

Second Report of the Regular Limnological Survey of Lake Biwa (1967)

I. Plankton in General and Phytoplankton*

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The collecting stations of plankton samples and methods of the survey were just the same as described in the first report (1967).

I. The volume of the total plankton

The volume of the precipitated, total plankton has been measured as seen in Table 1 and Table 2.

Table 1. The volume of the total plankton in cm^3 per m^3 of lake water at Station Ie-1 in 1967

(1)

Date	1967 I-13	1967 II-15	1967 III-13	1967 IV-14	1967 V-11	1967 VI-15	1967 VII-17
Zone							
0~2 m	2.27	5.87	1.30	16.23	2.60	1.95	2.60
2~5 m	0.65	1.52	7.58	2.81	1.73	5.41	3.25
5~10m	1.16	1.03	1.03	1.55	3.74	6.45	3.74
10~20m	1.69	1.17	1.43	1.43	1.10	2.08	0.39
20~30m	0.97	0.78	0.65	0.39	0.58	0.32	0.19
30~50m	1.62	0.75	0.23	0.55	0.10	1.04	0.19
50~70m	1.30	1.20	0.10	0.06	0.10	0.75	0.19
Average	1.38	1.76	1.76	3.29	1.42	2.57	1.51

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(2)

Date	1967 VIII-16	1967 IX-19	1967 X-20	1967 XI-15	1967 XII-15	Average
Zone						
0~2 m	3.25	17.20	1.62	1.62	2.60	4.92
2~5 m	1.30	5.19	8.01	3.68	1.08	3.52
5~10m	0.90	10.45	7.48	5.84	0.90	3.69
10~20m	0.58	2.92	2.40	2.16	1.23	1.55
20~30m	0.45	0.52	0.65	0.87	0.78	0.60
30~50m	0.58	0.39	0.19	1.52	0.42	0.63
50~70m	0.23	0.19	0.13	1.52	0.10	0.49
Average	1.05	5.27	2.93	2.46	1.02	(2.20)

Table 2. The volume of the total plankton in cm^3 per m^3 of the surface lake water at Stations Nb-2, Nb-5, and Na-3 in 1967

(1)

Date	1967 I-14	1967 II-17	1967 III-14	1967 IV-17	1967 V-16	1967 VI-16	1967 VII-15
Station							
Nb-2	1.00	0.50	0.50	2.50	17.50	4.75	7.00
Nb-5	0.75	0.25	0.25	1.25	5.00	1.75	5.25
Na-3	0.25	0.50	1.00	3.75	2.50	2.25	6.75
Average	0.67	0.42	0.58	2.50	8.33	2.92	6.33

(2)

Date	1967 VIII-15	1967 IX-20	1967 X-21	1967 XI-16	1967 XII-16	Average
Station						
Nb-2	4.25	1.50	2.50	2.00	2.00	3.83
Nb-5	3.25	2.00	3.75	2.50	1.25	2.27
Na-3	4.50	3.00	1.75	0.75	2.50	2.46
Average	4.00	2.17	2.67	1.75	1.92	(2.85)

Based on the results of the regular survey of the past ten years (from 1950 to 1959) by the Experimental Fishery Station of Shiga Prefecture, I have calculated the standard, mean volume of the totalplankton in each month in the main basin of Lake Biwa as follows (Table 3) :

Table 3. The mean volume of the total plankton in each month during the past ten years (1950-1959) in the main basin of Lake Biwa

(1)

Month	I (Jan.)	II (Feb.)	III (Mar.)	IV (Apr.)	V (May)	VI (June)	VII (July)
Zone							
0~10m	1.85	1.89	1.85	4.32	5.20	4.97	4.72
10~20m	1.03	1.31	1.47	2.51	3.03	2.96	4.60
20~40m	1.28	0.97	1.18	2.01	2.07	1.82	1.78
40~70m	1.03	0.91	0.76	0.90	1.06	0.57	0.59
Average	1.30	1.27	1.32	2.44	2.84	2.85	2.92

(2)

Month	VIII (Aug.)	IX (Sept.)	X (Oct.)	XI (Nov.)	XII (Dec.)	Average
Zone						
0~10m	4.76	4.87	4.96	3.98	3.14	3.83
10~20m	2.50	2.26	2.11	2.37	1.84	2.33
20~40m	1.12	0.92	0.75	1.86	2.15	1.49
40~70m	0.51	0.51	0.34	0.50	1.74	0.79
Average	2.22	2.22	1.92	2.18	2.22	(2.11)

Compared with this standard table, the average volume of the total plankton in each month of 1967 was fairly larger in April, September, and October, smaller in May, July, August, and December. But the total average of the year was almost equal with the standard.

