

THE ALGAE OF THE URBANA (OHIO) RAISED BOG¹

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The algae of the Urbana Raised Bog form such an interesting feature of the area, that special effort has been made by the writer to study this aspect of the flora. This unique bog is located at Urbana, Ohio, just north of the Champaign County Fair Grounds. It has been developed around an artesian spring, and due to hydrostatic pressure below and a mat of roots above, has become "raised" or dome-shaped, the center being some ten feet higher than the margins. It is covered with a shrubby type of vegetation consisting chiefly of shrubby cinquefoil (*Dasiphora fruticosa*).

The vascular flora of the bog has been studied by Dr. Robert B. Gordon (2), of the Botany Department at Ohio State University, and it was upon his suggestion that the present work on the algae was undertaken. The first collection of algae was made in early February, 1932, by Gordon, and since that time, much additional material has been obtained, particularly during the spring and summer months of the same year and in 1933. The list of algae from the raised bog is not large, perhaps on account of peculiar environmental conditions which will be discussed in this paper.

The writer wishes to thank Dr. Helen J. Brown and Dr. L. H. Tiffany for aid in identification of certain algae, especially members of the genus *Vaucheria*.

ALGAL HABITATS

Probably the most important algal habitat at the raised bog is a wide drainage ditch which encircles the entire area. This ditch, during the spring months is well filled with water and remains so until late July, when it becomes much smaller in size. This ditch is fed throughout the year by several springs which flow from the raised bog, and also by a small stream which issues from drainage tiles to the east. In the spring and early summer months the ditch is choked with water-cress (*Sisymbrium nasturtium-aquaticum*), *Batrachium circinatum*,

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Chara foetida, *Chara fragilis*, and *Zannichelia palustris*. In the early summer months when the water supply decreases, numerous species of herbaceous plants begin to grow along the ditch until the whole is shaded by their dense and rank growth. Most important of these are species of *Carex*, *Rumex*, and *Persicaria*. The ditch remains in this condition until late autumn, when the plants are killed by frost, and the fall rains come. At that time it becomes filled to capacity with water again.

Other interesting situations for algae are the several springs which issue from the bog. The waters of these are cold, clear, and are impregnated with lime. A constant flow of water issues from these springs throughout the year. The temperature of the water is uniformly cool in summer and winter, the temperature being 55° F. on a very hot day in late July. The volume of the springs is diminished to some extent during the summer months, and at that time they are surrounded by various herbaceous plants comprising the same species which grow along the ditch. The shade produced by this dense growth of vegetation is sufficient to prevent growth of algae except, perhaps, some bluegreens and diatoms.

SEASONAL CHANGES IN THE ALGAL FLORA

During February, March, and April, the dominant algae are *Tetraspora lubrica*, *Stigeoclonium stagnatile*, *S. subsecundum*, and *Microspora quadrata*. A number of species of *Spirogyra* and one of *Mougeotia* in the vegetative condition are also very common at this season, and persist until May and June when they begin to fruit. All of these occur in the ditch which encircles the bog proper. In April such forms as *Vaucheria sessilis*, *V. woroniniana*, *V. geminata*, and *V. geminata* var. *longistipata* var. nov. appear in the springs. Reproductive structures of *Vaucheria ornithocephala* were found on February 13, 1932. All of these forms usually form a dark green mat on the wet, black muck surrounding the springs, and frequently are found submerged in the flowing water, attached to soil. *Chara foetida* and *C. fragilis* grow in the alkaline waters of the ditch at all times of the year, and both were found fruiting several times in April and again in September. In May, June, and July the dominant forms are the filamentous green algae, comprising the genera *Spirogyra* and *Mougeotia*. Throughout the spring months, *Spirogyra weberi* is exceedingly

common in the ditch. It appears as large yellow-green masses until June, when it turns brownish and begins to produce zygospores. Simultaneously, *Spirogyra varians* var. *scrobiculata* begins to fruit. No zygospore production has been seen in *Mougeotia* collected at this bog, although sterile material is found in abundance, and geniculation frequently occurs, especially in what is perhaps *M. genuflexa*.

