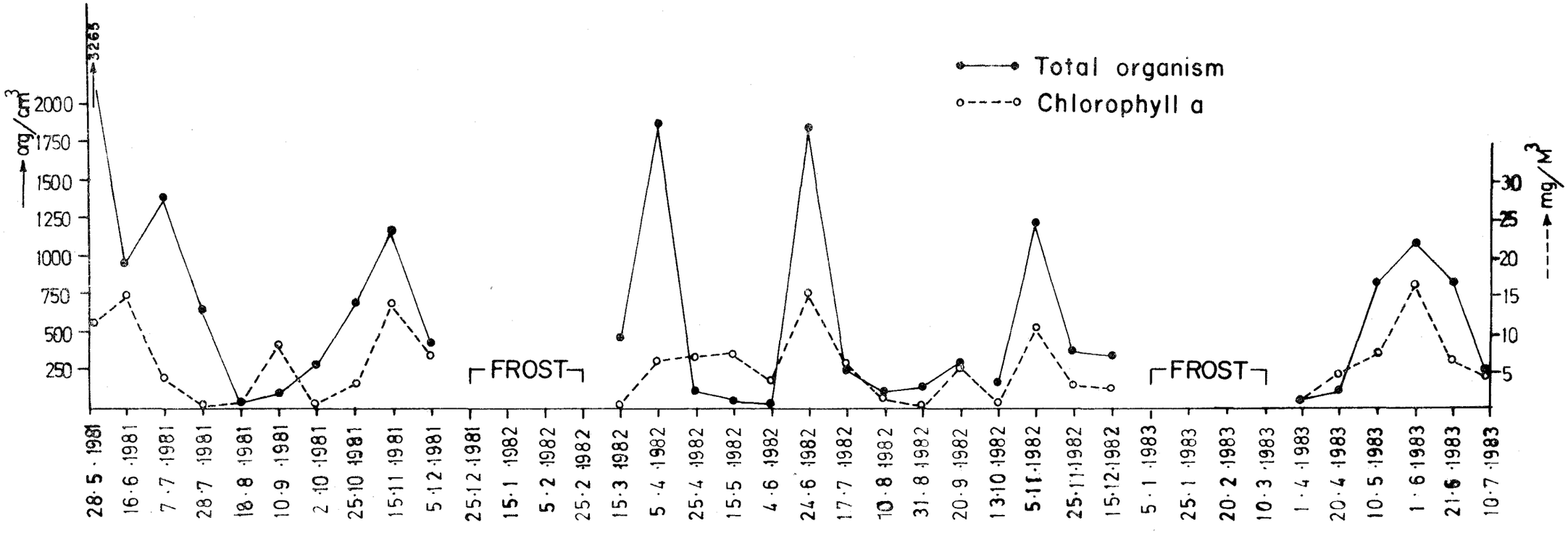

Figure 5.— The seasonal variation of total organism (●—●) and chlorophyll a-(○- -●) contents in the Bayındır Dam Lake.

Volvocales order of **Chlorophyta** members, *Chlamydomonas*, *Pandorina* and *Phacotus* were very rarely in Bayındır Dam Lake. These organisms which were dominant in Kurtboğazı (Aykulu and Obalı 1981) together with *Cryptomonas* sp.. did not gain any significance in other waters. **Chlorococcales** members were present in very high proportion in all the waters except Tortum Lake (Altuner 1982).