In the main basin the average volume of the total plankton in each month was largest in September and smallest in December, while in the accessory basin it was largest in May and smallest in February. The average volume of the total plankton through the year was larger in the accessory basin than in main basin. It was smaller than that of the foregoing year in both basins. Especially in the accessory basin it was far smaller, being 9.95 cm³ per m³ of lake water in the foregoing year.

II. The volume of the phytoplankton

By using the precipitated material, the reading of the volume of the phytoplankton may be often easily done, when the zooplankton is mainly composed of the relatively large animals, such as Copepoda or Cladocera and the colored

phytoplankton is laid on the colorless zooplankton, but it is sometimes almost difficult, when the zooplankton is composed of the relatively small animals and is perfectly mixed with the phytoplankton.

For that reason the volume of phytoplankton may be sometimes correctly, and sometime with a small accuracy measured.

The volume of phytoplankton in the main basin was outlined as shown in Table 4:

Table 4. The volume of the phytoplankton at Station Ie-1 of the main basin in 1967

(1)

Date	1967 I-13	1967 II-15	1967 III-13	1967 IV-14	1967 V-11	1967 VI-15	1967 VII-17
Zone							
0~2 m	1.62	3.25	0.65	1.01	0.97	0.97	1.95
2~5 m	0.43	1.30	1.08	0.65	0.43	1.08	2.43
5~10m	0.77	0.52	0.39	0.39	0.90	0.65	2.48
10~20m	1.30	0.58	0.26	0.26	0.32	0.52	0.13
20~30m	0.65	0.39	0.13	0.19	0.13	0.06	0.06
30~50m	1.30	0.48	0.06	0.16	0.06	0.23	0.06
50~70m	1.14	1.07	0.03	0.03	0.06	0.10	0.06
Average	1.03	1.08	0.37	0.38	0.41	0.52	1.02

(2)

Date	1967 VIII-16	1967 IX-19	1967 X-20	1967 XI-15	1967 XII-15	Average
Zone						
0~2 m	2.16	2.86	0.65	0.97	1.95	1.58
2~5 m	0.96	0.87	4.01	1.52	0.65	1.28
5~10m	0.72	1.03	1.87	0.65	0.52	0.91
10~20m	0.45	0.58	0.84	0.20	0.45	0.49
20~30m	0.13	0.26	0.26	0.20	0.52	0.25
30~50m	0.29	0.10	0.06	0.06	0.30	0.26
50~70m	0.06	0.06	0.06	0.06	0.03	0.23
Average	0.68	0.83	1.10	0.52	0.63	(0.71)

III. The voluminal ratio of phytoplankton to zooplankton

The voluminal ratio of phytoplankton to zooplankton was ascertained in outline as follows (Table 5) :

Table 5. The voluminal ratio of Phytoplankton : zooplankton at Station Ie-1 of the main basin in 1967

(1)

Date	1967 I-13	1967 II-15	1967 III-13	1967 IV-14	1967 V-11	1967 VI-15
Zone						
2~2 m	5:2	5:4	1:1	1:15	3:5	1:1
2~5 m	2:1	6:1	5:3	1:10	1:3	5:2
5~10m	3:1	1:1	3:5	1:3	1:3	1:9
10~20m	3:1	1:1	1:4	1:4	1:2	1:3
20~30m	2:1	1:1	1:4	1:1	2:7	1:4
30~50m	4:1	2:1	2:5	1:2	2:1	1:4
50~70m	7:1	4:1	1:2	1:1	2:1	1:7

(2)

Date	1967 VII-17	1967 VIII-16	1967 IX-19	1967 X-20	1967 XI-15	1967 XII-15
Zone						
0~2 m	3:1	2:1	1:5	2:3	3:2	3:1
2~5 m	3:1	3:1	1:5	1:1	2:3	3:2
5~10m	2:1	4:1	1:9	1:3	1:4	4:3
10~20m	1:2	3:1	1:4	1:2	1:6	2:3
20~30m	1:2	2:5	1:1	2:3	3:1	2:1
30~50m	2:5	1:1	1:1	1:2	2:5	3:1
50~70m	2:5	2:5	2:1	1:1	2:5	1:2

IV. The zonal distribution and the seasonal succession of the phytoplankton at Station Ie-1 of the main basin

The following algae were found in the samples collected at Station Ie-1 :

