SOME ALGAE OF THE UPPER CUYAHOGA RIVER SYSTEM IN OHIO[1]

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ABSTRACT

A qualitative survey of algae was made during June and September, 1967, in three tributaries of the Cuyahoga River in Geauga County: West Branch, East Branch, and Tare Creek. Sixty-four species of algae found in this survey are reported here. Eight species which were collected at the majority of the 14 stations sampled are *Cladophora glomerata, Aphanochaete repens, Rhizoclonium hieroglyphicum, Euglena gracilis, Vaucheria sessilis, Tribonema bombycinum, Oscillatoria nigra,* and *O. limosa.*

INTRODUCTION

While there have been qualitative and quantitative algal surveys on the Ohio River system (Brinley *et al.*, 1942; Hirsch and Palmer, 1958; Hartman, 1965), there has been no previous survey of the algal flora of the upper Cuyahoga River

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system in Geauga County, Ohio. The objective of this study was a qualitative taxonomic survey of the summer algal flora in three tributaries of this river system.

HABITATS

The upper Cuyahoga River watershed lies wholly in Geauga County, Ohio. The algal flora was studied on a qualitative basis at a total of 14 stations on three tributaries of this river, four stations on West Branch, six stations on East Branch, and four stations on Tare Creek (fig. 1). At these sites, scrappings from submerged rock and logs, samples from algal mats entangled in weeds and twigs, and benthic samples from the mud and sand surfaces of the stream beds were collected. Benthic samples were obtained by using a ¼-inch ID glass tube attached to rubber tubing terminated by a squeeze bulb. Collections were made in June and September, 1967. Temperature and pH were recorded at each station at the time of collection.

Taxonomic identifications of both living and preserved material were based on keys developed by Prescott (1962) and by Bourrelly (1966). Species of *Oedogonium*, *Spirogyra*, and *Mougeotia* were identified when sexually reproductive material was available. If no sexually reproductive material was present, the latter three genera were identified only as "sp.". Samples for future reference were preserved in a solution of 10 g potassium chrom alum and 5 ml formaldehyde in 500 ml of water (Cavanaugh, 1956).

RESULTS AND DISCUSSION

Temperatures at all stations at the time of collecting in June, 1967, ranged from 14 to 17°C. The range in September was from 20 to 23°C. The pH at all stations during the collecting periods in both June and September varied from 6.8 to 7.2. Since there were no extreme variations in either temperature or pH during this time, the details of these data for each station are not presented here.

The results of this survey have been drawn together in Table 1, the algae grouped by division, followed by the substrate on which each taxon was found. *Cladophora glomerata*, *Aphanochaete repens*, *Rhizoclonium hieroglyphicum*, *Euglena gracilis*, *Vaucheria sessilis*, *Tribonema bombycinum*, *Oscillatoria nigra*, and *O. limosa* were collected at 7 or more of the 14 stations sampled. In the benthic communities sampled, there was usually a single dominant macroscopic development of either *Cladophora*, *Chara*, *Nitella*, *Batrachospermum*, *Chaetophora incrassata*, or *Oscillatoria*. *Euglena* and *Phacus* were commonly encountered in the benthic mud and sand samples. On rock and wood surfaces, there was also usually a single dominant form of either *Stigeoclonium*, *Cladophora*, *Vaucheria*, *Chaetophora pisiformis*, *Spirogyra*, or *Oscillatoria*.

A comparison between the filamentous algae found in the upper Cuyahoga River watershed and in the west end of Lake Erie (Tiffany, 1937) showed that of the 34 species of filamentous algae identified in this survey, 56 per cent were also reported by Tiffany. *Stigeoclonium lubricum*, *Ulothrix tenerrima*, *Draparnaldia glomerata*, *Chaetophora incrassata*, *Aphanochaete repens*, *Schizomeris leibleinii*, and *Oscillatoria limosa*, found to occur in the west end of Lake Erie (Tiffany, 1937) and the upper Cuyahoga River watershed, have also been reported from the piedmont region of North Carolina (Whitford and Schumacher, 1963; 1969).