Pediastrum, *Scenedesmus* and *Ankistrodesmus* belonging to this order and found in all other waters analysed are considered as eutrophic **Chlorococcales** (Hutchinson 1967). The **Desmidiales** members which are characteristic of some oligotrophic lakes were not observed in Tortum Lake (Altuner 1982) and very rarely observed in Bayındır and other lakes investigated. **Cyanophyta** members were not found in Çubuk-I (Gönülol and Aykulu 1984) but a species of these, *Microcystis aeruginosa* exhibited extensive growth in Mogan Lake (Obalı 1984) during Summer. *Peridinium cinctum* belonging to **Dinophyta** was observed to reach high numerical values in Kurtboğazı Dam Lake (Aykulu and Obalı 1981) and Beytepe and Alap artificial lakes (Ünal 1984) during some periods. This species found in dam and artificial lakes in high proportion especially in late Summer prefer eutrophic waters (Hutchinson 1967). *Crypyomonas ovata* from **Cryptophyta** was not very important in other waters except in Kurtboğazı (Aykulu and Obalı 1981). In Çubuk-I Dam Lake (Gönülol and Aykulu 1984) another member *Rhodomonas* sp. reached to higher numbers during some periods. **Euglenophyta** members and *Dinobryon sertularia* from **Chrysophyta** were found in low numbers. There was no *Euglena* species in Tortum Lake (Atuner 1982).

Hutchinson (1967) extensively examined the results obtained by other workers and determined the subgroups of oligotrophic and eutrophic phytoplankton communities. *Cyclotella* species are especially considered as oligotrophic organisms in Mid-Europian lakes and they are also markedly found in eutrophic waters. *Cyclotella ocellata* which were found in large amounts in the lakes around Ankara may suitably be accepted as species which can easly propogate in lakes having various eutrophy degrees. On the other hand, **Chlorococcales** members were seen to go on dominant growth in Kurtboğazı (Aykulu and Obalı 1981), Çubuk-I (Gönülol and Aykulu 1984) and Altınapa (Yıldız 1982) Dam Lakes.

The most significant factors controlling the density and periodicity of phytoplankton in Bayındır Dam Lake are light and temperature due to their role in photosynthesis. The decreasing lighting duration and temperature in Winter months creates unfavourable conditions for the reproduction of algae. The lowest densities were generally found during Winter months (Figure: 3). Swale (1964) and Lund (1965) stated that the most effective factor for diatome increase puring Spring is the extension of day time. The Spring growth may be delayed if the temperature remains too low and the ice cover on the lake persists too long, because the number of algae which survive from these adverse conditions may be low. The number of algae in late July and August is as low as it is in Winter months. Therefore it may be concluded that high temperature and light have also an adverse effect on many algae groups.

The water in Bayındır Dam Lake is in constant circulation like in many dam lakes. This fact prevents the formation of algae in high densities. This was the case observed in Kurtboğazı (Aykulu and Obalı 1981), Çubuk-I (Gönülol and Aykulu 1984), Altınapa (Yıldız 1982) dam lakes and Beytepe artificial lake (Ünal 1984).

The nutrients in the lake is low, except silisium (Table: 2). According to Lund (1950) the silisium content above 0,5 mg/lt is more than enough for the growth of diatoms. The silisium contents are generally very high in all the dam lake and artificial lakes investigated in the vicinity of Ankara. That is probably the reason why diatoms are always the predominant organisms in all these lakes.

The chlorophyll-a content of phytoplankton is ranging 0,003 - 16,6 mg/M^3. These values are 5 - 47 mg/M^3in Çubuk-I (Gönülol and Aykulu 1984), 0,17 - 50 mg/M^3in Kurtboğazı (Aykulu and Obalı 1981), 0,23 17 mg/M^3in Mogan (Obalı 1984) and 0.02 - 49 mg/M^3in Beytepe (Ünal 1984) lakes. Ichimura (1955) described the lakes having chlorophyll-a contents between 1 to 50 mg/M^3as mesotrophic and oligotrophic based upon his finding from the chlorophyll-a measurements performed upon many lakes having various trophic features. He said that the values below 1 were generally found in oligotrophic lakes. According to these values the lakes in the vicinity of Ankara can be described as mesotrophic and near eutrophic. As it was mentioned in previous studies (Aykulu and Obalı 1981, Gönülol and Aykulu 1984) the evolution of productivity of the lake by solely basing upon chlorophyll-a measure-

ments may be misleading, because the chlorophyll-a content in cells varies according to the type of the cell and ecological and physical conditions.

The Bayındır Dam Lake is understood to have lowest productivity and less tendency to mesotrophy among the lakes investigated in the vicinity of Ankara.

