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BOOK REVIEW

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Ferns of Tennessee with the Fern Allies Excluded

By Jesse M. Shaver. Bureau of Publications, George Peabody College, Nashville 5, Tenn. XVIII+502, ill. 1954. $6.00.

This is by far the finest state fern flora thus far to appear. A labor of love, it represents the product of what time and energy that Dr. Shaver could salvage from his heavy duties as teacher, administrator and editor.

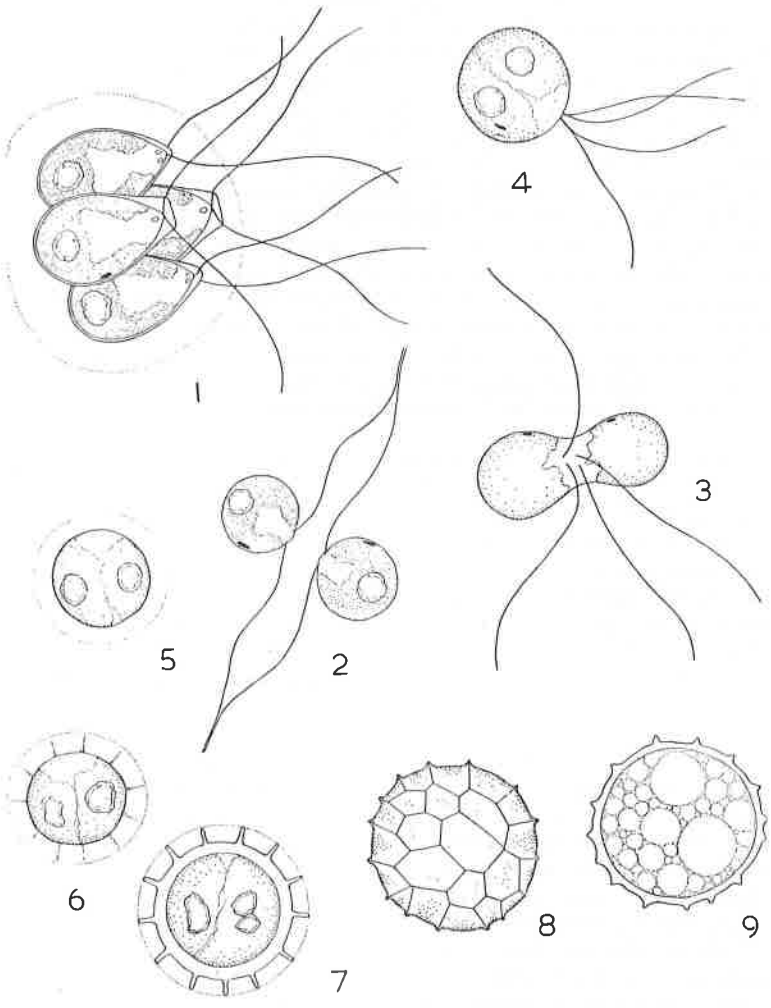
No book on American ferns is so profusely and adequately illustrated. Line drawings represent, not only the common species but also many of the unusual varieties or aberrant forms, often even to the minute details of venation. There are half-tones prepared from photographs of each species and the distribution of most species is given on a state map with county outlines. Of the 248 illustrations 81 are half-tones and 54 are maps.

Descriptions in the text leave little to be desired, the details of structure and variations being fully discussed. Moreover these descriptions and discussions of distribution (including out-of-state ranges as given by Broun) are each followed by a very useful bibliography where these matters may be pursued further. A list of prepared collections which were examined by the author follows the discussion of the last fern (*Azolla*) on p. 456. A satisfactory glossary is followed by an index to Latin names and another to common names of Tennessee ferns.

The initial chapter, "Some General Notes on Ferns," will delight the amateur "fernologist" as well as provide important information to the professional pteridologist. Here are discussed such matters as the fern life cycle, folklore, a fern herbarium, nomenclature, fern gardening and general fern geography in Tennessee.

There are a few errors in the book, most of them minor such as the misspelling of *hexagonoptera* on pp. 279-282. The more serious ones are caught by the author himself and listed on p. viii. That there are not more is surprising considering that the volume was mostly produced in a difficult manner: as a series of articles in THE JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE. The pagination and dates of the publications of these parts are listed on p. 490. The early publication (1942) of the initial chapter makes the information (p. 25) about the American Fern Society out-of-date. Its present annual dues are $2.00 and its treasurer is Dr. Ronald L. McGregor, Department of Botany, University of Kansas, Lawrence, Kansas.