Chrysophyta

- 1) *Melosira solida* Eulestein
- 2) *Melosira italica* (Ehr.) Kützing
- 3) *Stephanodiscus carconensis* Grunow und var. *pusilla* Grunow
- 4) *Rhizosolenia longiseta* Zacharias
- 5) *Asterionella formosa* Hassal
- 6) *Dinobryon divergens* Imhof
- 7) *Mallomonas fastigata* Zacharias

Pyrophyta

- 8) *Ceratium hirundinella* (O. F. Müller) Schrank

Chlorophyta

- 9) *Pediastrum Biwae* Negoro and var. *triangulatum* Negoro
- 10) *Oocystis* sp.
- 11) *Lagerheimia citriformis* (Snow) G. M. Smith
- 12) *Ankistrodesmus falcatus* (Corda) Ralfs
- 13) *Coelastrum microporum* Nägeli
- 14) *Eudorina elegans* Ehrenberg
- 15) *Staurastrum dorsidentiferum* W. et G. S. West var. *ornatum* Grönbl.
- 16) *Staurastrum limneticum* Schmidle var. *Burmense* W. et G. S. West
- 17) *Spondylosium moniliformis* Lundell*
- 18) *Cosmocladium constrictum* Arch.
- 19) *Closterium aciculare* Tuffen West var. *subpronum* W. et G.S. West

Cyanophyta

- 20) *Aphanocapsa elachista* W. et G. S. West var. *conferta* W. et G. S. West
- 21) *Chroococcus dispersus* (Keissler) Lemmermann
- 22) *Aphanothece clathrata* W. et G. S. West
- 23) *Lyngbya limnetica* Lemmermann

The composition and the zonal distribution of the phytoplankton in each month were as shown in Table 6 :

Table 6. Phytoplankters per m³ of lake water at Station Ie-I. A unit of number corresponds to ten thousand (10,000).

(1)	1961-I-13					
	<i>Melosira solida</i>	<i>Melosira italica</i>	<i>Stephano- discus carconensis</i>	<i>Rhizo- solenia longiseta</i>	<i>Mallo- monas fastigata</i>	<i>Ceratium hirundi- nella</i>
0~2 m	1641	61	61	-	-	-
2~5 m	449	7	34	-	-	7
5~10m	421	12	20	-	-	-
10~20m	672	12	12	-	-	-
20~30m	153	-	24	-	-	2
30~50m	590	4	8	4	2	-
50~70m	277	16	28	8	4	-

* In the First Report, I have identified this alga by mistake as *S. Lütkemülleri* Grönbl.

	<i>Pediastrum Biwae</i>	<i>Staurastrum dorsident. v. ornatum</i>	<i>Staurastrum limneticum v. Burmense</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare v. subpron.</i>
0~2 m	-	20	41	-	-
2~5 m	-	7	14	-	7
5~10m	-	4	20	-	-
10~20m	-	4	20	20	-
20~30m	-	4	10	8	2
30~50m	2	6	2	57	2
50~70m	-	4	-	28	-

(2)

1967-II-15

	<i>Melosira solida</i>	<i>Melosira italica</i>	<i>Stephano- discus carconensis</i>	<i>Rhizo- solenia longiseta</i>	<i>Mallo- monas fastigata</i>
0~2 m	561	10	92	-	-
2~5 m	442	-	27	-	14
5~10m	207	4	32	-	-
10~20m	249	-	22	2	-
20~30m	165	-	14	-	-
30~50m	97	3	8	-	-
50~70m	103	2	13	1	1

	<i>Ceratium hirundi- nella</i>	<i>Staurastrum dorsident. v. ornatum</i>	<i>Staurastrum limneticum v. Burmense</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare v. subpron.</i>
0~2 m	-	10	10	10	41
2~5 m	-	41	7	27	20
5~10m	4	8	-	28	-
10~20m	-	6	-	51	-
20~30m	-	8	4	8	-
30~50m	-	4	-	2	2
50~70m	-	1	-	12	2

(3)

1967-III-13

	<i>Melosira solida</i>	<i>Stephanodiscus carconensis</i>	<i>Mallomonas fastigata</i>	<i>Ankistrodesmus falcatus</i>
0~2 m	112	10	-	-
2~5 m	129	7	-	7
5~10m	150	8	-	-
10~20m	196	6	2	-
20~30m	98	3	2	-
30~50m	55	1	-	-
50~70m	19	4	-	-

	<i>Staurastrum dorsident.</i> v. <i>ornatum</i>	<i>Staurastrum limneticum</i> v. <i>Burmense</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare</i> v. <i>subpron.</i>
0~2 m	143	-	82	82
2~5 m	20	7	129	20
5~10m	12	-	97	12
10~20m	35	-	65	6
20~30m	10	-	55	2
30~50m	7	-	40	3
50~70m	4	1	20	1