ACKNOWLEDGEMENT

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ÖZET

Bayındır baraj gölü fitoplanktonunun kompozisyonu ve mevsimsel değişimi Mayıs 1981 Temmuz 1983 tarihleri arasında kalitatif ve kantitatif olarak incelenmiştir. Fitoplanktonun klorofil-a muhteviyatı ve göl suyunun bazı fiziksel ve kimyasal özellikleri tayin edilmiştir. Fitoplanktonu **Bacillariophyta, Chlorophyta, Cyanophyta, Dinophyta, Cryptophyta, Chrysophyta ve Euglenophyta** divizyolarına ait 71 tür oluşturmuştur. Genellikle **Bacillariophyta**'nın dominant olduğu fitoplankton kışın fakir olmuş, erken yaz ve sonbahar aylarında bazı artışlar göstermiştir. Erken yaz ayarında çoğalmayı **Sentrik Diyatometerden** *Cyclotella ocellata*, sonbahar aylarında **Chlorophyta**'dan *Tetraedron minimum* yapmıştır. Klorofil-a değerleri toplam organizma miktarına uyum göstermiştir.

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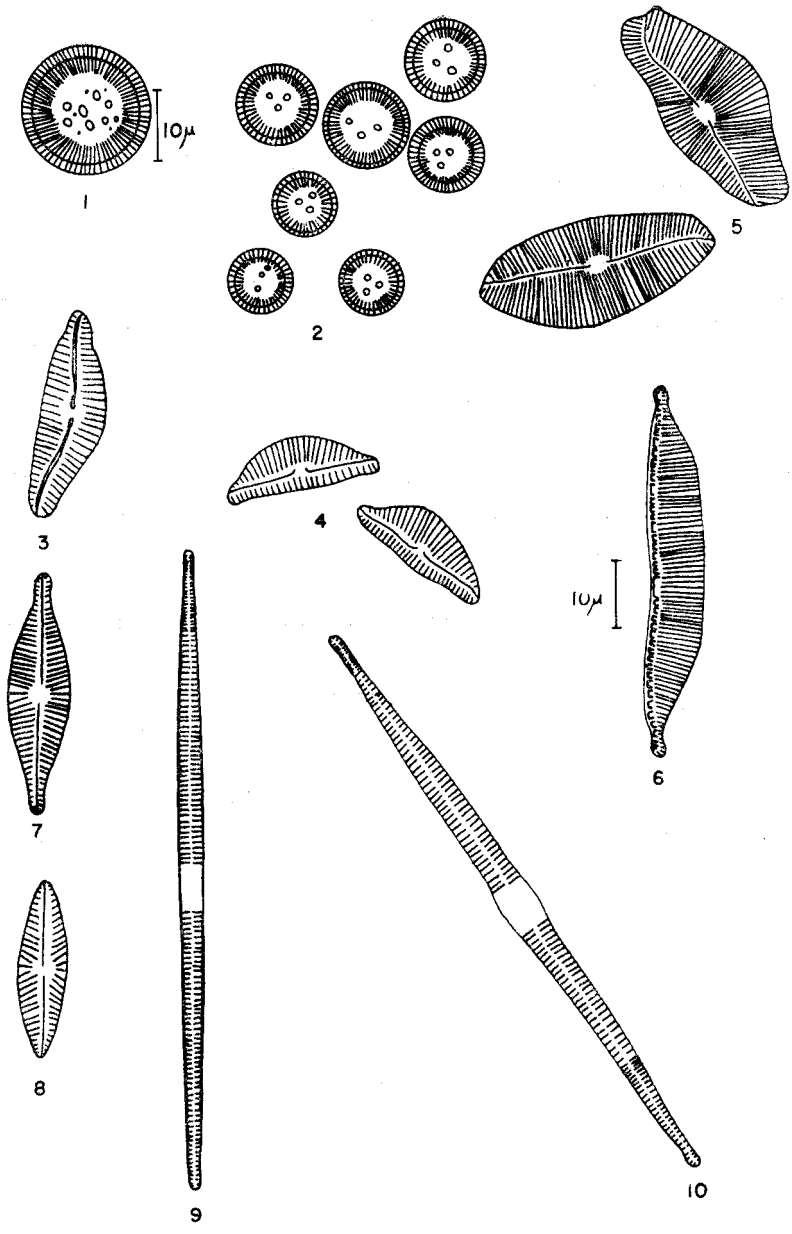

