

A STUDY OF THE PHYTOPLANKTON OF CRAB ORCHARD LAKE

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Crab Orchard Lake is that body of water formed by a dam across Crab Orchard Creek at the Jackson-Williamson county line in Southern Illinois. (Fig. 1). The stream and its tributaries have a drainage basin of 200 miles. The lake at the spillway level covers about 7,000 acres. It is about four miles wide at the widest part and about 10 miles long. Its greatest depth, in the stream bed at the outlet tower, is 14 meters. The stream bed is three or four meters below the surrounding land. Thus the greatest depth out of the stream bed is 10 meters. The land which was flooded was badly eroded leaving many gullies in the bottom of the lake; consequently it was necessary to place buoys at the two stations out in the lake to mark those depths used in our experiments.

Four stations were established across the lake for a distance of one and one-fourth miles, beginning at the southern edge. See figure 1. Station CO-1 is in a cove on the south side of the lake well protected by headlands on the east and west. A small stream emptied into this cove during the wet seasons. Only surface samples were taken here, and these in the mouth of the stream where the water was not over two feet deep.

Station CO-2 was taken in the old stream bed. When water is at the spill-

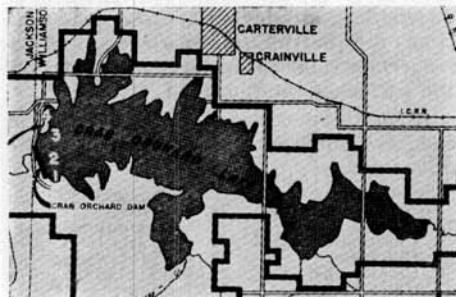


Fig. 1.—Outline Map of Crab Orchard Lake.

way level this station is not over 13 meters. (The lowest the water was last summer was 10 meters deep.) Along the banks of the old stream were small trees

and shrubs. These are now completely covered and are found only when they tangle the lines of the collecting tube. Small bits of wood are found in samples from this station.

Station CO-3 is about three-fourths of the way from Station CO-2 to the north shore. Its greatest depth was five meters. At the low water stage it was about three meters. The soil here had been cultivated and was most recently planted in corn.

Station CO-4 is in a shallow cove on the north shore where the soil had been graded to make a smooth beach. This had grown over with weeds before the land was flooded. The water here was only about two feet deep. Surface samples were taken here.

The dam was closed May 10th, 1940, and the water went over the spillway for

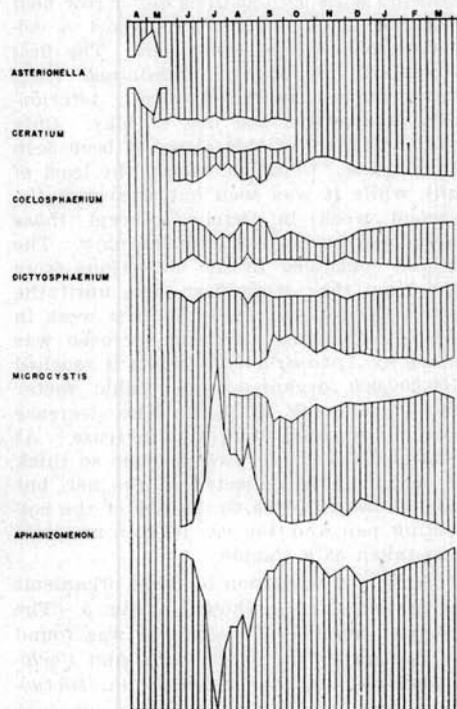


Fig. 2.—Diagram of average net algae at Station CO-2.

the first time during the night of February 1st, 1942. Most of these data were taken before the water had reached spillway level. The collections from the surface were taken in a dip pan and from water below with a collecting tube of one liter capacity. Samples were put through a collecting net of silk bolting cloth and washed into 100 c.c. of Transeau's Fluid for storage. Counts of the numbers of organisms were made in a Sedgwick-Rafter cell of 1 c.c. capacity. At Stations CO-2 and CO-3 the samples from below the surface were taken at one meter intervals.

