Tolypella prolifera Leonh. in Indiana

Fay Kenoyer Daily

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Butler University
Botanical Studies
(1929-1964)

Edited by

Ray C. Friesner
The Butler University Botanical Studies journal was published by the Botany Department of Butler University, Indianapolis, Indiana, from 1929 to 1964. The scientific journal featured original papers primarily on plant ecology, taxonomy, and microbiology. The papers contain valuable historical studies, especially floristic surveys that document Indiana’s vegetation in past decades. Authors were Butler faculty, current and former master’s degree students and undergraduates, and other Indiana botanists. The journal was started by Stanley Cain, noted conservation biologist, and edited through most of its years of production by Ray C. Friesner, Butler’s first botanist and founder of the department in 1919. The journal was distributed to learned societies and libraries through exchange.

During the years of the journal’s publication, the Butler University Botany Department had an active program of research and student training. 201 bachelor’s degrees and 75 master’s degrees in Botany were conferred during this period. Thirty-five of these graduates went on to earn doctorates at other institutions.

The Botany Department attracted many notable faculty members and students. Distinguished faculty, in addition to Cain and Friesner, included John E. Potzger, a forest ecologist and palynologist, Willard Nelson Clute, co-founder of the American Fern Society, Marion T. Hall, former director of the Morton Arboretum, C. Mervin Palmer, Rex Webster, and John Pelton. Some of the former undergraduate and master’s students who made active contributions to the fields of botany and ecology include Dwight. W. Billings, Fay Kenoyer Daily, William A. Daily, Rexford Daudenmire, Francis Hueber, Frank McCormick, Scott McCoy, Robert Petty, Potzger, Helene Starcs, and Theodore Sperry. Cain, Daubenmire, Potzger, and Billings served as Presidents of the Ecological Society of America.

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fertile branchlet: 3-10 at a time; the ultimate ray usually longer than the ducet, bearing usually one one-celled ultimate ray always one aborted), the tip ranging from acute to obtuse, bearing usually one one-celled ultimate ray, the acule with 3-10 at a time; the ultimate ray usually longer than the ducet, bearing usually one one-celled ultimate ray always one aborted), the tip ranging from acute to obtuse, bearing usually one one-celled ultimate ray, the acule with

**FERTILE BRANCHLET: 3-10 at a time; the ultimate ray usually longer than the ducet, bearing usually one one-celled ultimate ray, the tip ranging from acute to obtuse, bearing usually one one-celled ultimate ray, the acule with**

**TOLYPELLA PROLIFERA LEONH. IN INDIANA**

*By Fay Kenoyer Daily*

Although members of the genus Tolypella have been found in Illinois and Ohio, apparently none have been reported previously from Indiana. On September 10, 1947, at Pokagon State Park, Steuben county, Indiana, in one of the display ponds, *Tolypella prolifera* Leonh. was found by W. A. Daily and the author.

This specimen is very similar to the *Tolypella prolifera* Leonh. found in Nebraska by Dr. Walter Kiener and described by the author in 1946 (1); tending, however, toward production of fertile branchlets with ultimate rays having more cells and bearing more short mucronate end cells. A key to the genera of Characeae found in Nebraska was also given in the 1946 publication, and could be used for the Indiana Characeae, since the known members of this group found in Indiana are the same as are found in Nebraska.

The members of the Characeae are all similar in that they are made up of whorls of structures called branchlets occurring at succeeding nodes on the stem. Branchlets of a given whorl are usually more or less similar in size and structure. Differential characteristics are given in the following paragraphs.

The genus Tolypella (Plate I-A) contains plants having whorls of similar sterile branchlets as well as whorls of fertile branchlets. The sterile branchlets are usually simple unbranched structures of a few cells attached end to end; however, they may be branched. The ultimate cells may be conical or elongate.

The fertile branchlets of members of the genus Tolypella have a main axis giving rise to lateral processes. The main axis is topped by an ultimate ray made up of one to several cells and usually long overtopping the rest of the branchlet. The lateral rays are smaller than the ultimate ray and are usually made up of several cells. A lateral ray may occasionally also give rise to lateral processes. The long overtopping ultimate rays and the crowding of the fertile whorls give the usual Tolypella a characteristic appearance by producing nest-like heads.