Figure : 6-1. Cyclotella kützingiana Thwaites x1600, 2. C. ocellata Pant x1609,3. Cymbella tumidula Grum. x1600, 4. C. ventricosa. Kütz x 1600, 5. Eucocconeis flexella (Kütz.) Grun. x 1600,6. Hantzschia amphioxys (Ehr.) Grun. x 1600,7. Navicula cryptocephala Kütz. x 1600,8. N. graciloides A. Mayer x 1600,9. Synedra ulna (Nitzsch) Ehr. x 1600,19. S. ulna var. danica (Kütz.) Grun. x 1600

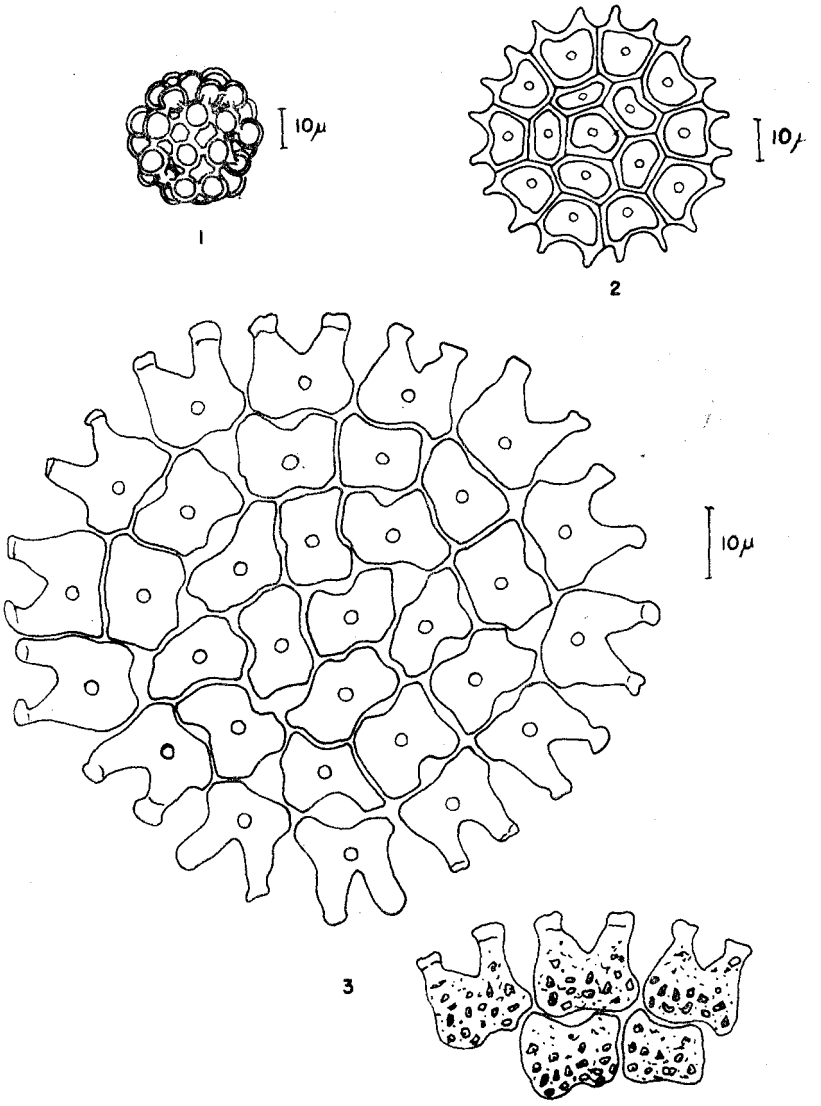

Figure: 7- 1. Coelastrum microporum Neageli x640, 2. Pediastrum boryanum (Turp.) Meneghini x640, 3. P. duplex Meyen x1600