Although ditches are usually favorable habitats for representatives of the Oedogoniales, only one species, *Oedogonium landsboroughi*, was collected. Perhaps it is because of the high alkalinity of the waters which flow from beds of marl. The hydrogen-ion concentration of these waters was determined colorimetrically in the field on February 22, 1933. A pH value of 9 was recorded. This fact probably explains the absence of a great many other genera of algae.

In late May, June, and early July a number of blue-greens were found, consisting of species of *Lyngbya* and *Oscillatoria*. These forms were dominant until the vegetation had developed sufficiently to shut out most of the light from the water. They were then succeeded in August and September by enormous quantities of diatoms, which seem to flourish under the conditions of diffuse light, warmer temperatures, and subsequent decay of vegetation. Great masses of iron bacteria form in the ditch in open, sunny places during the hot summer months, accompanying a rapid decay of *Chara* and other water plants.

ANNOTATED LIST OF ALGAE OCCURRING IN THE
URBANA RAISED BOG

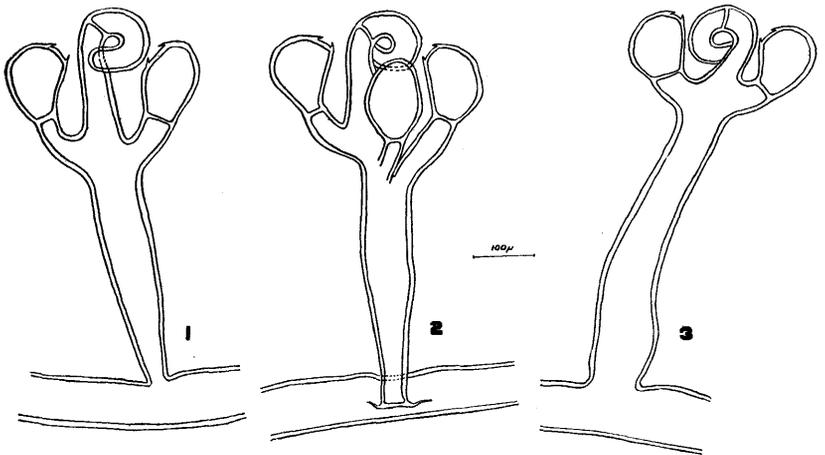
DIATOMACEAE

1. *Nitzschia obtusa* W. Smith. An abundant diatom occurring throughout the year, both in springs and in the ditch.
2. *Achnanthes microcephala* Kütz. Abundant.
3. *Synedra ulna* (Nitzsch.) Ehr. Abundant in autumn and spring.
4. *Cymatopleura solea* (Breb.) W. Smith. Very rare. Spring.
5. *Gomphonema intricatum* Kütz. Abundant. April.
6. *Gomphonema montanum* Schum. Common. September.
7. *Tabellaria fenestrata* (Lyngbh.) Kütz. Common. May.
8. *Fragillaria virescens* Ralfs. Common. September.
9. *Navicula radiosa* Kütz. Particularly abundant in August and September.

CHLOROPHYCEAE

10. *Closterium moniliferum* (Bory) Ehr. Rare. April.
11. *Gonatozygon brebissonii* De Bary var. *minutum* W. & G. S. West. Rare. February.