Antheridium and oogonia are produced laterally at the nodes of the...
branchlet or at the base of the whorls of branchlets. The small crown of cells, the coronula, at the top of the oogonium is made up of 10 cells in 2 tiers of 5 cells each. The ooospores are terete or cylindrical and slightly tapering at each end.

There is considerable variation in the appearance of the plant body in Nitella. Although heads may occasionally be produced, they differ from Tolypella in that they are usually symmetrical due to the furcation of the branchlet into more or less equal rays. Many Nitellas do not have crowded fertile whorls producing heads. In fact, some Nitellas do not have branchlets furcate to the extent shown in the illustration of Nitella tenueissima Kütz. (Plate I-B), but in the simplest form may have only one node giving rise to only one ultimate ray.

The antheridia in Nitella are terminally produced at the summit of a ray at a node. The oogonia are formed beneath the antheridia as a lateral outgrowth. The coronula is of two tiers of five cells each as in Tolypella. The ooospores are flattened laterally.

In Chara (Plate I-C), the branchlet has a central axis as in Tolypella. Several nodes are usually found, each giving rise to one-celled processes called bracts.

The antheridia and oogonia are produced laterally at the branchlet nodes. The oogonium differs from that found in Nitella and Tolypella in having a five-celled coronula. The ooospore is terete. At the base of the branchlets are one-celled structures called stipulodes.

Although some Charas do not have it, others develop cortication which means that the stem and branchlet internodes are covered by a layer of cells one cell in thickness. The illustration (Plate I-C, fig. 2) shows how the layer of cortication surrounds the central cell of the stem in cross section. Cortication is not found in Tolypella or Nitella.

The chief differential characteristics of the Characeae found in Indiana are compared for convenience in Table I.

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LITERATURE CITED

I-A. *Tolypella prolifera* Loebl. 1. Sterile branchlet. 2. Coronula of oogonium. 3. Fertile branchlet. 4. A portion of the plant, \( \frac{1}{2} \) natural size.

I-B. *Nitella tenax* Kütz. 1. A portion of a branchlet, showing only one of several similar rays in some cases, the other rays being represented by only basal portions. 2. Portion of plant, \( \frac{1}{2} \) natural size.

I-C. *Chara contraria* A. Br. 1. Oogonium. 2. Transverse section of the stem. 3. The basal portion of a whorl of branchlets arising from the stem, showing one branchlet completed.
TABLE I

Chief characteristics of the Genus Tolypella as compared with the two other Genera of Characeae found in Indiana

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Monopodial</th>
<th>Simple (1 node with 1 ultimate ray), obscurely monopodial, simply or successively furcate into more or less equal rays</th>
<th>Monopodial</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fertile branchlet growth</td>
<td>Genus Tolypella</td>
<td></td>
<td>Genus Nitella</td>
</tr>
<tr>
<td>2. Length of branchlet rays or bracts</td>
<td>Unequal rays</td>
<td>More or less equal rays</td>
<td>Variable bracts</td>
</tr>
<tr>
<td>3. Branchlet whorls</td>
<td>If fertile, clustered into nest-like heads</td>
<td>If fertile, may or may not be clustered into symmetrical heads</td>
<td>Not usually crowded except at apex</td>
</tr>
<tr>
<td>4. Branchlet and stem cortication</td>
<td>Excorticate</td>
<td>Excorticate</td>
<td>Corticate or excorticate</td>
</tr>
<tr>
<td>5. Antheridia and oogonia</td>
<td>Both lateral</td>
<td>Antheridia-terminal, oogonia-lateral</td>
<td>Both lateral</td>
</tr>
<tr>
<td>6. Coronula of oogonium</td>
<td>10 cells in 2 tiers</td>
<td>10 cells in 2 tiers</td>
<td>5 cells in 1 tier</td>
</tr>
<tr>
<td>7. Stipules</td>
<td>None</td>
<td>None</td>
<td>Present</td>
</tr>
<tr>
<td>8. Oospore</td>
<td>Terete</td>
<td>Laterally flattened</td>
<td>Terete</td>
</tr>
</tbody>
</table>

This is a general classification and exceptions may occur.