TRANSACTIONS, ILL. STATE ACAD. SCI.
Vol. 70, No. 1 (1977)

DISTRIBUTION OF *CHARA* SPECIES IN ILLINOIS

John E. Ebinger and Randy L. Vogel

Eastern Illinois University, Charleston 61920

ABSTRACT: -- A total of 160 recent collections has extended the range of eight species of *Chara* in Illinois. Notes concerning the geographic distribution and county dot maps for six of these species are included. *Chara inconnexa* T. F. Allen is reported from Illinois for the first time.

Except for the taxonomic review of Stotler (1968) and the cytological studies of Williams and Tindall (1975) very little information is available concerning the Characeae of Illinois. Other works on the algae have generally ignored these plants, and at most cite only the generic names (Britton, 1944; Tiffany and Britton, 1952). In the detailed work of Stotler (1968) nine species of *Chara* are reported for the state. Most of his material comes from the southern half of Illinois. Of these, three species are known from a single collection. *Chara fibrosa* Ag. ex Bruz. (as *C. keukensis*) is reported from Wabash County; *C. kieneri* Daily is reported from Menard County; while *C. aspera* Deth. ex Willd. is reported from Cook County. The remaining species have a more general distribution, being known from scattered localities throughout Illinois. At the present time eleven species are known from Illinois. Nine of these were listed by Stotler (1968), one additional species, *Chara haitensis* Turp., was reported from two southern Illinois locations by Williams and Tindall (1975), while *C. inconnexa* T. F. Allen was found during the present study.

Some of the specimens used in the present study were collected by Conservation Biologists of the Division of Fisheries, Illinois Department of Conservation. These biologists were involved in a project that was started in 1964 (Winterringer, 1966), and resulted in the publication of a manual on the identification of aquatic plants in Illinois by Winterringer and Lopinot (1966). The remaining material was collected by the present authors during a study of aquatic communities in east-central Illinois. The specimens collected were from both natural habitats and artificial impoundments. All collections are located in the Stover Herbarium of Eastern Illinois University (EIU) with duplicate material, when available, deposited in the private herbarium of Dr. Fay Kenoyer Daily. Each species listed was found during the present study, and included for most of the species is a county map showing its distribution in Illinois. On these maps a circle represents a county in which the species had been reported previously by Stotler (1968) while a square indicates a new county record. For two of the rarer species no map is included, but the county and collecting data of the specimens are listed.

Acknowledgements: -- The authors would like to thank Dr. Fay Kenoyer Daily for her help in the identification of many of the specimens, and to Mr. Mike Conlin, Chief of the Division of Fisheries, Illinois Department of Conservation, for continuing the collecting program by the Conservation Biologists.

Chara braunii Gmel. -- The only totally ecorticate member of the genus Chara in Illinois. Its ecorticate condition, delicate habit, and long stipulodes in one series makes it easy to recognize. Stotler (1968) reported this species from 8 counties in Illinois, while in the present study it was found in three additional localities (Map 1).

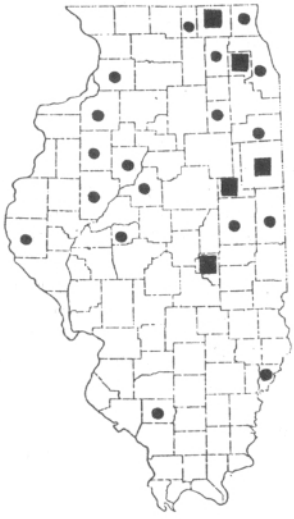
Chara contraria A. Br. ex Kutz. --This fairly robust species commonly grows to 3 or 4 dm tall. It appears to be very similar to C. vulgaris. Grant and Proctor (1972) found no single characteristic or combination of characteristics that would provide a completely clear separation between these two species. Similar results were obtained by Wood (1967) who found that no single external morphological feature could be used for consistent separation. In studying the Illinois species Stotler (1968) also mentioned the difficulty in separating these two taxa. The following characteristics are listed by Grant and Proctor (1972) as being useful. In C. contraria the primary cortical cells of the main axis are equal to or exceed the secondary cortical in diameter, the anterior bract cells rarely exceed 3 times the length of the mature oogonia, and the oospores are black. In C. vulgaris, in contrast, the secondary cortical cells are more prominent, exceeding the diameter of the primary, the anterior bract cells are 6 to 10 times the length of the mature oogonia, and the oospores are usually brown. Stotler (1968) considered this taxon to be the most common in Illinois and recorded it for 18 counties. In the present study it is recorded for 5 additional counties (Map 2).

