# First Report of the Regular Limnological Survey of Lake Biwa (Oct.1965-Dec.1966) (II) : Plankton in General and Phytoplankton

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# First Report of the Regular Limnological Survey of Lake Biwa (Oct.1965 – Dec.1966) II. Plankton in General and Phytoplankton*

By

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## I. The Collecting Stations

By the constriction-like, narrowest portion of the lake between Katada fishing village and the delta of River Yasu-gawa, Biwa-ko may be divided into two parts, namely the main basin or the northern part and the accessory basin or the southern part. The former is far larger as well as deeper than the latter. The water of the accessory basin is seemed to be mesotrophic, while that of the main basin is typically oligotrophic and streams down from north to south, longitudinally across the accessory basin, toward the endmost, sole effluent Seta-gawa.

As already mentioned in the foregoing article "General Remark", one station, Ie-1, in the main basin and three stations, Nb-2, Nb-5, and Na-3, in the accessory basin were selected for the survey of the present report, viz. the collection of the plankton. Station Nb-2 (an eastern littoral point), Station Nb-5 (a point in the middle portion, formerly Nb-3) and Station Na-3 (a western littoral point, formerly Na-2) stand in a line transversely across the lake. Station Na-3 is located near the Ôtsu Hydrobiological Station. These collecting stations are seemed to be fairly typical for the study of the plankton of Lake Biwa-ko.

## II. Methods

For the collection of the Plankton samples was used throughout the course of the survey a closing tow-net, Kitahara's quantitative plankton net manufactured by Rigôsha Co. Ltd. (Tokyo). This net resembles in its shape and construction the Wisconsin plankton net and is 15 cm in mouth (upper ring) diameter

* In this article, the results of our several preliminary surveys (from the end of May to Sept. 1965) were also described.
Contributions from the Otsu Hydrobiological Station, Kyoto University, No. 189.

and approx. 86 cm in overall length, consisting of 2 cones. The upper truncated cone is made of canvas, 28 cm long, and gradually enlarged to the bottom so as to permit a better flow of water. The lower cone is made of bolting cloth, the mesh of which corresponds to No. XX-13 of the Japanese standard (129 meshes per inch), and is 26 cm in mouth (lower ring) diameter, about 58 cm in lentgh.

The plankton samples were collected at Station Ie-1 by vertical hauls in six or seven zonal water columns and at three stations of the accessory basin by straining 40 l surface water through the net cloth. The samples were preserved in 3 to 5% formalin solution. The records of the temperature, pH, and the dissolved oxygen amount of the water were taken in connection with the samples collected.

The volume of the total plankton was obtained by allowing the fixed material to stand for 48 hours in graduated sedimentation tube until it has completely settled, and from this figure the volume per cubic meter of the original lake water was calculated.

The number of the plankton organisms was enumerated by using Sedgwick-Rafter counting cell. Then 10 fields under the microscope were counted at 150 × magnification. The averages so obtained were used to compute the number of plankters per cubic meter of lake water.

## III. The volume of the total plankton

By using the precipitated meterial, the reading of the phytoplankton volume may often be easily done, but it is sometimes almost difficult when the phytoplankton is perfectly mixed with the zooplankton. Hence only the volumes of the total plankton are described here (Table 1 and 2).

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

(1)

| Date | 1965 VI-15 | 1965 VII-15 | 1965 VIII-16 | 1965 IX-15 | 1965 X-18 | 1965 XI-16 | 1965 XII-15 | Average from July to Dec. |
|---|---|---|---|---|---|---|---|---|
| Zone | | | | | | | | |
| 0~ 5 m | 2. 19 | 4. 90 | 46. 44 | 21. 93 | 14. 19 | 19. 35 | 25. 80 | 22. 10 |
| 5~10 m | 0. 90 | 1. 94 | 9. 68 | 5. 16 | 2. 97 | 5. 16 | 4. 77 | 4. 94 |
| 10~20 m | 0. 07 | 1. 30 | 10. 38 | 0. 65 | 0. 65 | 3. 12 | 1. 62 | 2. 95 |
| 20~30 m | 0. 07 | 0. 33 | 4. 54 | 0. 65 | 0. 26 | 1. 49 | 1. 95 | 1. 54 |
| 30~50 m | 0. 10 | 0. 49 | 0. 91 | 0. 81 | 0. 16 | 0. 42 | 0. 65 | 0. 57 |
| 50~70 m | 0. 03 | 0. 13 | 0. 81 | 0. 32 | 0. 39 | 0. 39 | 0. 39 | 0. 41 |
| Average | 0. 56 | 1. 52 | 12. 13 | 4. 92 | 3. 10 | 4. 99 | 5. 86 | |

(2)

| Date | 1966 I-13 | 1966 II-16 | 1966 III-16 | 1966 IV-18 | 1966 V-13 | 1966 VI-15 | Average |
|---|---|---|---|---|---|---|---|
| Zone | | | | | | | |
| 0～ 5 m | 10. 58 | 4. 52 | 10. 32 | 10. 32 | 7. 74 | 21. 93 | 10. 90 |
| 5～10 m | 2. 97 | 1. 29 | 1. 55 | 2. 58 | 1. 55 | 7. 74 | 2. 95 |
| 10～20 m | 1. 23 | 0. 65 | 0. 97 | 1. 30 | 1. 17 | 2. 47 | 1. 30 |
| 20～30 m | 1. 17 | 0. 52 | 0. 65 | 0. 78 | 0. 78 | 0. 65 | 0. 76 |
| 30～50 m | 0. 55 | 0. 65 | 0. 19 | 0. 23 | 0. 23 | 0. 39 | 0. 37 |
| 50～70 m | 0. 13 | 0. 19 | 0. 10 | 0. 32 | 0. 42 | 0. 49 | 0. 28 |
| Average | 2. 77 | 1. 30 | 2. 30 | 2. 59 | 1. 98 | 5. 61 | |

