

THE OCCURRENCE OF BANGIA ATROPURPUREA (ROTH) C. AG.  
(RHODOPHYCEAE) IN ILLINOIS WATERS OF LAKE MICHIGAN

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ABSTRACT

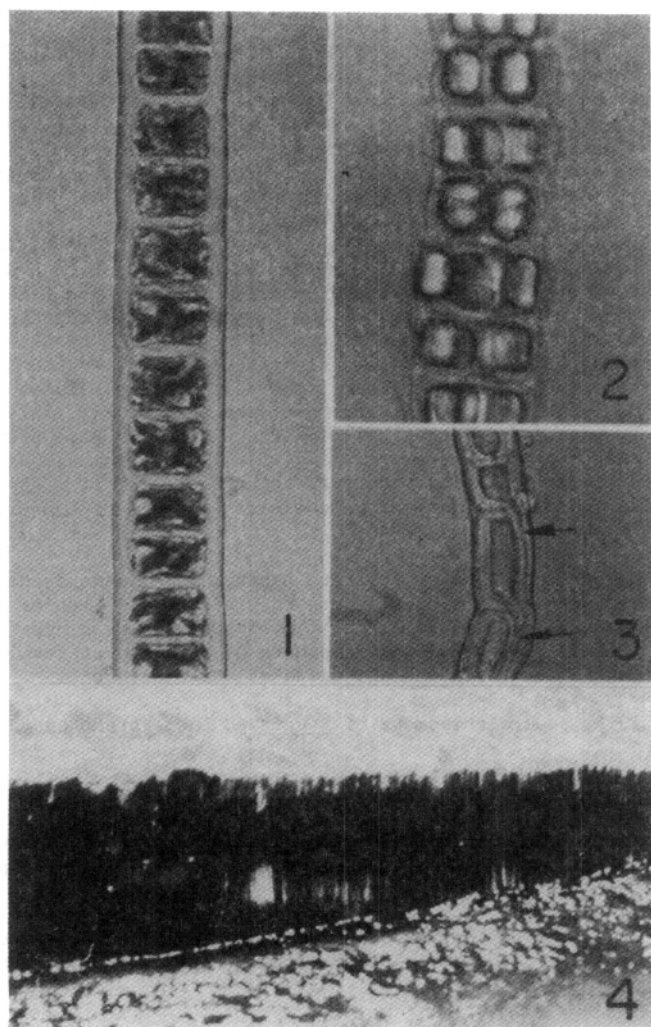
The freshwater red alga, Bangia atropurpurea (Roth) C. Ag. is reported for the first time in Illinois. Initial specimens were identified in collections from Lake Michigan at Lake Forest, Lake County, in October, 1975; an earlier unpublished record obtained on June 15, 1968, is also noted. Additional distribution records are reported.

Bangia atropurpurea (Roth) C. Ag., a well-known freshwater red alga, was discovered in a sample of Cladophora glomerata (L.) Kütz. obtained from a shoreline area of Lake Michigan at Lake Forest (Lake County, Illinois) in October, 1975. Although collections from this location had been made on many previous occasions, this was the first time that the existence of the red alga became apparent. While the presence of this alga in Illinois waters of Lake Michigan has been known since 1968 (Ponce de Leon, personal communication), the author believes this account to represent the first published report for Bangia in Illinois.

Since our first encounter with this alga in 1975, subsequent collections have confirmed its establishment from the Wisconsin-Illinois line in northeastern Lake County to as far south as northern Cook County. In addition to the Lake Forest record, the occurrence of Bangia has now been confirmed at the following locations: Spring Bluff Forest Preserve near Winthrop Harbor, Illinois Beach State Park near Zion, North Beach in Waukegan, Center Park in Highland Park, Tower Road Beach in Winnetka, Lookout Lighthouse Park in Evanston, and adjacent to Montrose Harbor in Chicago.

Credit for the first collection of Bangia in Lake Michigan belongs to Maxine C. Long who collected specimens on June 15, 1968, in the vicinity of the Forty-ninth Street Beach in Chicago (Ponce de Leon, personal communication). These specimens are deposited in the cryptogamic collection of the Field Museum of Natural History in Chicago.