(4)

1967-IV-14

	<i>Melosira solida</i>	<i>Stephanodiscus carconensis</i>	<i>Mallomonas fastigata</i>	<i>Ceratium hirundinella</i>
0~2 m	20	-	-	-
2~5 m	14	14	-	-
5~10m	4	8	4	-
10~20m	-	4	-	2
20~30m	2	2	-	2
30~50m	6	2	2	1
50~70m	6	2	-	-

	<i>Staurastrum dorsident.</i> v. <i>ornatum</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare</i> v. <i>subpron.</i>
0~2 m	183	-	61
2~5 m	34	-	27
5~10m	85	4	8
10~20m	39	-	10
20~30m	12	-	6
30~50m	22	-	5
50~70m	12	-	4

(5)

1967-V-11

	<i>Melosira solida</i>	<i>Stephanodiscus carconensis</i>	<i>Asterinella formosa</i>	<i>Dinobryon divergens</i>
0~2 m	-	10	-	41
2~5 m	-	41	-	-
5~10m	-	12	4	8
10~20m	2	20	-	4
20~30m	2	2	-	2
30~50m	-	9	-	1
50~70m	-	-	-	-

	<i>Staurastrum dorsident.</i> v. <i>ornatum</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare</i> v. <i>subpron.</i>
0~2 m	234	-	163
2~5 m	190	7	54
5~10m	182	-	45
10~20m	137	-	18
20~30m	82	-	20
30~50m	13	-	1
50~70m	26	-	9

(6)

1967-VI-15

	<i>Melosira solida</i>	<i>Stephanodiscus carconensis</i>	<i>Oocystis</i> <i>sp.</i>	<i>Pediastrum Birwae</i>
0~2 m	20	-	10	-
2~5 m	7	14	-	7
5~10m	-	8	-	-
10~20m	-	-	-	-
20~30m	-	-	-	-
30~50m	1	-	-	1
50~70m	3	3	-	-

	<i>Eudorina elegans</i>	<i>Staurastrum dorsident.</i> v. <i>ornatum</i>	<i>Closterium aciculare</i> v. <i>subpron.</i>
0~2 m	-	520	285
2~5 m	-	333	14
5~10m	-	405	8
10~20m	2	96	8
20~30m	-	43	6
30~50m	-	53	-
50~70m	-	12	1

(7)

1967-VII-17

	<i>Melosira solida</i>	<i>Stephanodiscus carconensis</i>	<i>Ceratium hirundinella</i>	<i>Pediastrum Birwae</i>	<i>Oocystis</i> <i>sp.</i>	<i>Lagerheimia citriformis</i>
0~2 m	-	10	10	-	10	41
2~5 m	-	-	7	7	14	-
5~10m	-	-	-	4	-	57
10~20m	2	-	-	2	6	18
20~30m	-	-	-	-	6	31
30~50m	-	-	-	-	-	7
50~70m	1	-	-	-	-	11

	<i>Coelastrum microporum</i>	<i>Staurastrum dorsident. v. ornatum</i>	<i>Staurastrum limneticum v. Burmense</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare v. subpron.</i>	<i>Aphanothece clathrata</i>
0~2 m	20	4087	-	10	112	10
2~5 m	7	1027	7	7	-	-
5~10m	-	932	8	28	16	-
10~20m	-	204	2	4	8	-
20~30m	-	112	-	-	-	-
30~50m	-	70	-	-	-	-
50~70m	-	54	-	-	1	-

(8) 1967-VIII-16

	<i>Melosira italica</i>	<i>Stephano- discus carconensis</i>	<i>Ceratium hirundi- nella</i>	<i>Pedia- strum Birwae</i>	<i>Oocystis sp.</i>	<i>Eudorina elegans</i>
0~2 m	-	-	10	20	51	10
2~5 m	-	-	7	14	20	-
5~10m	-	-	-	8	8	-
10~20m	-	-	-	10	2	-
20~30m	2	6	2	-	2	-
30~50m	1	2	-	2	2	-
50~70m	2	1	-	2	3	-

	<i>Staurastrum dorsident. v. ornatum</i>	<i>Staurastrum limnetidum v. Burmense</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare v. subpron.</i>	<i>Aphanocapsa elachist. v. conf.</i>	<i>Lyngbya limnetica</i>
0~2 m	1641	10	-	31	31	-
2~5 m	809	-	7	7	-	-
5~10m	551	8	-	16	8	-
10~20m	269	-	18	2	-	-
20~30m	86	2	-	4	-	-
30~50m	194	-	6	4	3	-
50~70m	65	1	-	2	2	1