(3)

| Date | 1966 VII-15 | 1966 VIII-19 | 1966 IX-13 | 1966 X-14 | 1966 XI-16 | 1966 XII-15 | Average | |
|---|---|---|---|---|---|---|---|---|
| Zone | | | | | | | | |
| 0～ 2 m | 12. 33 | 9. 74 | 10. 32* | 9. 74 | 3. 90 | 9. 09 | 8. 96 | 14. 10* |
| 2～ 5 m | 11. 91 | 1. 95 | | 4. 76 | 6. 50 | 4. 33 | 5. 89 | |
| 5～10 m | 0. 30 | 0. 13 | 2. 32 | 0. 28 | 0. 39 | 0. 52 | 0. 66 | |
| 10～20 m | 2. 60 | 1. 75 | 1. 49 | 1. 95 | 0. 84 | 4. 41 | 2. 17 | |
| 20～30 m | 0. 65 | 0. 39 | 0. 52 | 0. 45 | 0. 52 | 3. 89 | 1. 07 | |
| 30～50 m | 0. 65 | 0. 32 | 0. 23 | 0. 26 | 0. 26 | 2. 75 | 0. 75 | |
| 50～70 m | 1. 04 | 1. 62 | 0. 26 | — | 0. 19 | 0. 23 | 0. 67 | |
| Average | 4. 21 | 2. 27 | 2. 52 | 2. 91 | 1. 80 | 3. 60 | | |

* Values from the zone of 0 ～ 5 m depth.

On an average the volume of the plankton was largest in August of 1965 and smallest in June of 1965. It was also very small in the following months ; July of 1965, February of 1966, May of 1966, and December or 1966. These considerable fluctuations in the volume of the total plankton were seemed to be mainly due to the amount of the zooplankton.

The zonal distribution of the plankton in volume was generally normal for the last half-year of 1965 and the first half-year of the next year, but abnormal for the last half-year of 1966, because the unexpected small volume was shown in the 5～10 m zone.

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

| Station | Nb-2 (Tsudaë) | Nb-5 (Nb-3) | Na-3 (Shimo-sakamoto) | Average |
|---|---|---|---|---|
| Date | | | | |
| 1965-V-31 | 2.00 | 1.25 | 1.00 | 1.42 |
| 1965-VI-9 | 1.25 | 1.75 | 0.75 | 1.25 |
| 1965-VII-8 | 5.00 | 12.50 | 150.00 | 55.83 |
| 1965-VIII-2 | 32.50 | 15.00 | 0.50 | 16.00 |
| 1965-VIII-17 | 7.50 | 7.50 | 10.00 | 8.33 |
| 1965-IX-1 | 8.75 | 10.00 | 2.50 | 7.08 |
| 1965-X-1 | 16.25 | 11.25 | 22.50 | 16.67 |
| 1955-X-15 | 32.50 | 22.50 | 32.50 | 29.17 |
| 1965-XI-2 | 37.50 | 17.50 | 8.75 | 21.25 |
| 1965-XII-2 | 2.50 | 10.00 | 8.75 | 7.08 |
| 1965-XII-13 | 6.25 | 5.00 | 1.00 | 4.08 |
| 1966-I-5 | 5.00 | 3.75 | 3.00 | 3.92 |
| 1966-I-17 | 5.00 | 8.75 | 6.25 | 6.67 |
| 1966-II-1 | 2.25 | 2.50 | 6.25 | 3.67 |
| 1966-II-17 | 2.25 | 2.50 | 2.50 | 2.42 |
| 1966-III-2 | 1.25 | 2.25 | 5.00 | 2.83 |
| 1966-III-18 | 42.50 | 50.00 | 12.50 | 35.00 |
| 1966-III-31 | 12.50 | 15.00 | 7.50 | 11.67 |
| 1966-IV-12 | 7.50 | 7.50 | 2.50 | 5.83 |
| 1966-IV-30 | 15.00 | 22.50 | 27.50 | 21.67 |
| 1966-V-16 | 50.00 | 30.00 | 21.25 | 33.75 |
| 1966-V-30 | 2.50 | 5.00 | 3.75 | 3.75 |
| 1966-VI-13 | 30.00 | 1.25 | 1.50 | 10.92 |
| 1966-VII-16 | 20.00 | 15.00 | 20.00 | 18.33 |
| 1966-VIII-18 | 2.50 | 5.00 | 1.25 | 2.92 |
| 1966-IX-16 | 5.75 | 5.00 | 2.50 | 4.42 |
| 1966-X-15 | 11.25 | 3.75 | 7.50 | 7.50 |
| 1966-XI-19 | 3.75 | 1.25 | 0.75 | 1.92 |
| 1966-XII-19 | 1.50 | 2.00 | 2.00 | 1.83 |
| Average | 12.84 | 10.25 | 12.82 | |

The average volume of three stations was largest on 8th July, 1965, owing to the remarkable occurrence of the zooplankters, especially *Eodiaptomus japonicus*, and smallest in the preceding month, namely on 9th June, 1965. It was generally small during the period from December of 1965 to the beginning of March of the next year. But this was perhaps the normal phenomenon in winter.

The average volume of the plankton throughout all surveys was greater in both littoral portions (Nb-2 and Na-3) than in the middle portion (Nb-5).

## IV. The zonal distribution and the seasonal succession of the phytoplankton

### A. At Station Ie-1

The following algae were found in the samples collected at Station Ie-1 during one year and a half of our survey :

Chrysophyta

1) *Melosira solida* Eulenstein
2) *Melosira italica* (Ehr.) Kützing
3) *Stephanodiscus carconensis* Grunow and var. *pusilla* Grunow
4) *Asterionella formosa* Hassal
5) *Dinobryon cylindricum* Imhof
6) *Mallomonas fastigata* Zacharias
7) *Botryococcus Braunii* Kützing

Pyrophyta

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

Chlorophyta

9) *Pediastrum Biwae* Negoro and var. *triangulatum* Negoro
10) *Oocystis* sp. (new species ? )
11) *Sphaerocystis Schroeteri* Chodat
12) *Ankistrodesmus falcatus* (Corda) Ralfs
13) *Dictyosphaerium pulchellum* Wood
14) *Chlamydomonas* sp. (now still unidentified)
15) *Eudorina elegans* Ehrenberg
16) *Staurastrum dorsidentiferum* W. et G. S. West var. *ornatum* Grönbl.
17) *Staurastrum pingue* Telling
18) *Staurastrum limneticum* Schmide var. *Burmense* W. et G. S. West
19) *Spondylosium Lütkemülleri* Grönbl.
20) *Cosmocladium constrictum* Arch.
21) *Closterium aciculare* Tuffen West var. *subpronum* W. et G. S. West

Cyanophyta

22) *Microcystis aeruginosa* Kützing
23) *Chroococcus dispersus* (v. Keissler) Lemmermann

The composition and the zonal distribution of the phytoplankton in each month were as follow :

Table 3. Phytoplankters per $m^3$ of lake water at Station Ie-1. A unit of number corresponds to ten thousand (10,000).