It is now apparent that the alga has become generally



established in the southern end of Lake Michigan. Recent surveys by Stoermer and Bowman (personal communication) have established its occurrence along the eastern shore in both Michigan and Indiana, while Blum (personal communication) reports its widespread development in the vicinity of Milwaukee, Wisconsin, and adjacent shorelines.

At all Illinois locations examined in 1976 the alga formed extensive, smooth coatings on a variety of firm substrates: rock, concrete, wood, and steel such as found in piers, jetties, seawalls, etc. As a rule, it grew in close association with Cladophora, but, unlike the latter plants, tended to become established in a clearly defined supralittoral band. Bangia appeared to be second in abundance only to Cladophora at each location visited.

In form and habit, Illinois specimens conform to usual descriptions of the taxon (Smith, 1950). Typical plants are unbranched, up to two centimeters or more in length and basally attached. Each cell in the thallus has a large, stellate, reddish-brown plastid containing a central pyrenoid; pit connections between adjacent cells are lacking. Younger portions of the thallus are uniseriate (Fig. 1), while older portions become multiseriate through repeated periclinal divisions (Fig. 2). Cells near the basal portion of the thallus typically produce slender, basally directed, rhizoid-like extensions that provide additional anchorage for the plants (Fig. 3). The appearance of the plants is further characterized through the presence of firm, hyaline sheaths which surround individual as well as all cells of the filament (Fig. 1).

Although Bangia has an attached habit, free filaments were often found intertwined among filaments of Cladophora. Kishler and Taft (1970) reported a similar association between these plants in Lake Erie. Like Cladophora, Bangia appears to attain best development where sunlight is plentiful and agitation by water frequent.

In 1976, peak development of Bangia at Lake Forest appeared

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Figure 1. Uniseriate portion of B. atropurpurea that reveals stellate plastids and sheaths surrounding both individual cells and entire filament, X2,300.

Figure 2. Multiseriate condition resulting from repeated periclinal division of cells in older filament of B. atropurpurea (preserved), X4,300.

Figure 3. Rhizoid-like extensions (arrows) from basal cells in holdfast region of B. atropurpurea (preserved), X2,300.

Figure 4. Supralittoral band of B. atropurpurea and Ulothrix zonata growing above submerged Cladophora glomerata on concrete jetty at Lake Forest, July, 1976.

to be reached in July. During this period, a rich reddish-brown band several centimeters in height became apparent on vertical surfaces above the coarser and much bushier growth of Cladophora (Fig. 4). Ulothrix zonata (Weber and Mohr) Kütz. was a third major component of this association. By late summer the red alga had begun to decline and by early November the plants, en masse, were buff-colored and only weakly tinged with pink.

According to Geesink (1973), freshwater Bangia does not produce a Conchocelis phase during its life history and the only known means of reproduction is by neutral spores. Because he found that B. fuscopurpurea (Dillw.) Lyngb. could successfully adapt to fresh water and conversely, B. atropurpurea (Roth) C. Ag. to seawater, he concluded that the species were conspecific and that the latter binomial took precedence. Geesink clearly demonstrated that adaptation takes place through neutral spore formation. Such evidence lends support to the suggestion of Kishler and Taft (1970) that Bangia was introduced to the Great Lakes via ocean-going vessels plying the St. Lawrence Seaway.

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#### LITERATURE CITED

- GEESINK, R., 1973. Experimental Investigations on Marine and Freshwater Bangia (Rhodophyta) from the Netherlands. J. exp. mar. Biol. Ecol., 11:239-247.
- KISHLER, J. and Clarence E. Taft, 1970. Bangia atropurpurea (Roth) C. Ag. in Western Lake Erie. The Ohio Journal of Science, 70(1):56.
- SMITH, G. M., 1950. Fresh-Water Algae of the United States, 2nd ed. McGraw-Hill Book Company, Inc., New York.