(9) 1967-IX-19

	<i>Melosira solida</i>	<i>Melosira italica</i>	<i>Ceratium hirundi- nella</i>	<i>Pediastrum Birwae</i>	<i>Staurastrum dorsident. v. ornatum</i>
0~2 m	16	-	8	57	130
2~5 m	11	-	5	38	54
5~10m	6	-	-	65	45
10~20m	2	2	2	5	11
20~30m	2	1	3	4	17
30~50m	-	-	+	1	7
50~70m	-	-	2	1	4

	<i>Staurastrum limneticum</i> v. <i>Burmense</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare</i> v. <i>subpron.</i>	<i>Aphanothece clathrata</i>	<i>Aphanocapsa elachista</i> v. <i>conferta</i>
0~2 m	114	16	33	130	-
2~5 m	27	16	16	103	11
5~10m	13	32	13	117	6
10~20m	13	5	3	29	2
20~30m	2	1	3	14	1
30~50m	+	-	2	5	-
50~70m	+	-	6	4	2

(10)

1967-X-20

	<i>Melosira solida</i>	<i>Melosira italica</i>	<i>Stephano- discus carconensis</i>	<i>Pedia- strum Bivae</i>	<i>Oocysts sp.</i>	<i>Staurastrum dorsident.</i> v. <i>ornatum</i>
0~2 m	3	-	-	28	3	807
2~5 m	-	5	5	28	-	1031
5~10m	-	-	-	17	-	504
10~20m	7	-	-	15	-	297
20~30m	-	1	1	10	-	36
30~50m	-	-	1	2	-	11
50~70m	-	-	1	1	-	18

	<i>Staurastrum limneticum</i> v. <i>Burmense</i>	<i>Spondylosium moniliformis</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare</i> v. <i>subpron.</i>	<i>Aphanocapsa elach.</i> v. <i>conf.</i>	<i>Aphanothece clathrata</i>
0~2 m	3	17	-	7	-	7
2~5 m	18	5	-	-	-	-
5~10m	6	3	50	8	30	3
10~20m	-	4	57	4	14	4
20~30m	-	-	3	-	-	-
30~50m	-	+	+	1	+	-
50~70m	-	-	-	+	-	-

(11)

1967-XI-15

	<i>Melosira solida</i>	<i>Stephano- discus carconensis</i>	<i>Pediastrum Bivae</i>	<i>Oocysts sp.</i>	<i>Staurastrum dorsident.</i> v. <i>ornatum</i>
0~2 m	112	61	41	-	224
2~5 m	34	54	20	-	156
5~10m	10	32	12	-	39
10~20m	2	16	14	-	35
20~30m	4	24	4	2	39
30~50m	3	8	4	-	12
50~70m	3	10	4	-	11

	<i>Spondylosium moniliformis</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare</i> v. <i>subpron.</i>	<i>Chroococcus dispersus</i>	<i>Aphanothece clathrata</i>
0~2 m	10	-	-	-	-
2~5 m	-	-	-	-	-
5~10m	10	10	-	-	-
10~20m	-	2	2	2	-
20~30m	2	4	12	-	-
30~50m	-	-	-	-	1
50~70m	-	-	-	-	-

(12)

1967-XII-15

	<i>Melosira solida</i>	<i>Stephanodiscus carconensis</i>	<i>Pediastrum Biwae</i>	<i>Staurastrum dorsident.</i> v. <i>ornatum</i>
0~2 m	41	41	82	173
2~5 m	20	54	20	54
5~10m	5	17	15	22
10~20m	2	10	8	16
20~30m	4	8	10	22
30~50m	10	16	1	8
50~70m	1	4	1	11

	<i>Staurastrum limneticum</i> v. <i>Burmense</i>	<i>Spondylosium moniliformis</i>	<i>Cosmocladium constrictum</i>	<i>Closterium aciculare</i> v. <i>subpron.</i>
0~2 m	10	-	31	71
2~5 m	14	-	7	20
5~10m	-	2	-	10
10~20m	-	-	2	4
20~30m	-	-	-	8
30~50m	1	-	-	2
50~70m	1	-	-	2

Based on the previous table, the number of the component species and the number of cells or colonies of the phytoplankton per cubic meter of lake water were summarized in Table 7 and Table 8 respectively.