Keys to genera and species (given only in a few instances, e. g., *Cystopteris*) may be desired by some but the illustrations and descriptions are such that no one should have difficulty in



EXPLANATION OF FIGURES 1-9

Gonium sociale (Dujardin) Warming. All figures were drawn with the aid of a camera lucida, using a 2 mm. oil immersion objective and a 10X ocular. The approximate magnification of the figures is X1462. Fig. 1. Lateral view of a colony, each cell shown in longitudinal section. Fig. 2. Pair of gametes showing agglutinated flagella. Fig. 3. Fusing gametes. Fig. 4. Quadriflagellate planozygote. Fig. 5. Young zygote soon after becoming quiescent. Figs. 6, 7. Stages in the formation of resistant reticulate wall of the zygote, in median optical section. Fig. 8. Surface view of mature zygote. Fig. 9. Median optical section of mature zygote showing many oil drops.

the tube. The first microscopic evidence of sexuality in a culture is the appearance of a green viscous film in this lighted area. Microscopic examination of this film will reveal the presence of all stages in the sexual process. Sexual stages did not usually appear until one to three weeks after inoculation of the liquid medium, at which time almost the entire culture would undergo sexual reproduction. The variation in the time of sexual activity seems to be correlated with the amount of illumination and its effect on the multiplication of the alga. Both soil-water and liquid soil extract media were used in securing the sexual stages; the presence or absence of bacteria seemed to have no influence on the appearance of sexual stages in the respective media. No sexual reaction could be obtained by the transfer of cells from agar slants to liquid in hanging drop preparations. Zygotes ultimately appeared in all clonal cultures originally isolated, indicating the homothallic nature of this strain.

The production of gametes by vegetative cells was not observed. The first manifestation of the sexual process was the pairing of the isogamous biflagellate gametes (fig. 2). Each gamete is a spherical, biflagellate cell which apparently has no cell wall; the use of plasmolytic agents and observations made during the sexual process fail to show a cell wall. The pairs of gametes are held together by an agglutination of the ends of their flagella (fig. 2). In hanging drop preparations these agglutinated flagella stick to the cover glass while the bodies of the gametes are bumped together by contractions of the free portions of the flagella. Fusion of the paired gametes is rapid, once the gametic bodies actually become joined in the region of the blepharoplast (fig. 4). The quadriflagellate planozygote (fig. 5) remains motile for an undetermined period of time before becoming quiescent. Upon cessation of movement, the zygote loses its flagella and secretes a thick gelatinous wall which is homogenous (fig. 6). As the zygote ages, radiating streaks of a more dense composition appear in the gelatinous wall (fig. 7). These streaks are the precursors of the reticulations which the zygospore wall possesses at maturity. The ornamentation becomes increasingly sharply defined with age (fig. 8), until, at maturity, the remainder of the gelatinous layer decomposes, leaving the zygospore surface freely exposed; this is covered with a series of sharp ridges united in a net-like pattern (fig. 9). In optical section the ridges appear as radiating spines on the surface of the zygospore (fig. 10). The loss of the gelatinous protective covering is possibly responsible for the decrease in sharpness of the ridges of the mature zygospore surface. The zygospores are green at first, but soon become filled with oil (fig. 10) and turn light-brown. A maximum size of 18 microns is attained by some zygospores. No attempts have been made to effect germination of the zygospores.

SUMMARY

1. The homothallic, isogamous sexual reproduction of *Gonium sociale* (Dujardin) Warming is described and illustrated.
2. Bacteria-free clonal cultures of the organism are maintained in the collection of algae at Indiana University (No. 14).

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AN ANNOTATED LIST OF THE VASCULAR PLANTS OF THE GORGES OF THE FALL CREEK FALLS STATE PARK

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In the course of a phytosociological study of the vegetation of the gorges of the Fall Creek Falls State Park, a collection was made of the plants encountered there. In addition, habitat notes were made concerning all of the species collected.

Since so little material has been published with specific reference to the vegetation of the Cumberland Plateau in Tennessee, it appeared advisable to prepare a list of species collected, along with some of the habitat notes. In order to make the list as complete as possible, the herbarium of the University of Tennessee was consulted for additional species from the gorges. Wherever collections are cited for species included in the herbarium of the University of Tennessee, the name (s) of the collector (s) and the University of Tennessee collection number is given. Other species are represented by specimens collected by the author and deposited in the herbarium of Vanderbilt University. The scientific names of species and their arrangement correspond to those in Gray's Manual of Botany, 8th Edition (Fernald, 1950) unless noted specifically.

No information is presented here dealing with the general distribution of the true ferns, sedges of the genus *Carex*, or woody plants. This is because of the recent treatment of the