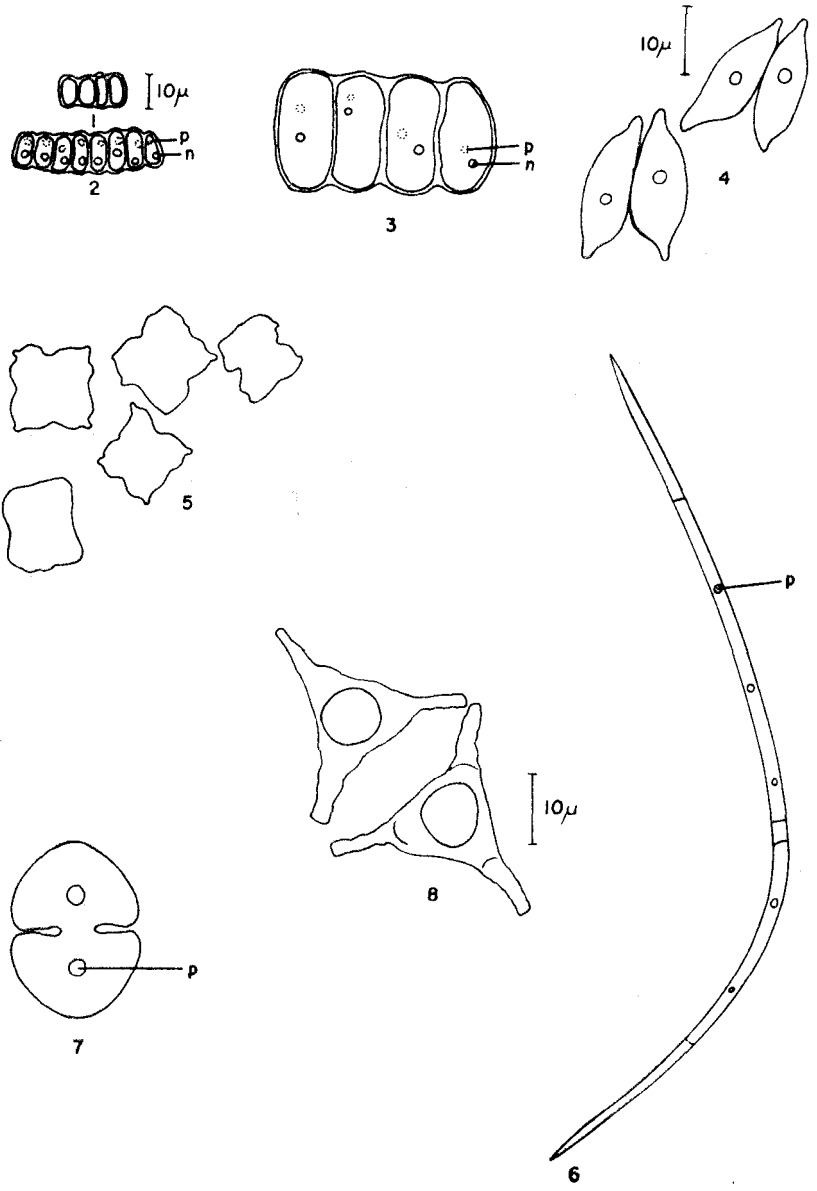

Figure: 8- 1, 2. Scenedesmus ecornis (Ralfs) Chod. x640, 3, S. ecornis (Ralfs) Chod. x1600, 4. S. ovalternus Ahod. x1600, 5. Tetraedron minimum (A.Braun) Hansgirg x1600, 6. Closterium acutum (Lyngbye) Breb. x1600, 7. Cosmarium granatum Breb. x1600, 8. Staurastrum gracile Ralfs x16000, p: Pyrenoid, n: Nucleus