Table 7. Number of the component species of the phytoplankton at Station Ie-1 of the main basin in 1967

	1967 I-13	1967 II-15	1967 III-13	1967 IV-14	1967 V-11	1967 VI-15	1967 VII-17	1967 VIII-16	1967 IX-19	1967 X-20	1967 XI-15	1967 XII-15
The whole zone	11	10	8	7	7	7	12	12	10	12	10	8
0~2 m	5	7	5	3	4	4	9	8	8	8	5	7
2~5 m	7	7	7	4	4	5	7	6	9	6	4	7
5~10m	5	6	5	6	5	3	6	6	8	8	6	6
10~20m	6	5	6	4	5	3	8	5	10	8	7	6
20~30m	7	5	6	5	5	2	3	7	10	5	8	5
30~50m	10	6	5	6	4	3	2	8	6	7	5	6
50~70m	7	8	6	4	2	4	4	9	7	4	4	6

Table 8. Number of cells or colonies of the phytoplankton per cubic meter of lake water at Station Ie-1 of the main basin in 1967

	1967 I-13	1967 II-15	1967 III-13	1967 IV-14	1967 V-15	1967 VI-15	1967 VII-17
0~2 m	1824	734	429	269	448	835	4310
2~5 m	525	578	319	89	292	375	1076
5~10m	477	283	279	113	250	421	1045
10~20m	740	330	310	55	181	106	240
20~30m	203	199	170	24	108	49	149
30~50m	677	116	106	38	24	55	77
50~70m	365	135	49	24	35	19	67
Average	687	339	237	88	191	266	995

	1967 VIII-16	1967 IX-19	1967 X-20	1967 XI-15	1967 XII-15	Average
0~2 m	1804	504	875	448	449	1077
2~5 m	864	281	1092	264	189	495
5~10m	599	297	621	113	71	381
10~20m	301	74	402	73	42	238
20~30m	104	48	51	91	52	104
30~50m	214	17	18	28	38	117
50~70m	79	20	21	28	20	72
Average	566	177	440	149	123	(355)

**V. The distribution and the succession of the phytoplankton
at Stations Nb-2, Nb-5, and Na-3 of the accessory basin**

The following algae were found in the samples collected at Stations Nb-2, Nb-5, and Na-3 of the accessory basin :

Chrysophyta

- 1) *Melosira solida* Eulenstein
- 2) *Melosira italica* (Ehr.) Kützing
- 3) *Melosira granulata* (Ehr.) Ralfs
- 4) *Melosira* sp.
- 5) *Stephanodiscus carconensis* Grunow and var. *pusilla* Grunow
- 6) *Rhizosolenia longiseta* Zacharias
- 7) *Fragilaria crotonensis* Kitton
- 8) *Asterionella formosa* Hassal
- 9) *Synedra ulna* (Nizsch) Ehrenberg
- 10) *Dinobryon cylindricum* Imhof
- 11) *Dinobryon divergens* Imhof
- 12) *Mallomonas fastigata* Zacharias

Pyrophyta

- 13) *Ceratium hirundinella* (O. F. Müller) Schrank

Chlorophyta

- 14) *Pediastrum Biwae* Negoro and var. *triangulatum* Negoro
- 15) *Pediastrum duplex* Meyen
- 16) *Oocystis* sp.
- 17) *Sphaerocystis Schroeteri* Chodat
- 18) *Ankistrodesms falcatus* (Corda) Ralfs
- 19) *Actinastrum* sp.
- 20) *Dictyosphaerium pulchellum* Wood
- 21) *Coelastrum microporum* Nägeli
- 22) *Scenedesmus* sp.
- 23) *Chlamydomonas* sp.
- 24) *Eudorina elegans* Ehrenberg
- 25) *Staurastrum dorsidentiferum* W. et G. S. West var. *ornatum* Grönl.
- 26) *Staurastrum limneticum* Schmidle var. *Burmense* W. et G. S. West
- 27) *Staurastrum pingue* Teiling
- 28) *Cosmocladium constrictum* Arch.
- 29) *Arthrodesmus* sp.
- 30) *Spondylosium moniliformis* Lundell
- 31) *Closterium aciculare* Tuffen West var. *subpronum* W. et G. S. West
- 32) *Spirogyra* sp.

Cyanophyta

- 33) *Microcystis aeruginosa* Kützing
 34) *Aphanocapsa elachista* W. et G. S. West var. *conferta* W. et G. S. West
 35) *Aphanothece clathrata* W. et G. S. West
 36) *Merismopedia elegans* A. Br.
 37) *Anabaena macrospra* Klebahn
 38) *Lyngbya limnetica* Lemmermann

The composition and the distribution of the phytoplankton in each month were as shown in Table 9 :

Table 9. Phytoplankton per m³ of lake water at Stations Nb-2, Nb-5, and Na-3. A unit of number corresponds to ten thousand (10,000).