Chara fibrosa Ag. ex Bruz. --This very delicate species rarely exceeds 1 dm in length. The main axis is corticate while the branchlets are mostly ecorticate, which separates it from the other Illinois species. The taxon found during the present study is ssp. gymnopitys (A. Br.) Zanev. This extremely rare species was reported from one county (Menard) by Stotler (1968).
County record. -- CRAWFORD: Submersed in Lake Walton, 1 mile S of West York, Phillippe 2009.

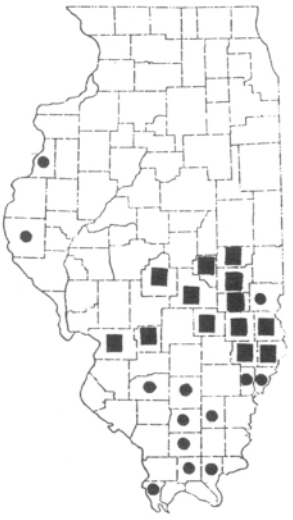
Chara foliolosa Muhl. --This common species is very similar to C. zeylanica. Both have triplostichous main axis and lowest branchlet internodes that are ecorticate. The distinguishing feature of C. foliolosa is that in this species the gametangia are isolated at the branchlet nodes, with either one antheridium or one oogonium per fertile node (sejoined), while in C. zeylanica the gametangia are conjoined. Stotler (1968) referred this taxon to C. sejuncta A. Br., while that binomial is listed as a synonym by Proctor, Griffin, and Hotchkiss (1971). This taxon is probably the most common Chara in Illinois. Stotler (1968) reported it from 13 counties while it was found in 13 additional counties in the present study, occurring in many lakes and ponds in most of the counties visited (Map 3).

Chara globularis Thuill. --This common taxon is fairly robust, growing up to 3 dm high. The triplostichous main axis and the corticate condition of all the branchlet internodes separates it from other species commonly found

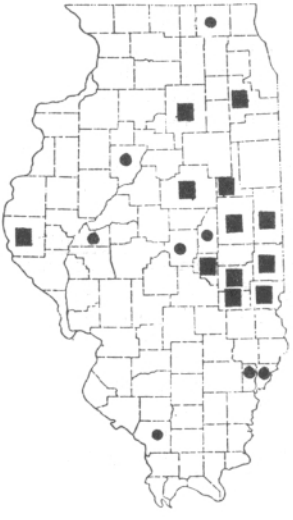
Map 1. Chara braunii



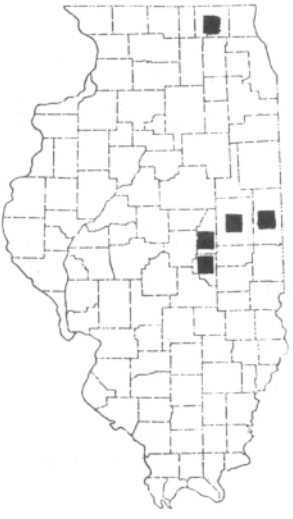
Map 2. Chara contraria



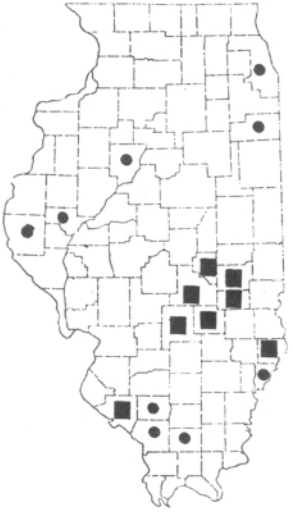
Map 3. Chara foliolosa



Map 4. Chara globularis



Map 5. Chara inconnexa



Map 6. Chara zeylanica

in Illinois. The minute spheroidal stipulodes in two series are also quite distinctive. Stotler (1968) reported it from 8 counties while it was found in 12 additional counties in the present study (Map 4).