(1) 1965-VI-15

| | *Melosira solida* | *Stephanodiscus carconensis* | *Dinobryon cylindricum* | *Botryococcus Braunii* | *Ceratium hirundinella* | *Pediastrum Biwae* | *Staurastrum dorsidentiferum* |
|---|---|---|---|---|---|---|---|
| 0～ 5 m | – | – | 4 | – | 28 | 4 | – |
| 5～10 m | – | – | 8 | 4 | 8 | – | – |
| 10～20 m | – | – | 4 | 2 | 4 | – | – |
| 20～30 m | – | 2 | 2 | – | 2 | – | 6 |
| 30～50 m | 1 | 3 | – | – | 2 | 1 | 3 |
| 50～70 m | 3 | 2 | – | – | 1 | – | 1 |

(2) 1965-VII-15

| | *Stephanodiscus carcconensis* | *Pediastrum Biwae* | *Sphaerocystis Schroeteri* | *Eudorina elegans* | *Staurastrum dorsidentiferum* | *Microcystis aeruginosa* |
|---|---|---|---|---|---|---|
| 0～ 5 m | – | – | 65 | – | 16 | 16 |
| 5～10 m | – | 16 | 49 | – | 16 | – |
| 10～20 m | – | 8 | 41 | 16 | 16 | – |
| 20～30 m | – | – | 33 | – | – | – |
| 30～50 m | – | – | 24 | 4 | – | 4 |
| 50～70 m | 4 | 4 | 20 | – | – | – |

(3) 1965-VIII-16

| | *Stephanodiscus carconensis* | *Ceratium hirundinella* | *Pediastrum Biwae* | *Staurastrum dorsidentiferum* | *Staurastrum limneticum* | *Spondylosium Lütkemülleri* | *Microcystis aeruginosa* |
|---|---|---|---|---|---|---|---|
| 0～ 5 m | – | 16 | 32 | 826 | 97 | – | 16 |
| 5～10 m | – | 16 | 32 | 924 | 162 | – | 49 |
| 10～20 m | – | 16 | 41 | 693 | 33 | – | 16 |
| 20～30 m | – | – | 16 | 456 | 73 | 8 | – |
| 30～50 m | – | – | 20 | 41 | – | 4 | 4 |
| 50～70 m | 4 | – | – | 41 | 8 | – | – |

(4) 1965-IX-15

| | *Melosira solida* | *Ceratium hirundinella* | *Pediastrum Biwae* | *Staurastrum dorsidentiferum* | *Staurastrum pingue* | *Staurastrum limneticum* | *Spondylosium Lütkemülleri* | *Cosmocladium constrictum* | *Closterium aciculare* | *Microcystis aeruginosa* | *Chroococcus dispersus* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0～5m | – | 32 | 65 | 5995 | 32 | – | 81 | – | 16 | 16 | – |
| 5～10m | 16 | 49 | 32 | 4310 | 49 | – | 113 | 113 | 16 | – | 65 |
| 10～20m | – | 41 | 16 | 424 | – | – | 41 | 16 | 16 | – | – |
| 20～30m | – | 16 | 33 | 228 | – | 8 | 8 | – | 8 | – | – |
| 30～50m | 4 | 12 | 12 | 252 | – | – | 8 | – | 8 | 16 | – |
| 50～70m | | | | | | | | | | | |

(5) 1965-X-18

| | *Melosira solida* | *Ceratium hirundinella* | *Pediastrum Biwae* | *Oocystis sp.* | *Eudorina elegans* | *Staurastrum dorsidentiferum* | *Staurastrum pingue* | *Closterium aciculare* | *Chroococcus dispersus* |
|---|---|---|---|---|---|---|---|---|---|
| 0～ 5m | 16 | 16 | 49 | - | - | 6335 | 65 | 97 | - |
| 5～10m | 32 | - | 49 | 16 | - | 3759 | 16 | 49 | - |
| 10～20m | - | - | - | - | - | 701 | 8 | 16 | - |
| 20～30m | - | - | 24 | - | - | 709 | 8 | 16 | 24 |
| 30～50m | - | - | 4 | 4 | 4 | 195 | 4 | 4 | - |
| 50～70m | - | - | 4 | - | - | 277 | 4 | 16 | 4 |

(6) 1965-XI-16

| | *Melosira solida* | *Stephanodiscus carconensis* | *Ceratium hirundinella* | *Pediastrum Biwae* | *Oocystis* sp. | *Sphaerocystis Schroeteri* | *Staurastrum dorsidentiferum* | *Staurastrum pingue* | *Cosmocladium constrictum* | *Closterium aciculare* |
|---|---|---|---|---|---|---|---|---|---|---|
| 0～ 5m | 146 | - | - | 113 | 32 | 16 | 13529 | 178 | - | 421 |
| 5～10m | - | - | - | 97 | 16 | 49 | 5428 | 16 | 16 | 113 |
| 10～20m | 57 | - | 8 | 33 | 8 | 24 | 2291 | 16 | - | 49 |
| 20～30m | 8 | 16 | - | 41 | - | 8 | 2038 | 8 | - | 16 |
| 30～50m | 4 | 24 | - | 4 | 8 | - | 476 | - | - | 12 |
| 50～70m | 4 | - | - | - | 4 | - | 346 | - | - | - |

(7) 1965-XI-15

| | *Melosira solida* | *Stephanodiscus carconensis* | *Pediastrum Biwae* | *Oocystis* sp. | *Staurastrum dorsidentiferum* | *Staurastrum pingue* | *Closterium aciculare* |
|---|---|---|---|---|---|---|---|
| 0～ 5m | 259 | - | 16 | - | 13804 | 227 | 729 |
| 5～10m | 32 | - | 32 | 16 | 3046 | - | 65 |
| 10～20m | 33 | 8 | 24 | 8 | 2217 | 41 | 8 |
| 20～30m | 8 | - | 24 | - | 1467 | 8 | 73 |
| 30～50m | 4 | - | 12 | 4 | 851 | 4 | 16 |
| 50～70m | 4 | - | - | 4 | 704 | 4 | 28 |