Fig. 2 shows the average of six net algae that were abundant enough long enough to be charted. These were collected at Station CO-2. As was expected the number of individuals was small and the genera few early in the spring. The collections were made each week until the first week of October; then every two weeks until the second week of December. At this time a question of jurisdiction arose since the upper end of the lake became a defense area. Then the lake was covered with ice too thick for a row boat but not thick enough to support a collector and all the equipment. The first organisms to appear maintained little variation in a restricted range. *Asterionella* disappeared the last of May. Only one individual of this alga has been seen this spring. *Ceratium* varied the least of any while it was seen but was gone the second week in October, except those found the second week in February. The others continued in the collections from the time they were first seen until the last collection was made the first week in April. The most striking increase was made by *Aphanizomenon* when it reached 700,000,000 organisms per cubic meter the third week of July. The decrease was more rapid than the increase. At Station CO-1 *Microcystis* became so thick it could not be collected in the net, but was allowed to rise to the top of the collecting pan and 100 c.c. of this material was taken as a sample.

Vertical distribution of these organisms at Station CO-2 is shown in Fig. 3. The greatest number of organisms was found at two meters in *Asterionella* and *Coelosphaerium*, at three meters in *Dictyosphaerium* and *Aphanizomenon*, and at four meters in *Ceratium*, and at the bottom in *Microcystis*. These represent the average

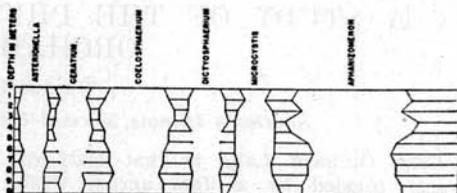


Fig. 3.—Vertical Distribution at CO-2.

numbers taken during the middle of the season for each.

Vertical distribution at the four stations is shown in Fig. 4. The letters indicate the name of the organism and the distance between the short vertical lines shows the number of individuals of each alga. This gives a rough idea of the distribution from top to bottom of the lake. *Dictyosphaerium* was not seen in the

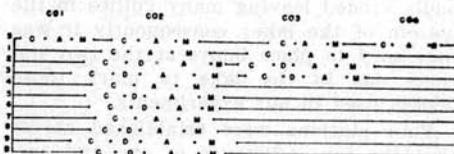


Fig. 4.—Vertical distribution of four algae at the four stations in Crab Orchard Lake. C = *Coelosphaerium*. D = *Dictyosphaerium*. A = *Aphanizomenon*. M = *Microcystis*. Sept. 12, 1941.

upper two meters at any station and was also absent from the four and seven meter samples taken at Station CO-2. Here again the greatest number occurred at the three-meter depth at CO-2 and at the two meter depth at CO-3. The surface samples were very much the same at all stations, although when the wind was from the north *Microcystis* and *Coelosphaerium* collected in large quantities on the surface at Station CO-1.

Among the other net algae found in sufficient number to be recorded were the following:

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|---------------------|-------------------|
| 1. Anabaena | 19. Mougeotia |
| 2. Ankistrodesmus | 20. Netrum |
| 3. Arthrospira | 21. Oedogonium |
| 4. Chlamydomonas | 22. Oocystis |
| 5. Chlorella | 23. Oscillatoria |
| 6. Closteriopsis | 24. Pachycladon |
| 7. Closterium | 25. Pediastrum |
| 8. Coelastrum | 26. Pleurotaenium |
| 9. Cosmarium | 27. Scenedesmus |
| 10. Crucigenia | 28. Schroederia |
| 11. Cylandrospermum | 29. Sphaerocystis |
| 12. Diatoms | 30. Spirogyra |
| 13. Dinobryon | 31. Spondylosium |
| 14. Eudorina | 32. Staurastrum |
| 15. Euglena | 33. Stigeoclonium |
| 16. Gloeocapsa | 34. Tetradon |
| 17. Gonium | 35. Ulothrix |
| 18. Gonyaulax | 36. Zygnuma |