The most ubiquitous filamentous alga found in this survey was *Cladophora glomerata*, recorded at 10 of the 14 stations. Blum (1956, p. 327) states that "*C. glomerata* appears to be the most abundant filamentous alga in streams throughout the world." Butcher (1940) reports *Cladophora* from the River Hull, Yorkshire, England, which had a pH of 7.5 and 180 ppm of $CaCO_3$. Orr (1969) found an average HCO_3^- concentration of 92 ppm in the upper Cuyahoga River at stations where *Cladophora* was present. In contrast, Whitford and Schumacher (1963) found no *Cladophora* in soft-water streams having a HCO_3^- concentration

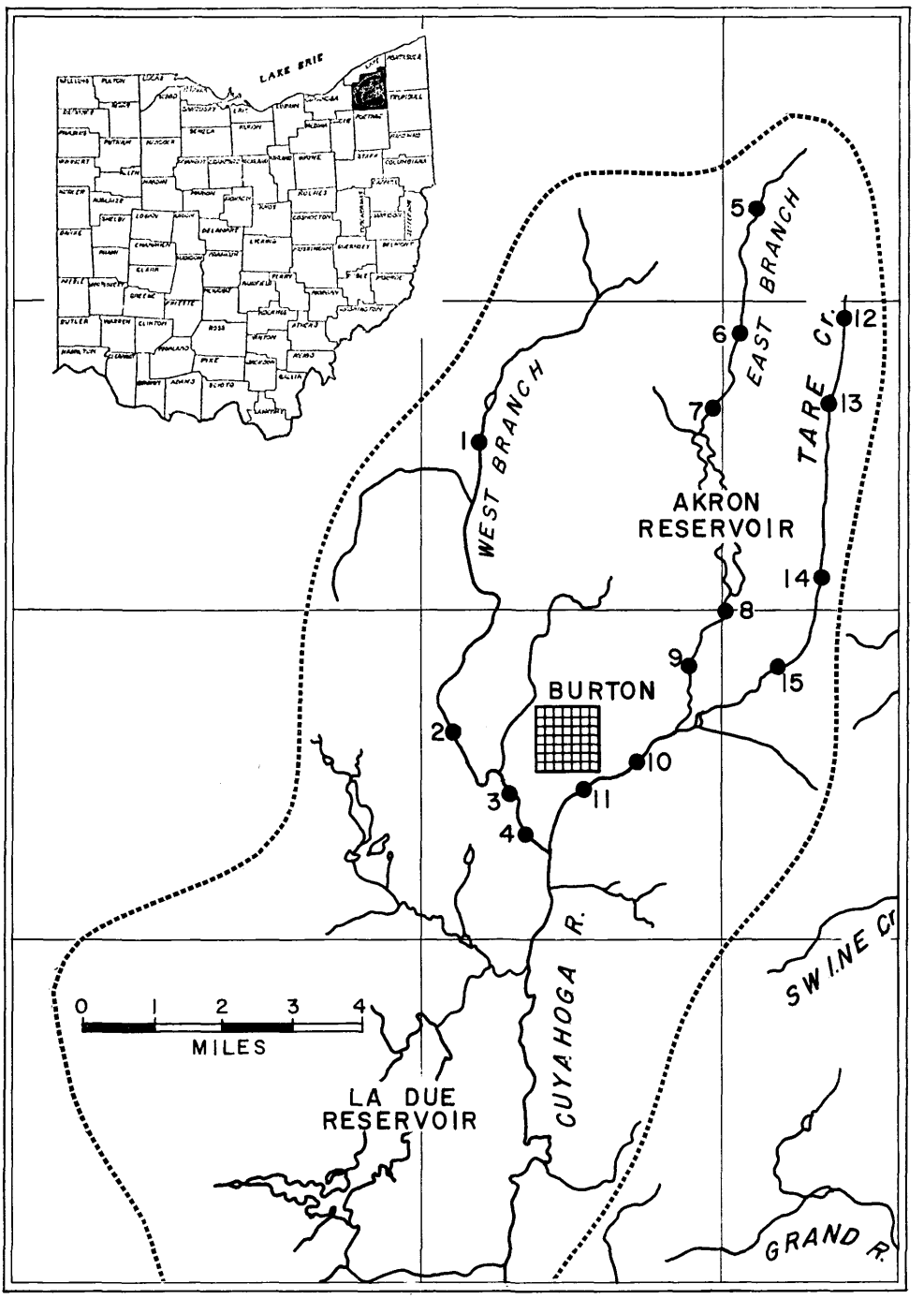

FIGURE 1. Location of Geauga County in Ohio (blackened in upper insert) and upper Cuyahoga River watershed in Geauga County (enclosed by dotted line), including relative locations of sampling stations (numbered).

of only 20 ppm. They suggested that the absence of *Cladophora* in the flora of North Carolina was due to the differences in the hardness of the stream water there, in contrast to that of streams farther north. Our results do not negate the conclusion of Whitford and Schumacher. *Scenedesmus dimorphus, Pediastrum duplex, P. boryanum, Coelastrum microporum, Synura uvella, Merismopedia glauca,* and *Euglena spirogyra,* non-filamentous algae identified in the upper Cuyahoga River watershed, have also been found in surveys of phytoplankton in regions of the eastern United States (Reinhard, 1931; Palmer, 1932; Tiffany, 1934; Whitford, 1958).