(8) 1966-I-13

| | *Melosira solida* | *Stephanodiscus carconenensis* | *Pediastrum Biwae* | *Staurastrum dorsidentiferum* | *Staurastrum pingue* | *Closterium aciculare* |
|---|---|---|---|---|---|---|
| 0～ 5m | 686 | - | - | 17547 | - | 817 |
| 5～10m | 97 | - | - | 2965 | - | 113 |
| 10～20m | 73 | - | - | 1793 | 16 | 90 |
| 20～30m | 57 | - | - | 1035 | 16 | 24 |
| 30～50m | 20 | - | - | 663 | 8 | 16 |
| 50～70m | 16 | 24 | 8 | 553 | 8 | 8 |

(9) 1966-II-16

| | *Melosira solida* | *Staurastrum dorsidentiferum* | *Closterium aciculare* |
|---|---|---|---|
| 0 ～ 5 m | 810 | 4537 | 826 |
| 5 ～ 10 m | 259 | 2916 | 211 |
| 10 ～ 20 m | 90 | 1117 | 57 |
| 20 ～ 30 m | 163 | 864 | 49 |
| 30 ～ 50 m | 49 | 362 | 49 |
| 50 ～ 70 m | 94 | 269 | 33 |

(10) 1966-III-16

| | *Melosira solida* | *Astrionella formosa* | *Staurastrum dorsidentiferum* | *Closterium aciculare* |
|---|---|---|---|---|
| 0 ～ 5 m | 956 | 65 | 6675 | 1410 |
| 5 ～ 10 m | 275 | 16 | 1896 | 324 |
| 10 ～ 20 m | 245 | - | 986 | 139 |
| 20 ～ 30 m | 139 | - | 766 | 114 |
| 30 ～ 50 m | 81 | - | 431 | 28 |
| 50 ～ 70 m | 33 | - | 232 | 20 |

(11) 1966-IV-18

| | *Melosira solida* | *Melosira italica* | *Stephanodiscus carconensis* | *Asterionella formosa* | *Dinobryon cylindricum* | *Ceratium hirundinella* | *Staurastrum dorsidentiferum* | *Clostrium aciculare* |
|---|---|---|---|---|---|---|---|---|
| 0～ 5m | 616 | - | - | 843 | - | 16 | 2690 | 2690 |
| 5～10m | 324 | - | - | 49 | - | - | 254 | 421 |
| 10～20m | 106 | 8 | - | 65 | - | - | 334 | 228 |
| 20～30m | 163 | - | - | 16 | - | - | 253 | 155 |
| 30～50m | 61 | - | - | 4 | 4 | - | 134 | 37 |
| 50～70m | 77 | - | 8 | 16 | - | - | 126 | 110 |

(12) 1966-V-13

| | *Melosira solida* | *Stephanodiscus carconensis* | *Asterionella formosa* | *Dinobryon cylindricum* | *Ceratium hirundinella* | *Ankistrodesmus falcatus* | *Staurastrum dorsidentiferum* | *Closterium aciculare* |
|---|---|---|---|---|---|---|---|---|
| 0～ 5m | 81 | - | 211 | 470 | 32 | 32 | 2204 | 4909 |
| 5～10m | | | | | | | | |
| 10～20m | 49 | - | 90 | 16 | - | - | 660 | 424 |
| 20～30m | 33 | 16 | 33 | 33 | - | - | 187 | 220 |
| 30～50m | 33 | - | 12 | - | - | - | 122 | 94 |
| 50～70m | 175 | 20 | - | - | - | - | 146 | 77 |

(13) 1966-VI-15

| | *Melosira solida* | *Stephanodiscus carconensis* | *Ceratium hirundinella* | *Staurastrum dorsidentiferum* | *Closterium aciculare* |
|---|---|---|---|---|---|
| 0 ～ 5 m | 32 | 32 | 81 | 356 | 5703 |
| 5 ～ 10 m | 81 | 65 | 16 | 113 | 1410 |
| 10 ～ 20 m | 8 | 8 | – | 82 | 448 |
| 20 ～ 30 m | – | 8 | – | 90 | 359 |
| 30 ～ 50 m | 12 | – | – | 37 | 155 |
| 50 ～ 70 m | 16 | – | – | 12 | 77 |

(14) 1966-VII-15

| | *Certium hirundinella* | *Sphaerocystis Schroeteri* | *Ankistrodesmus falcatus* | *Staurastrum dorsidentiferum* | *Staurastrum pingue* | *Closterium aciculare* |
|---|---|---|---|---|---|---|
| 0～ 2m | 41 | – | – | 122 | – | 3506 |
| 2～ 5m | 27 | 27 | – | 272 | 27 | 1196 |
| 5～10m | – | 32 | – | 162 | – | 745 |
| 10～20m | – | 24 | 8 | 24 | – | 253 |
| 20～30m | – | 16 | – | 16 | – | 334 |
| 30～50m | – | 8 | – | 8 | – | 85 |
| 50～70m | – | – | – | 16 | – | 90 |

(15) 1966-VIII-19

| | *Melosira solida* | *Stephanodiscus carconensis* | *Ceratium hirundinella* | *Pediastrum Biwae* | *Oocystis* sp. | *Sphaerocystis Schroeteri* | *Staurastrum dorsidentiferum* | *Staurastrum limneticum* | *Closterium aciculare* |
|---|---|---|---|---|---|---|---|---|---|
| 0～ 2m | – | – | 41 | 41 | – | – | 2690 | 41 | 204 |
| 2～ 5m | – | – | 109 | 54 | – | 27 | 1659 | – | 109 |
| 5～10m | – | – | – | – | – | – | 470 | 16 | – |
| 10～20m | – | – | – | 8 | – | – | 310 | – | 82 |
| 20～30m | – | – | – | – | – | – | 90 | – | 49 |
| 30～50m | – | – | 8 | – | 4 | – | 24 | – | 8 |
| 50～70m | 16 | 8 | – | – | – | – | – | – | – |

