appears only in the Zygophyllaceae, Euphorbiaceae (*Chamaesyce*), Loganiaceae, and Rubiaceae. I was also influenced in part by the cytological studies of Bruce A. Perry (1943), who found haploid chromosome numbers of 6, 7, 8, 9, and 10 in *Euphorbia* in the broad sense. One of his statements particularly deserves quoting (italics are mine): “Chromosome number, chromosome size and certain morphological differences, especially vegetative specialization, suggests that the *Euphorbia* complex could be broken up into several genera” (op.cit., p. 541).

REFERENCES


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An Ecological Study of *Cladophora glomerata* (Chlorophyceae) near Dallas

Martha Hasty Thurman & Robert A. Kuehne

*Cladophora glomerata*, a green alga of the order Ulotrichales, family Cladophoraceae, is characterized by dichotomous branching, with ramuli ending in dense terminal fascicles. Its filaments range from 75 to 100 micra in diameter; its ramuli are not tapered but rounded at the ends; and its thalli (which may reach a length of 40 cm.) are dark green, strong, and rough to the touch. Fruiting bodies are terminal or sub-terminal.

Between October, 1949 and July, 1950, we collected this species in the Dallas area from Elm Fork of the Trinity River, and Bachman’s, White Rock, and Ten Mile creeks. With the exception of the Elm Fork habitat, those streams in which the species is found are typically clear, with rocky beds and banks, and swift, shallow ripples alternating with quiet pools.

In our studies, we sought this species (but unsuccessfully) in the West Fork of the Trinity River, and in Denton, Mountain, and Hackberry creeks. These streams all have a high turbidity, sluggish flow, muddy banks and bottoms, and

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usually depths of more than four feet; and are located in
the geological formations of Taylor Marl and/or Eagle Ford
shale. Along with these two formations, the Dallas area is
also transected by Austin Chalk, whose formation now stands
as a long higher ridge more resistant to erosion than the
two other formations. Minor streams of the Austin Chalk
differ from those of the Taylor and Eagle Ford formations
by being swifter, shallower, clearer, and with rocky sub­
strates. Except for two artificial habitats on the Elm Fork
of the Trinity River (Carrollton Dam and the effluent from
Lake Dallas, both of which lie in the Eagle Ford shale) C.
glomerata was found only in streams of the Austin Chalk
(White Rock, Bachman’s, Five Mile, and Ten Mile creeks.)

Seasonal Occurrence of Cladophora glomerata.— (1) Arti­
ficial habitats: The vegetative form of this species appeared
at Carrollton Dam and at the effluent from Lake Dallas in
the first week of October, 1949. Strands were of normal green
color, but had a length of not more than 10 cm. A month later
there was an abundance of C. glomerata, many strands of
which were as much as 40 cm. long. Intermittent rises in
the river washed away a large portion of the plant but its
reëstablishment was rapid after the stream flow returned
to normal. The peak of abundance was reached in late Jan­
uary and early February of 1950. Subsequently there was a
gradual decline until in July only a few short, pale-green
strands remained at the effluent from Lake Dallas. At this
time, we could not find the vegetative form at Carrollton
Dam. The effluent from Lake Dallas was the only place in
this area at which C. glomerata could be found during sum­
mer. Water entering the stream from the lake never exceeded
74°F in temperature. (2) Natural habitats in limestone-bed­
ded streams: The species began to appear in the limestone­
bedded creeks of the Austin Formation early in November,
1949. As at Carrollton Dam, the strands were of a normal
dark green color, but not over 10 cm. in length. Sparse
growth and limited occurrence continued through the win­
ter months and until the middle of March, 1950, when there
began a rapid increase in both size and quantity. By April
the dense growth of C. glomerata impeded the water flow in
some rapids with exposed bedrock. Floods resulting from a
2-inch rain removed this profuse growth; and further rains
in April prevented reëstablishment in its former abundance.
Occasional strands persisted through May, after which we could not find the vegetative form.

Associated Algae. — A great number of species of algae were found floating freely among the densely interwoven thalli of the Cladophora. The following genera were noted:

- Bacillariae
  - Centrales
  - Melosira
  - Pennales
  - Tabellaria
  - Fragilaria
  - Synedra
  - Navateula
  - Caloneis
  - Gyrosigma
  - Gomphonema
- Cymbella
- Amphora
- Chlorophyceae
- Ulotrichales
- Coleochaete
- Zygmematales
- Zygnema
- Spirogyra
- Closterium
- Cosmarium
- Hyalotheca

_Gomphonema_ was the only form found growing epiphytically. Most abundant genera were _Navicula_, _Gomphonema_, and _Melosira_.

A quantitative study of associated algae was made by the following method. Sections one centimeter long were taken from roughly cylindrical bundles of thalli with a diameter of one centimeter and placed in a test tube containing 10 ml. of 4% formaldehyde. The tubes were shaken gently and allowed to stand for a day. One ml. of the liquid was examined in a Sedgewick-Rafter counting cell and results were computed for the original sample taken.

Great variation was found in the number of forms. In 12 collections made at the effluent from Lake Dallas the count varied from 750 to 73,200, with an average of 19,013 organisms per sample.

**CONCLUSIONS**

1. High selectivity of habitat was found for _Cladophora glomerata_. Except for two artificial habitats at Lake Dallas and Carrollton Dam, it was found only in the limestone-bedded streams of the Austin Chalk in the Dallas area. It occurred abundantly only in shallow, rapid water with rocky substrate or exposed bedrock, and showed definite preference for zones of high aeration and maximum light intensity.

2. The species showed definite seasonal variation, being most abundant during the colder months and disappearing during the summer months. Since it prefers maximum light intensity, its disappearance in summer indicates lack of tolerance to higher temperatures (75 degrees F. and above in this area). Persistence of the species during summer only at the entrance of cool water from Lake Dallas substantiates this view.

3. A great number of algal forms (at least 16 genera) were found in free-floating association with _Cladophora glomerata_.