Chara inconnexa T. F. Allen. --This taxon is very similar to C. contraria and C. vulgaris, but differs by having an incomplete and variable cortex. Wood (1967) considers it to be a variety of C. vulgaris while Stotler (1968) does not list it for Illinois. This species was found in five counties in east-central and northeastern Illinois (Map 5). Numerous specimens were found in strip mine ponds in Vermilion County.

Chara vulgaris L. --This species is fairly robust and usually heavily lime-encrusted. It is very similar to C. contraria and can only be separated on the basis of cortical cell development. Stotler (1968) reported it from three counties, all in the northern third of Illinois. County records. -- MOULTRIE: Submersed in pond 2 miles W of Lovington, Vogel 842B. VERMILION: Submersed in small pond at Forest Glen Preserve, Ebinger 15772.

Chara zeylanica Klein ex Willd. --This taxon commonly exceeds 5 dm in height, and is the most robust Chara found in Illinois. The main axis of this species is triplostichous, and the lowest brachlet internodes are ecorticate, separating it from all other Chara species in Illinois with the exception of C. foliolosa. The conjoined gametangia of C. zeylanica are the only reliable characteristic separating these two species. Chara zeylanica, however, tends to have thick branchlets with less than 12 segments, while the branchlets of C. foliolosa usually are more delicate and have up to 16 seqments. Proctor, Griffin, and Hotchkiss (1971), in a study of the series Gymnobasalia, list C. haitensis Turpin, a species very similar to C. zeylanica, as also occurring in Illinois. This species differs from C. zeylanica in having 8 shield cells in the antheridium. During the present study it was not encountered as all of the material examined had 4 shield cells in the antheridium. Williams and Tindall (1975) recently found C. haitensis in southern Illinois. According to Stotler (1968) C. zeylanica occurs in 9 counties scattered throughout Illinois while in the present study it was found in 8 additional counties (Map 6).

LITERATURE CITED

BRITTON, M. E., 1944. A catalog of Illinois algae. Northwestern Univ., Evanston, Ill. 177 pp.

GRANT, M. C. and V. W. PROCTOR. 1972. Chara vulgaris and C. contraria: Patterns of reproductive isolation for two cosmopolitan species complexes. Ecology 26:267-281.

PROCTOR, V. W., D. G. GRIFFIN III, and A. T. HOTCHKISS. 1971. A synopsis of the genus Chara, series Gymnobasalia (Subsection Willdenowia RDW). Amer. Jour. Bot. 58:894-901.

STOTLER, R. E., 1968. The Characeae of Illinois. Amer. Midl. Nat. 79:225-239.

TIFFANY, L. H. and M. E. BRITTON. 1952. The algae of Illinois. Univ. of Chicago Press, Chicago. 407 pp.

WILLAMS, J. T. and D. R. TINDAL. 1975. Chromosome numbers for species of Characeae from Southern Illinois. Amer. Midl. Nat. 93:330-338.

WINTERRINGER, G. S., 1966. Aquatic vascular plants new for Illinois. Rhodora 68:221-222.

_____ and A. C. LOPINOT. 1966. Aquatic plants of Illinois. Ill. St. Mus. Popular Sci. Series VI:1-141. Springfield, Ill.

WOOD, R. D., 1967. Charophytes of North America. A guide to the species of Charophyta of North America, Central America, and the West Indies. Stella's Printing, West Kingston, Rhode Island. 72 pp.