(16) 1966-IX-13

| | *Melosira solida* | *Ceratium hirundinella* | *Pediastrum Biwae* | *Oocystis* sp. | *Staurastrum dorsidentiferum* | *Staurastrum pingue* | *Staurastrum limneticum* | *Closterium aciculare* |
|---|---|---|---|---|---|---|---|---|
| 0～ 5m | – | 324 | 16 | 16 | 15052 | 16 | 32 | 16 |
| 5～10m | – | 113 | 16 | – | 3419 | 16 | 97 | 16 |
| 10～20m | – | 41 | 8 | – | 1166 | 8 | – | 8 |
| 20～30m | – | 24 | – | – | 709 | – | – | 8 |
| 30～50m | 4 | 16 | – | – | 415 | 8 | – | – |
| 50～70m | – | 16 | 4 | – | 370 | – | – | – |

(17) 1966-X-14

| | *Ceratium hirundinella* | *Pediastrum Biwae* | *Oocystis* sp. | *Dictyosphaerium pulchellum* | *Staurastrum dorsidentiferum* | *Staurastrum limneticum* | *Closterium aciculare* | *Microcystis aeruginosa* |
|---|---|---|---|---|---|---|---|---|
| 0～ 2m | 82 | - | 41 | - | 3506 | 204 | 245 | - |
| 2～ 5m | - | - | - | - | 571 | - | 109 | 109 |
| 5～10m | 16 | 49 | - | 16 | 843 | - | 49 | 16 |
| 10～20m | - | 33 | 8 | - | 1149 | 65 | 24 | - |
| 20～30m | - | 8 | - | - | 106 | - | 24 | - |
| 30～50m | 4 | - | - | - | 20 | - | 4 | - |
| 50～70m | | | | | | | | |

(18) 1966-XI-16

| | *Melosira solida* | *Melosira italica* | *Stephanodiscus carconensis* | *Ceratium hirundinella* | *Pediastrum Biwae* | *Staurastrum dorsidentiferum* | *Staurastrum limneticum* | *Microcystis aeruginosa* |
|---|---|---|---|---|---|---|---|---|
| 0～ 2m | 815 | 41 | - | 82 | - | - | 41 | - |
| 2～ 5m | 189 | - | - | 27 | - | 27 | - | - |
| 5～10m | 162 | 16 | - | - | 16 | 16 | 65 | - |
| 10～20m | 33 | - | 8 | - | 8 | 16 | 8 | - |
| 20～30m | - | - | - | - | 16 | 33 | 8 | 8 |
| 30～50m | 16 | - | 12 | - | 4 | 12 | - | 4 |
| 50～70m | 12 | - | 8 | 4 | 8 | 12 | - | - |

(19) 1966-XII-15

| | *Melosira solida* | *Melosira italica* | *Stephanodiscus carconensis* | *Mallomonas fastigata* | *Ceratium hirundinella* | *Chlamydomonas* sp. | *Staurastrum dorsidentiferum* | *Staurastrum limneticum* | *Cosmocladium constrictum* | *Microcystis aeruginosa* |
|---|---|---|---|---|---|---|---|---|---|---|
| 0～ 2m | 3792 | 82 | - | 122 | 41 | 41 | 41 | 326 | 815 | 41 |
| 2～ 5m | 761 | 27 | 82 | - | - | - | - | 27 | 82 | - |
| 5～10m | 405 | - | - | - | - | - | 16 | 81 | 113 | 8 |
| 10～20m | 636 | 33 | 33 | - | - | - | 16 | 16 | 187 | - |
| 20～30m | 269 | 16 | - | - | - | - | - | 8 | 57 | - |
| 30～50m | 501 | 24 | - | - | - | - | 8 | 33 | 102 | - |
| 50～70m | 37 | 4 | 12 | - | - | - | - | 8 | 4 | - |

Table 4. Number of the component species of the phytoplankton and number of cells or colonies of the total phytoplankton per $m^3$ of water in epilimnion (0~5m). A unit of number of cells or colonies is shown in 10,000 ($10^4$).

| Date | Number of the component species | Number of cells or colonies of the total phytoplankton |
|---|---|---|
| 1965-VI-15 | 7 | 36 |
| 1965-VII-15 | 6 | 97 |
| 1965-VIII-16 | 7 | 987 |
| 1965-IX-15 | 11 | 6237 |
| 1965-X-18 | 9 | 6578 |
| 1965-XI-16 | 10 | 14435 |
| 1965-XII-15 | 7 | 15035 |
| 1966-I-13 | 6 | 19050 |
| 1966-II-16 | 3 | 6173 |
| 1966-III-16 | 4 | 9106 |
| 1966-IV-18 | 8 | 6855 |
| 1966-V-13 | 8 | 7934 |
| 1966-VI-15 | 5 | 6204 |
| 1966-VII-15 | 6 | 5218 |
| 1966-VIII-19 | 9 | 4975 |
| 1966-IX-13 | 8 | 15472 |
| 1966-X-14 | 8 | 4867 |
| 1966-XI-16 | 8 | 1222 |
| 1966-XII-15 | 10 | 6280 |

Based on the previous table, the number of the component species of the phytoplankton and the number of cells or colonies of the total phytoplankton per cubic meter of water in epilimnion were summerized in Table 4.

From this table it is clearly seen that the individual number of phytoplankton began to increase gradually from July of 1965 and came to the enormous multiplication in November of the same year. Then the maximum multiplication was reached in January of the next year. Though the number of the component species greatly decreased in the following months, namely in February anp March of 1966, the number of the cells of phytoplankton had scarcely any diminution received. This prosperity continued nearly to the end of the year 1966.

The most striking feature on the phytoplankton during the period of our present survey was the remarkable occurrence of *Staurastrum dorsidentiferum* var. *ornatum* together with its maximum multiplication in winter. The already mentioned, enormous cell-number of the total phytoplankton in the cold season seems to practically due to the remarkable multiplication of this alga.

Another impressive fact was that, to the author's experience, in the main basin of Lake Biwa, *Melosira solida* and *Stephanodiscus carconensis* used to appear in winter at the same time in enormous quantity as main plankters;

however during this period of the survey the former of these two semi-endemic diatoms occurred in a considerable amount in winter, but the latter appeared scarcely through all seasons in the epilimnion, remaining mostly in the deep zone near the bottom.