TABLE 1

Algae identified from collections taken from three tributaries of the Cuyahoga River, June and September, 1967, Algae are grouped by division; substrates on which each taxon was found are given following its name, abbreviated as follows: rock—ro, wood—wo, stream bed—b, weeds—we, twigs—tw.

Chlorophyta

Aphanochaete repens A. Braun epiphytic on *Rhizoclonium, Oedogonium, Mougeotia*
Chaetophora incrassata (Hudson) Hazen ro, b
C. pisiformis (Roth) C. A. Agardh ro, wo, we
Chara schweinitzii (A. Braun) b
Characium pringsheimii A. Braun epiphytic on *Oedogonium*
Cladophora glomerata (L.) Kuetzing ro, wo, we, tw
Closterium spp. ro, b, we, tw
Coelastrum microsporum Naegeli we, tw
Coeleochaete orbicularis Pringsheim we
Draparnaldia glomerata (Vaucher) C. A. Agardh tw
Gloeocystis ampla (Kuetzing) Lagerheim tw
G. gigas (Kuetzing) Lagerheim tw
Hyalotheca sp. ro
Microspora loefgrenii (Nordst.) Lagerheim ro, b
Mougeotia spp. wo, we
Nitella flexilis (L.) C. A. Agardh b
Oedogonium anomalum Hirn tw
O. cardiacum (Hass.) Wittrock ro, tw
Oedogonium spp. ro, wo
O. suecium Wittrock we
Palmodictyon varium (Naegeli) Lemmermann we
Pediastrum boryanum (Turp.) Meneghini tw
P. duplex var. *clathrathum* (A. Braun) Lagerheim wo
P. duplex var. *cohaerans* Bohlin ro
P. duplex Meyen tw
P. tetras (Ehrenberg) Ralfs we, tw
Rhizoclonium hieroglyphicum (C. A. Agardh) Kuetzing b
Scenedesmus dimorphus (Turp.) Kuetzing we
Schizomeris leibleinii Kuetzing we
Sphaerocystis schroeteri Chodat tw
Spirogyra spp. ro, wo, we
S. crassa Kuetzing ro
Spirogyra denticulata ro
S. novae-angliae Transeau wo
Stigeoclonium lubricum (Dillw.) Kuetzing ro
Tetraedron regulare var. *bifurcatum* Wille we
Tetraspora gelatinosa (Vaucher) Desvaux we
Ulothrix tenerrima Kuetzing we
U. zonata (Weber and Mohr) Kuetzing ro
Zygnema sp. wo

Euglenophyta

Colacium vesiculosum Ehrenberg epizooic on Cladoceran animal
Euglena acus Ehrenberg b
E. gracilis Klebs b, wo, we
E. spirogyra Ehrenberg b, we
Lepocinclis acuta Prescott b
Phacus acuminatus b
Phacus helikoides Pochmann b
P. triqueter (Ehrenberg) Dujardin b

TABLE 1—(*Continued*)

Chrysophyta

Synura uvella Ehrenberg we, b
Tribonema bombycinum (C. A. Agardh) Derbis & Solier b, we
Vaucheria sessilis (Vaucher) DeCandolle ro

Rhodophyta

Audouneilla violacea (Kuetzing) Hamel ro
Batrachospermum moniliforme ro, b

Cyanophyta

Anabaena affinis Limmermann b
A. oscillariodes Bory ro
Aphanocapsa grevillei (Hassen) Rabenhorst ro
Calothrix parietana (Naeg.), Thuret ro
Merismopedia convoluta deBrebisson b, ro
M. glauca (Ehrenb.) Naegeli ro, we
Oscillatoria agardhii Gomont ro, we
O. limosa (Roth) C. A. Agardh ro, b
O. nigra Vaucher ro, we, tw
O. tenuis C. A. Agardh h,
Phormidium retzii (C. A. Agardh) Gomont b
Shizothrix vaginata (Naeg.) Gomont b
Tolypothrix tenius (Kuetzing) J. Schmidt ro

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