12. *Stigeoclonium stagnatile* (Hazen.) Collins. Abundant in spring months.
13. *Stigeoclonium subsecundum* Kütz. Common in spring months in the ditch.
14. *Stigeoclonium stagnatile* Kütz. April. Rare.
15. *Rhizoclonium hieroglyphicum* (Ag.) Kütz. April. Common.
16. *Tetraspora lubrica* Ag. Common in the ditch. March-April.
17. *Ulothrix tenerrima* Kütz. Rare in the ditch. April.
18. *Geminella minor* Heering. Rare. May.
19. *Microspora stagnorum* Lagerh. Common in spring months.
20. *Microspora quadrata* Hazen. Abundant in spring months.
21. *Tribonema minus* (Wolle) Hazen. Rare. April.
22. *Stichococcus bacillaris* Näg. Occasional in April.
23. *Spirogyra weberi* Kütz. Abundant in the ditch. Fruits in June.
24. *Spirogyra varians* (Hass.) Kütz. var. *scrobiculata* Stockmayer. Common in the ditch, fruiting in May and June.
25. *Mougeotia genuflexa* (Dill.) Agardh. Common in the spring months. Often geniculating, but never producing zygospores.
26. *Oedogonium landsboroughi* (Hass.) Wittr. Rare, fruiting in May.
27. *Vaucheria sessilis* D. C. Common, fruiting in April.
28. *Vaucheria geminata* D. C. Common, fruiting in May.
29. *Vaucheria geminata* D. C. var. *racemosa* (Vauch.) Walz. Rare. In the springs.



Figs. 1-3. *Vaucheria geminata* D. C. var. *longistipata* var. nov. Figs. 1 and 2 show typical specimens. Fig. 3 represents a minor variation, probably an immature individual, but interesting because of the very long stipe.

30. *Vaucheria geminata* D. C. var. *longistipata* var. nov. (Figs. 1-3).
 Latin diagnosis: Filamentis 80-106 μ latis; ramis fructiferis, erectis, 70-94 μ latis, 320-550 μ longis; oogoniis 2-5 (plerumque 2-3) continuis, ovoideis vel oblongo-ovoides, arcuatis, lateraliter sub antheridiis sitis, 70-89 μ latis, 99-112 μ longis; oosporis eadem

forma ac oogoniis, oogonia complentibus, 65–84 μ latis, 93–105 μ longis; antheridiis terminalibus, curvatis, 32–38 μ latis.

Description: Filaments 80–106 μ in diameter; oogonia and antheridia borne at the end of a long branch, 70–94 μ in diam., 320–550 μ long; antheridium terminal, in typical specimens much surpassing the oogonia, hooked or circinate, 32–38 μ in diam.; oogonia 70–89 μ wide, 99–112 μ long, ovoid or oblong-ovoid, arched, 2–5 in number, usually 2–3; beaks of oogonia short; pedicels of oogonia 32–45 μ long, 32–38 μ wide, usually arising just below the antheridium, never surpassing it; oospores 65–84 μ wide, 93–105 μ long, completely filling the oogonia.

This variety has characters intermediate between *V. woroniniana* and *V. geminata*. It resembles the former in the long pedicel and short oogonial beaks, and the latter both in the number of oogonia and the arched appearance of the oogonia. It differs from both in that the antheridia always surpass the oogonia. In the light of these characters it is questionable whether the plant should be made a variety of *V. geminata* or of *V. woroniniana*. Perhaps there is more evidence for the former since *V. geminata* has long been known to vary in various habitats.

Type locality: Urbana Raised Bog, Champaign County, Ohio. In flowing springs associated with *Vaucheria ornithocephala* and *V. geminata*.

31. *Vaucheria ornithocephala* Ag. Rare. Found fruiting sparsely on February 13, 1932. This species has not been hitherto reported from Ohio.
32. *Vaucheria woroniniana* Heering. Very rare. Found fruiting on February 13, 1932. This species has not been previously reported from Ohio.
33. *Golenkinia paucispina* W. & G. S. West. Common in the ditch in April.

MYXOPHYCEAE

34. *Lyngbya major* Menegh. Rare. April.
35. *Lyngbya aerugineo-caerulea* (Kütz.) Gomont. Common in May and June in the ditch.
36. *Oscillatoria tenuis* Agardh. Common in the ditch during the late spring and early summer months.

CHARACEAE (CHAROPHYTA)

37. *Chara fragilis* Desvaux. Associated with *C. foetida*. Fruits from April to October.
38. *Chara foetida* A. Br. Abundant in the ditch. Fruiting from April to October.

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