### B. At Stations Nb-2, Nb-5, and Na-3

Besides the algae found at Station Ie-1, the following forms were added here as components of the phytoplankton to the flora of Lake Biwa-ko:

Chrysophyta

1) *Melosira granulata* (Ehr.) Ralfs
2) *Melosira granulata* var. *angustissima* Müller
3) *Melosira varians* C.A. Agardh
4) *Synedra ulna* (Nitzsch) Ehrenberg
5) *Fragilaria crotonensis* Kitton
6) *Dinobryon divergens* Imhof

Chlorophyta

7) *Micractinium pusillum* Fresenius
8) *Selenastrum gracile* Reinsch
9) *Spirogyra* sp. (without zygospores)

Cyanophyta

10) *Merismopedia elegans* A. Br.
11) *Anabaena macrospora* Klebahn
12) *Anabaena spiroides* Klebahn
13) *Lyngbya limnetica* Lemmermann

Table 5. Phytoplankters per $m^3$ of lake water at Stations Nb-2, Nb-5, and Na-3. A unit of number corresponds to ten thousand (10,000).

(1) 1965-V-31

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 126 | 63 | - |
| *Dinobryon cylindricum* | - | 31 | - |
| *Eudorina elegans* | - | 31 | - |

(2) 1965-VI-9

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira solida* | 1476 | 1319 | 157 |
| *Stephanodiscus carconensis* | - | - | 31 |
| *Dinobryon divergens* | 157 | 126 | 63 |

(3) 1965-VII-8

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 879 | 879 | 157 |
| *Melosira granulata* | 31 | – | – |
| *Pediastrum Biwae* | – | 63 | 31 |
| *Eudorina elegans* | 31 | – | – |
| *Staurastrum dorsidentiferum* | 31 | 157 | – |
| *Staurastrum limneticum* | 31 | – | – |
| *Closterium aciculare* | – | 31 | – |

(4) 1965-VIII-2

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 1068 | 1476 | 283 |
| *Pediastrum Biwae* | – | 126 | 63 |
| *Staurastrum dorsidentiferum* | 126 | 3548 | 628 |
| *Staurastrum pingue* | – | – | 31 |
| *Spondylosium Lütkemülleri* | 63 | – | – |
| *Closterium aciculare* | – | – | 31 |
| *Spirogyra* sp. | 31 | 126 | – |
| *Merismopedia elegans* | – | 31 | – |

(5) 1965-VIII-17

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 2512 | 973 | 408 |
| *Melosira granulata* | – | 31 | – |
| *Pediastrum Biwae* | 31 | – | – |
| *Staurastrum dorsidentiferum* | 942 | 785 | 2292 |
| *Staurastrum limneticum* | – | 63 | 94 |
| *Spondylosium Lütkemülleri* | – | – | 31 |
| *Closterium aciculare* | – | – | 31 |
| *Spirogyra* sp. | 63 | 63 | |
| *Microcystis aeruginosa* | 31 | – | 94 |
| *Anabena macrospora* | – | – | 31 |

(6) 1965-IX-1

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 9169 | 3485 | 1287 |
| *Melosira granulata* | 345 | – | – |
| *Pediastrum Biwae* | 63 | – | – |
| *Oocystis* sp. | 31 | – | – |
| *Staurastrum dorsidentiferum* | 1382 | 816 | 942 |
| *Staurastrum pingue* | – | 31 | 31 |
| *Staurastrum limneticum* | 31 | – | 31 |
| *Spondylosium Lütkemülleri* | 94 | 94 | 94 |

| | | | |
|---|---|---|---|
| *Cosmocladium constrictum* | - | 63 | 31 |
| *Closterium aciculare* | - | - | 31 |
| *Spirogyra* sp. | 31 | 157 | 31 |

(7) 1965-X-1

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 7096 | 942 | - |
| *Melosira granulata* | 220 | 63 | - |
| *Ceratium hirundinella* | - | - | 63 |
| *Pediastrum Biwae* | 31 | 126 | 126 |
| *Staurastrum dortidentiferum* | 7505 | 10111 | 11681 |
| *Staurastrum pingue* | - | 94 | 63 |
| *Closterium aciculare* | 220 | 188 | 283 |

(8) 1975-X-15

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira solida* | - | - | 63 |
| *Melosira italica* | 3956 | 251 | 502 |
| *Melosira granulata* | - | 63 | - |
| *Pediastrum Biwae* | 31 | 31 | 63 |
| *Oocystis* sp. | - | - | 31 |
| *Staurastrum dorsidentiferum* | 8164 | 16485 | 17898 |
| *Staurastrum pingue* | - | 188 | 188 |
| *Closterium aciculare* | 63 | 534 | 565 |

(9) 1965-XI-2

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 377 | 502 | 94 |
| *Melosira granulata* | 31 | - | - |
| *Oocytis* sp. | 31 | 31 | - |
| *Sphaerocystis Schroeteri* | - | 63 | - |
| *Micractinium pusillum* | 31 | - | - |
| *Staurastrum dorsidentiferum* | 5432 | 12591 | 8541 |
| *Staurastrum pingue* | 63 | 63 | 31 |
| *Closterium aciculare* | 314 | 879 | 597 |

(10) 1965-XII-2

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 188 | 377 | 220 |
| *Oocystis* sp. | 31 | - | 31 |
| *Staurastrum dorsidentiferum* | 3642 | 8729 | 7191 |
| *Staurastrum pingue* | 31 | 126 | 126 |
| *Closterium acicuare* | 314 | 628 | 628 |

(11) 1965-XII-13

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 16 | 126 | 204 |
| *Synedra ulna* | 16 | - | - |
| *Pediastrum Biwae* | - | - | 16 |
| *Staurastrum dorsidentiferum* | 958 | 4255 | 3690 |
| *Staurastrum pingue* | 16 | 16 | 31 |
| *Closterium aciculare* | 298 | 424 | 361 |
| *Spirogyra* sp. | - | - | 16 |

(12) 1966-I-5

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira solida* | - | - | 94 |
| *Melosira italica* | 534 | - | - |
| *Oocystis* sp. | 31 | - | - |
| *Staurastrum dorsidentiferum* | 4522 | 5244 | 6657 |
| *Staurastrum pingue* | - | 31 | - |
| *Closterium aciculare* | 345 | 565 | 785 |