(1)	1967-I-14		
	Nb-2	Nb-5	Na-3
<i>Melosira solida</i>	31	-	24
<i>Melosira italica</i>	24	31	-
<i>Staurastrum dorsidentiferum</i> v.	8	-	-
<i>Closterium aciculare</i> v.	16	-	-
(2)	1967-II-17		
	Nb-2	Nb-5	Na-3
<i>Melosira italica</i>	8	8	8
<i>Dinobryon divergens</i>	-	-	8
<i>Staurastrum dorsidentiferum</i> v.	8	24	24
<i>Cosmocladium constrictum</i>	-	-	8
<i>Closterium aciculare</i>	8	-	39
(3)	1967-III-14		
	Nb-2	Nb-5	Na-3
<i>Melosira solida</i>	16	-	-
<i>Melosira italica</i>	8	31	39
<i>Asterionella formosa</i>	8	-	8
<i>Synedra ulna</i>	8	-	-
<i>Staurastrum dorsidentiferum</i> v.	24	79	47
<i>Cosmocladium constrictum</i>	-	16	-
<i>Closterium aciculare</i>	-	79	55

(4)		1967-IV-17		
	Nb-2	Nb-5	Na-3	
<i>Melosira italica</i>	408	24	55	
<i>Stephanodiscus carconensis</i>	-	16	-	
<i>Asterionella formosa</i>	118	31	47	
<i>Synedra ulna</i>	24	16	8	
<i>Dinobryon divergens</i>	149	-	63	
<i>Ceratium hirundinella</i>	-	8	-	
<i>Staurastrum dorsidentiferum</i> v.	165	149	39	
<i>Cosmocladium constrictum</i>	-	-	8	
<i>Closterium aciculare</i> v.	94	55	-	

(5)		1967-V-16		
	Nb-2	Nb-5	Na-3	
<i>Melosira granulata</i>	-	-	8	
<i>Melosira italica</i>	345	442	338	
<i>Stephanodiscus carconensis</i>	-	16	39	
<i>Rhizosolenia longiseta</i>	-	-	8	
<i>Synedra ulna</i>	-	71	55	
<i>Asterionella formosa</i>	-	24	31	
<i>Fragilaria crotonensis</i>	-	8	-	
<i>Dinobryon divergens</i>	487	243	236	
<i>Dinobryon cylindricum</i>	-	8	-	
<i>Eudorina elegans</i>	-	-	31	
<i>Staurastrum dorsidentiferum</i> v.	1052	1036	691	
<i>Closterium aciculare</i> v.	236	212	259	

(6)		1967-VI-16		
	Nb-2	Nb-5	Na-3	
<i>Melosira granulata</i>	31	-	-	
<i>Melosira italica</i>	94	-	63	
<i>Stephanodiscus carconensis</i>	8	-	-	
<i>Pediastrum Biwae</i>	-	-	16	
<i>Eudorina elegans</i>	-	-	8	
<i>Coelastrum microporum</i>	-	-	8	
<i>Staurastrum dorsidentiferum</i> v.	204	543	581	
<i>Closterium aciculare</i> v.	31	173	47	

(7) 1967-VII-15

	Nb-2	Nb-5	Na-3
<i>Melosira granulata</i>	31	-	-
<i>Melosira italica</i>	31	534	86
<i>Ssephanodiscus carconensis</i>	8	-	16
<i>Ceratium hirundinella</i>	-	8	-
<i>Pediastrum Birwae</i>	-	24	39
<i>Eudorina elegans</i>	-	8	16
<i>Sphaerocystis Schroeteri</i>	-	-	8
<i>Pediastrum duplex</i>	-	8	-
<i>Staurastrum dorsidentiferum</i> v.	345	1099	2818
<i>Cosmocladium constrictum</i>	-	8	16
<i>Closterium aciculare</i> v.	63	110	113

(8) 1967-VIII-15

	Nb-2	Nb-5	Na-3
<i>Melosira granulata</i>	47	8	24
<i>Melosira italica</i>	502	157	204
<i>Synedra ulna</i>	8	-	-
<i>Pediastrum Birwae</i>	47	31	24
<i>Pediastrum duplex</i>	-	8	-
<i>Scenedesmus</i> sp.	-	8	-
<i>Chlamydomonas</i> sp.	-	-	8
<i>Dictyosphaerium pulchelum</i>	-	-	8
<i>Actinastrum</i> sp.	24	8	-
<i>Oocystis</i> sp.	8	-	8
<i>Staurastrum dorsidentiferum</i> v.	832	3203	2504
<i>Staurastrum pingue</i>	8	-	-
<i>Cosmocladium constrictum</i>	-	39	8
<i>Closterium aciculare</i> v.	-	55	31
<i>Spirogyra</i> sp.	63	47	8
<i>Aphanothece clathrata</i>	-	8	-
<i>Lyngbya limnetica</i>	188	220	102

