

that may be constituted by the presence of the bacteria flora.

Tubificids are usually considered an "indicator" of organic pollution. Emphasis was placed on bacteria living with or attached to soil particles adhering to the organisms.

The biochemical reactions of the Enterobacteria on Triple Sugar Iron Agar determined the following bacteria: (1) *Escherichia coli*, (2) *Proteus vulgaris*, (3) *Pseudomonas aeruginosa*, (4) *Serratia marcescens*.

The bacteria found in association with Tubificidae are known to cause urinary tract infections in man and also septicemia, meningitis, respiratory tract infections, peritonitis, diarrhea, and other infections that prove hazardous to man.

Vegetation Analysis of a South Facing Slope on Center Hill Reservoir. David Barnett and Cheryl A. Carter, Tennessee Technological University.

A plant analysis was made of a south facing slope on Tech Aqua Biological Station on Center Hill Reservoir near Smithville, Tennessee. In the tree layer, four species—*Quercus muehlenbergii*, *Fraxinus americana*, *Juniperus virginiana*, and *Quercus velutina*—were found to be the highest in relative density, frequency, relative frequency, and relative dominance. *Juniperus*

virginiana, *Quercus muehlenbergii*, and *Fraxinus americana* had the highest dominance in the shrub layer, also. These data suggest that the community is stable, since the most important trees species in both the tree and shrub layers are the same.

A 24-Hour Survey of Selected Chemical and Physical Parameters in Clarksville Lake (Montgomery County, Tennessee). Michael L. Davis, Fred W. Keyes and Diane I. Findley, Austin Peay State University.

Water temperature, dissolved oxygen, conductivity, pH, Secchi disc transparency, nitrate nitrogen, ortho phosphate, calcium hardness and total hardness were measured at three hour intervals in a small man-made lake from 1030 September 2 to 0730 September 3, 1976.

Oxygen concentrations were greatest during daylight hours. Total hardness, calcium hardness and pH were at maximum concentrations during hours of highest CO₂ production. Only scant traces of nitrate nitrogen and ortho phosphate were found.

In most cases temperature decreased with depth but stratification did not occur. Slight changes in conductivity correlated with hardness changes. From Secchi disc transparencies a photo-synthetic zone was determined.

JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE

VOLUME 52, NUMBER 2, APRIL, 1977

THE DISCOVERY OF *TORTULA FRAGILIS* TAYL. (MUSCI) IN TENNESSEE

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ABSTRACT

The moss *Tortula fragilis* Tayl. is reported for the first time in Tennessee. A description and illustration of Tennessee specimens is given with some discussion of the distribution and variability of this species in North and South America.

INTRODUCTION

The bryophytes of Tennessee have been the subject of investigation for nearly fifty years. Sharp (1939), after a decade of study, reported 426 species from the eastern third of the state. Additions to this first comprehensive species list are reported by Clebsch (1954, 1974), Sharp, Clebsch, and Bissel (1968), McNeilus and Sharp (1975), and Smith (1975). Still, the exploration of unique habitats in Tennessee continues to provide new state floristic records.

DISCOVERY

New to Tennessee is the report of *Tortula fragilis* Tayl., a species rarely collected east of the Mississippi River. It is more common in the southwestern U.S., with a central range in Mexico and Guatemala. *T. fragilis* represents another species which can be added to a list of exotic species already known from Tennessee, either by their northern or southern extent in range or as significant disjuncts from tropical America and Asia (see Sharp, 1938).

The specimen cited here is deposited in the Herbarium of the University of Tennessee, Knoxville.

Tortula fragilis Tayl. Tennessee, Smith County. Found on vertical calcareous bluffs along Caney Fork River between Rock Springs Branch and Opossum Valley, Smith 4858, June 29, 1976. A single cushion ca. 3 cm in diameter was found growing on a vertical rock surface 20 feet above the river water level. Associated species were *Anomodon rostratus* (Hedw.) Schimp., *Clasmatodon parvulus* (Hampe) Hook. & Wils. ex Sull., and *Gymnostomum angustifolium* Saito. Known east of the Mississippi River only from West Virginia and Virginia.

The following description and illustrations (Fig. 1) are drawn from Tennessee specimens only.