(13) 1966-I-17

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira solida* | - | 31 | 31 |
| *Melosira italica* | - | 126 | - |
| *Asterionella formosa* | - | 31 | - |
| *Synedra ulna* | - | 31 | - |
| *Dinobryon cylindricum* | - | - | 31 |
| *Mallomonas fastigata* | - | 31 | - |
| *Oocystis* sp. | - | - | 31 |
| *Staurastrum dorsidentiferum* | 3485 | 4584 | 7662 |
| *Cosmocladium constrictum* | 31 | - | - |
| *Closterium aciculare* | 471 | 973 | 659 |

(14) 1966-II-1

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira solida* | - | 31 | 31 |
| *Asterionella formosa* | - | 31 | 31 |
| *Synedra ulna* | - | 31 | 31 |
| *Staurastrum dorsidentiferum* | 4804 | 2575 | 4522 |
| *Closterium aciculare* | 471 | 502 | 754 |

(15) 1966-II-17

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Oocystis* sp. | - | 31 | 31 |
| *Staurastrum dorsidentiferum* | 4741 | 2261 | 3705 |
| *Closterium aciculare* | 628 | 691 | 597 |

(16) 1966-III-2

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosria solida* | - | 31 | - |
| *Staurastrum dorsidentiferum* | 1193 | 2355 | 3140 |
| *Closterium aciculare* | 565 | 565 | 879 |

(17) 1966-III-18

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 2606 | 597 | 283 |
| *Asterionella formosa* | - | 126 | 63 |
| *Ceratium hirundinella* | - | 94 | - |
| *Pediastrum Biwae* | 31 | 31 | - |
| *Selenastrum gracile* | 31 | - | - |
| *Staurastrum dorsidentiferum* | 3548 | 2700 | 1130 |
| *Closterium aciculare* | 26376 | 6343 | 2826 |
| *Spirogyra* sp. | - | 31 | - |

(18) 1966-III-31

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 440 | 94 | 31 |
| *Asterionella formosa* | 31 | 126 | 157 |
| *Dinobryon cylindricum* | - | 31 | - |
| *Staurastrum dorsidentiferum* | 3799 | 4365 | 2324 |
| *Staurastrum pingue* | 31 | 31 | - |
| *Closterium aciculare* | 1476 | 2010 | 1784 |

(19) 1966-IV-12

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 126 | | |
| *Melosira granulata* var. *angustissima* | 31 | | |
| *Dinobryon cylindricum* | 31 | | |
| *Staurastrum dorsidentiferum* | 785 | | |
| *Closterium aciculare* | 879 | | |

(20) 1966-IV-30

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 188 | 157 | 659 |
| *Asterionella formosa* | 126 | 220 | 126 |
| *Synera ulna* | 251 | 31 | 157 |
| *Dinobryon divergens* | 31 | – | – |
| *Staurastrum dorsidentiferum* | 408 | 1287 | 1507 |
| *Closterium aciculare* | 2324 | 3014 | 3737 |

(21) 1966-V-16

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 848 | 314 | 471 |
| *Melosira varians* | – | – | 31 |
| *Asterionella formosa* | 157 | 63 | 188 |
| *Synedra ulna* | – | 31 | 31 |
| *Fragilaria crotonensis* | – | – | 63 |
| *Dinobryon cylindricum* | – | – | 31 |
| *Dinobryon divergens* | – | – | 31 |
| *Pediastrum Biwae* | 31 | – | – |
| *Staurastrum dorsidentiferum* | 4773 | 3831 | 2355 |
| *Closterium aciculare* | 22671 | 10362 | 6939 |

(22) 1966-V-30

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira solida* | – | 63 | 31 |
| *Melosira italica* | 502 | 188 | 94 |
| *Synedra ulna* | 63 | – | – |
| *Fragilaria crotonensis* | – | 31 | – |
| *Eudorina elegans* | – | – | 31 |
| *Staurastrum dorsidentiferum* | 1225 | 3171 | 2512 |
| *Cosmocladium constrictum* | – | – | 31 |
| *Closterium aciculare* | 5212 | 6782 | 5401 |

(23) 1966-VI-13

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira solida* | – | 8 | – |
| *Melosira italica* | 7034 | 243 | 204 |
| *Pediastrum Biwae* | 31 | – | – |
| *Staurastrum dorsidentiferum* | 126 | – | – |
| *Closterium aciculare* | 5652 | – | – |

(24) 1966-VII-16

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 1978 | 94 | 911 |
| *Melosira granulata* | - | - | 31 |
| *Asterionella formosa* | 31 | - | - |
| *Eudorina elegans* | - | - | 31 |
| *Staurastrum dorsidentiferum* | 63 | 126 | 283 |
| *Closterium aciculare* | 1696 | 7819 | 4930 |
| *Spirogyra* sp. | - | - | 31 |

(25) 1966-VIII-18

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosire italica* | 864 | 754 | 785 |
| *Melosira granulata* | 94 | 63 | 16 |
| *Ceratium hirundinella* | - | 8 | - |
| *Pediastrum Biwae* | 16 | 16 | 8 |
| *Staurastrum dorsidentiferum* | 345 | 298 | 298 |
| *Closterium aciculare* | 8 | 126 | - |
| *Spirogyra* sp. | 79 | 24 | 16 |
| *Merismopedia elegans* | - | - | 8 |
| *Anabaena macrospora* | - | - | 63 |
| *Lyngbya limnetica* | 79 | 283 | 1444 |

(26) 1966-IX-16

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 5150 | 973 | 1005 |
| *Melosira granulata* | 63 | 31 | - |
| *Ceratium hirundinella* | 126 | 31 | - |
| *Pediastrum Biwae* | 63 | - | - |
| *Oocystis* sp. | - | 31 | - |
| *Eudorina elegans* | 31 | - | - |
| *Staurastrum dorsidentiferum* | 3360 | 3768 | 1633 |
| *Closterium aciculare* | 63 | - | - |
| *Spirogyra* sp. | 63 | 63 | 126 |
| *Anabaena macrospora* | 1319 | 502 | 502 |
| *Anabaena spiroides* | 126 | 188 | 126 |
| *Lyngbya limnetica* | 1476 | 534 | 440 |