(9)

1967-IX-20

	Nb-2	Nb-5	Na-3
<i>Melosira italica</i>	79	86	24
<i>Melosira</i> sp.	39	-	16
<i>Synedra ulna</i>	8	8	-
<i>Rhizosolenia longiseta</i>	-	8	8
<i>Pediastrum Biwae</i>	16	16	39
<i>Scenedesmus</i> sp.	8	-	-
<i>Coelastrum microporum</i>	8	-	-
<i>Ankistrodesmus falcatus</i>	-	-	16
<i>Staurastrum dorsidentiferum</i> v.	39	31	31
<i>Staurastrum limneticum</i> v.	8	-	-
<i>Arthrodesmus</i> sp.	8	-	-
<i>Closterium aciculare</i> v.	-	39	8
<i>Spirogyra</i> sp.	47	47	8
<i>Lyngbya limnetica</i>	1350	338	597
<i>Anabaena macrospora</i>	8	-	-
<i>Microcystis aeruginosa</i>	8	8	-
<i>Aphanothece clathrata</i>	126	24	39
<i>Merimopedia elegans</i>	8	-	-

(10)

1967-X-21

	Nb-2	Nb-5	Na-3
<i>Melosira italica</i>	55	8	31
<i>Mallomonas fastigata</i>	-	8	-
<i>Pediastrum Biwae</i>	39	31	47
<i>Ankistrodesmus falcatus</i>	-	-	8
<i>Staurastrum dorsidentiferum</i> v.	502	958	754
<i>Spondylosium moniliformis</i>	-	16	-
<i>Cosmocladium constrictum</i>	-	24	-
<i>Closterium aciculare</i> v.	-	39	24
<i>Lyngbya limnetica</i>	-	16	-
<i>Aphanocapsa elachista</i> v.	8	-	-

(11)	1967-XI-16		
	Nb-2	Nb-5	Na-3
<i>Melosira solida</i>	8	-	-
<i>Melosira italica</i>	39	110	31
<i>Stephanodiscus carconensis</i>	-	8	-
<i>Pediastrum Biwae</i>	-	31	16
<i>Staurastrum dorsidentiferum</i> v.	149	118	165
<i>Closterium aciculare</i> v.	16	16	24

(12)	1967-XII-16		
	Nb-2	Nb-5	Na-3
<i>Melosira italica</i>	31	8	31
<i>Pediastrum Biwae</i>	24	16	-
<i>Staurastrum dorsidentiferum</i> v.	55	55	47
<i>Staurastrum limneticum</i> v.	-	-	8
<i>Closterium aciculare</i> v.	16	63	110
<i>Spirogyra</i> sp.	8	24	16
<i>Merismopedia elegans</i>	8	-	-

From Table 9, number of the component species and number of cells or colonies of the phytoplankton per cubic meter of lake water at three stations of the accessory basin were calculated as seen in Table 10 and Table 11 respectively.

Table 10. Number of the component species of the phytoplankton at Station Nb-2, Nb-5, and Na-3 of the accessory basin in 1967

Date	Station			All three stations
	Nb-2	Nb-5	Na-3	
1967-I-14	4	1	1	4
1967-II-17	3	2	5	5
1967-III-14	5	4	4	7
1967-IV-17	6	7	6	9
1967-V-16	4	9	10	12
1967-VI-16	5	2	6	8
1967-VII-15	5	8	8	11
1967-VIII-15	10	12	11	17
1967-IX-20	15	9	10	18
1967-X-21	4	8	5	10
1967-XI-16	4	5	4	6
1967-XII-16	6	5	5	7
Average	6	6	6	10

Table 11. Number of cells or colonies of the phytoplankton per cubic meter of lake water at Stations Nb-2, Nb-5, and Na-5 of the accessory basin in 1967

Date	Station			Average
	Nb-2	Nb-5	Na-3	
1967-I-14	79	31	24	45
1967-II-17	24	32	87	48
1967-III-14	64	205	149	139
1967-IV-17	958	299	220	492
1967-V-16	2120	2060	1696	1959
1967-VI-16	368	710	723	602
1967-VII-15	478	1799	3132	1803
1967-VIII-15	1727	3792	2827	2782
1967-IX-20	1760	605	786	1050
1967-X-21	604	1100	864	856
1967-XI-16	212	283	236	244
1967-XII-16	142	166	212	173
Average	711	924	913	(849)

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