Dioicous; archegoniate plants only; gametophytes small, to 1.5 cm tall, stems matted forming compact caespitose cushions held together by dense rhizoids beneath; upper shoot bright green when wet, rosetiform with spreading leaves, gray-green when dry with crisped spirally twisted leaves. Stem with a conspicuous central strand of smaller thin walled cells. Leaves eroded except for uppermost and innermost, spatulate 2.0 – 2.5 mm long, rounded obtuse at tip with a 1 or 2 celled apiculus from an excurrent costa; margins plane, crenate above by marginal notches which extend into the lamina as cleavage lines. Lower leaves erose, often only as persistent costae with laminal remnants. Cells sub-

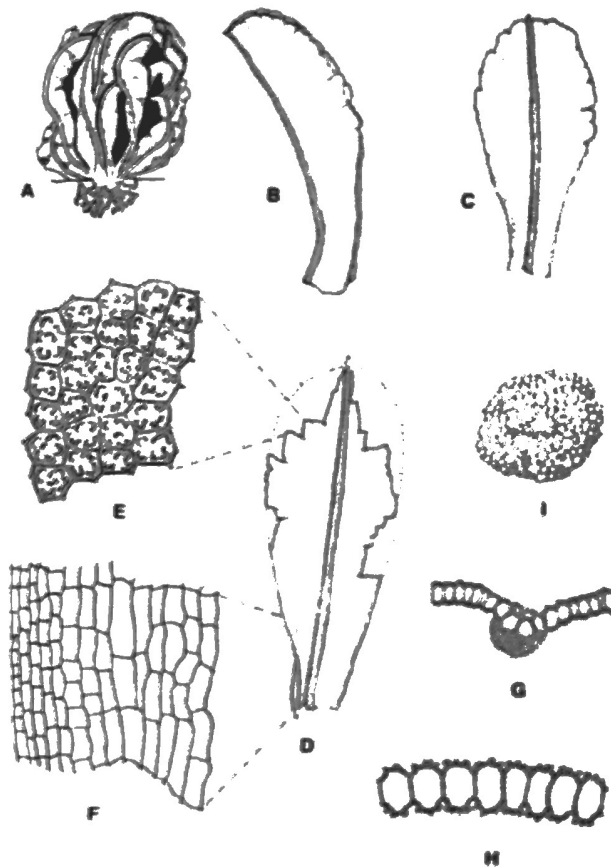


FIG. 1: A. *Tortula fragilis* Tayl. Dry habit sketch, $\times 10$. B-C. Intact leaves, $\times 30$. D. Fragmented leaf, $\times 30$. E. Leaf fragment of upper lamina with surface view of C-shaped papillae, $\times 800$. F. Basal cells of leaf from left side margin to right side costa, $\times 200$. G. Cross section near midleaf showing surface papillae and dorsal stereid band, $\times 250$. H. Cross section of upper lamina showing branching of surface papillae, $\times 600$. I. Cross section of stem showing central strand, $\times 120$.

quadrate above (7)–10–(15) microns with (3)–4–(7) branched C-shaped papillae, below enlarged hyaline rectangular basal cells 20 x 35–70 microns set off from the margin by several rows of smaller, shorter cells with slightly thickened end walls.

Comparisons among specimens from all parts of the known range of *T. fragilis* except South America show considerable variation. Bartram (1926) commented on this variability in re-evaluating the taxonomic status of *Tortula fragillifolia* Bartr. (Bartram, 1924) described from Arizona, now placed in synonymy under *T. fragilis*. Tennessee plants closely match the description and illustration of Arizona specimens (Bartram, 1924; Grout, 1939) but show minor differences from Mexican and Guatemalan specimens. American specimens contain obvious crenate upper leaf margins which readily fragment, invariably lack sporophytes, and are

of short stature. Specimens from Mexico and Guatemala are larger, have continuous margins, and commonly bear sporophytes. The friable leaf character with or without visible lines of cleavage coupled with a continuous or notched upper margin is not judged important enough to segregate northern and southern populations into distinct species (Bartram, 1926); however, restudy of *T. fragilis* throughout its range may reverse this opinion.

T. fragilis is widely distributed in the New World South America, Guatemala, Haiti, Mexico, and southern United States (Crum, 1951). East of the Mississippi River it is rare, known only from Virginia, West Virginia (Grout, 1939) and, with this report, Tennessee. West of the Mississippi River it is known from Oklahoma (Redfearn, 1970), Texas (Whitehouse & McAllister, 1954) and Arizona (Bartram, 1924 as *Tortula fragillifolia*).

SUMMARY

The discovery of *Tortula fragilis* Tayl. along calcareous bluffs of Caney Fork River, Middle Tennessee represents the newest addition to the state bryophyte flora. Besides Tennessee, *T. fragilis* is known east of the Mississippi River only from Virginia and West Virginia. It is more common in the southwestern United States and further south through Mexico, Central America and into South America. Comparisons between specimens from northern and southern ranges may reveal differences sufficient for dividing this highly variable and widely distributed species.

ACKNOWLEDGMENT

Contributions from the Botanical Laboratory, University of Tennessee, N.S. No. 479.

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