(27) 1966-X-15

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 1567 | 816 | 1853 |
| *Melosira granulata* | - | - | 31 |
| *Botryococcus Braunii* | - | 31 | - |
| *Pediastrum Biwae* | - | 63 | 31 |

| | | | |
|---|---|---|---|
| *Oocystis* sp. | - | 31 | - |
| *Staurastrum dorsidentiferum* | 377 | 1382 | 1727 |
| *Staurastrum limneticum* | - | - | 63 |
| *Closterium aciculare* | 283 | 31 | 220 |

(28) 1966-XI-19

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira italica* | 565 | 817 | 722 |
| *Pediastrum Biwae* | - | 94 | 31 |
| *Staurastrum dorsidentiferum* | 1162 | - | 659 |
| *Staurastrum limneticum* | - | - | 31 |
| *Closterium aciculare* | 63 | - | 63 |

(29) 1966-XII-19

| | Nb-2 | Nb-5 | Na-3 |
|---|---|---|---|
| *Melosira solida* | 8 | 141 | 110 |
| *Melosira italica* | 8 | 24 | 8 |
| *Asterionella formosa* | 71 | 16 | 8 |
| *Mallomonas fastigata* | 31 | 31 | 31 |
| *Staurastrum dorsdentiferum* | 8 | 8 | 16 |
| *Staurastrum limneticum* | 16 | 8 | 8 |
| *Cosmocladium constrictum* | - | 55 | 47 |
| *Closterium aciculare* | - | 8 | - |

Table 6. Number of the component species of the phytoplankton at three stations of the accessory basin

| Date | Station | | |
|---|---|---|---|
| | Nb-2 | Nb-5 | Na-3 |
| 1965-V-31 | 1 | 3 | 0 |
| 1965-VI-9 | 2 | 2 | 3 |
| 1965-VII-8 | 5 | 4 | 2 |
| 1965-VIII-2 | 4 | 5 | 5 |
| 1965-VIII-17 | 5 | 5 | 7 |
| 1965-IX-1 | 8 | 6 | 8 |
| 1965-X-1 | 5 | 6 | 5 |
| 1965-X-15 | 4 | 6 | 7 |
| 1965-XI-2 | 7 | 6 | 4 |
| 1965-XII-2 | 5 | 4 | 5 |
| 1965-XII-13 | 5 | 4 | 6 |
| 1966-I-5 | 4 | 3 | 3 |
| 1966-I-17 | 3 | 7 | 5 |
| 1966-II-1 | 2 | 5 | 5 |
| 1966-II-17 | 2 | 3 | 3 |
| 1966-III-2 | 2 | 3 | 2 |
| 1966-III-18 | 5 | 7 | 4 |

| | | | |
|---|---|---|---|
| 1966-III-31 | 5 | 6 | 4 |
| 1966-IV-12 | 5 | | |
| 1966-IV-30 | 6 | 5 | 5 |
| 1966-V-16 | 5 | 5 | 9 |
| 1966-V-30 | 4 | 5 | 6 |
| 1966-VI-13 | 4 | 2 | 1 |
| 1966-VII-16 | 4 | 3 | 6 |
| 1966-VIII-18 | 7 | 8 | 8 |
| 1966-IX-16 | 11 | 9 | 6 |
| 1966-X-15 | 3 | 6 | 6 |
| 1966-XI-19 | 3 | 2 | 5 |
| 1966-XII-19 | 6 | 8 | 7 |

Table 7. Number of cells or colonies of the total phytoplankton per $m^3$ of lake water. A unit of number is shown in 10,000 ($10^4$),

| Date | Station | | | |
|---|---|---|---|---|
| | Nb-2 | Nb-5 | Na-3 | Average |
| 1965-V-31 | 126 | 125 | 0 | 84 |
| 1965-VI-9 | 1633 | 1445 | 251 | 1110 |
| 1965-VII-8 | 1003 | 1130 | 188 | 774 |
| 1965-VIII-2 | 1288 | 5307 | 1036 | 2544 |
| 1965-VIII-17 | 3579 | 1915 | 2981 | 2825 |
| 1965-IX-1 | 11146 | 4646 | 2478 | 6090 |
| 1965-X-1 | 15072 | 11524 | 12216 | 12937 |
| 1965-X-15 | 12214 | 17552 | 19310 | 16359 |
| 1965-XI-2 | 6279 | 14129 | 9263 | 9890 |
| 1965-XII-2 | 4206 | 9860 | 8196 | 7421 |
| 1965-XII-13 | 1304 | 4821 | 4318 | 3481 |
| 1966-I-5 | 5432 | 5840 | 7536 | 6269 |
| 1966-I-17 | 3987 | 5807 | 8414 | 6069 |
| 1966-II-1 | 5275 | 3170 | 5369 | 4605 |
| 1966-II-17 | 5369 | 2983 | 4333 | 4228 |
| 1966-III-2 | 1758 | 2951 | 4019 | 2909 |
| 1966-III-18 | 32592 | 9922 | 4302 | 15605 |
| 1966-III-31 | 5777 | 6657 | 4296 | 5577 |
| 1966-IV-12 | 1852 | | | |
| 1966-IV-30 | 3328 | 4709 | 6186 | 4741 |
| 1966-V-16 | 28480 | 14601 | 10140 | 17740 |
| 1966-V-30 | 7002 | 10235 | 8100 | 8446 |
| 1966-VI-13 | 12843 | 251 | 204 | 4433 |
| 1966-VII-16 | 3768 | 8039 | 6217 | 6008 |
| 1966-VIII-18 | 1485 | 1572 | 2638 | 1898 |
| 1966-IX-16 | 11840 | 6121 | 3832 | 7118 |
| 1966-X-15 | 2167 | 2354 | 3925 | 2815 |
| 1966-XI-19 | 1790 | 911 | 1506 | 1402 |
| 1966-XII-19 | 142 | 291 | 228 | 220 |

From Table 7 we can know that there were several times of the high production of the phytoplankton, namely October lst, 1965, October 15th, 1965, March 18th, 1966, May 16th, 1966 etc. The enormous multiplication in October of 1965 corresponds probably to that of the main basin from Nov. 1965 to Jan. 1966. Station Nb-2 in the eastern littoral region had more often the times of the high production than other two stations.

It is striking that the considerable occurrence of *Melosira italica* was found throughout almost all seasons, with an exception of the severe winter in February 1966.

Three species of the blue-green algae, namely *Anabaena macrospora*, *Anabaena spiroides*, and *Lyngbya limnetica*, appeared abundantly in the late summer of 1966.

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