JOURNAL

OF THE

Tennessee Academy of Science

VOLUME XLIV NUMBER 4

CONTENTS

Page
Natural Reproduction on Upland Sites in the Cumberland Mountains of Tennessee. E. Thor, H. R. DeSelm and W. H. Martin
Substituent Effects in the Reduction of some 3'-or 4'- Substituted 4-Azobenzene-sulfonic Acids by Sodium Dithionite in Alkaline Solution. C. R. Wasmuth, A. F. Bridges, K. W. Carr, M. C. Nelson and A. B. Wilson
Detecting the Presence of European Wild Hogs in Wild Swine Populations. Vernon G. Henry
Heterochlamydomonas, A New Alga from Tennessee Soil. Edmond R. Cox and Temd R. Deason
Some Properties of Certain Hyper-Solids. Herta Taussig Freitag and Arthur H. Freitag
Food Habits of the Copperhead in Middle Tennessee. John S. Garton and Ralph W. Dimmick
Radiation-Induced Anatomical Modifications in Forest Trees. J. P. Witherspoon and F. G. Taylor, Jr
Index for 1969125

October 1969

JOURNAL

OF THE

Tennessee Academy of Science

EDITORIAL STAFF

DONALD CAPLENOR, Editor, Tenn. Tech. Univ., Cookeville 38501

JAMES D. CAPONETTI, Botany Editor, University of Tennessee, Knoxville 37916

FREDERICK L. CULP, Physics-Astronomy Editor, Tenn. Tech. Univ., Cookeville 38501

James B. Delano, Engineering Editor, Arnold Engineering Development Center, Tullahoma 37388

STUART W. MAHER, Geology-Geography Editor, Tennessee Division of Geology, Knoxville 37919

MARK M. JONES, Chemistry Editor, Vanderbilt University,

Nashville 37203
Mrs. G. H. Lundberg, High School Science-Mathematics Editor, Peabody Demonstration School, Nashville 37203

ROBERT E. MARTIN, News Editor, Tenn. Tech. Univ. RONALD SIRCY, Mathematics Editor, Tenn. Tech. Univ.,

Cookeville 38501 JOHN B. THOMISON, Medical Sciences Editor, School of Medicine, Vanderbilt University, Nashville 37203

R. P. Ward, Zoology Editor, Peabody College, Nashville 37203

All articles and communications for publications, books, and publications for review, should be addressed to the

New subscriptions, changes of address and applications for membership should be addressed to the Secretary. Personal items, news of events in the scientific world, and other notes suitable for the "News of Tennessee Science" department should be addressed to the News Editor.

Published quarterly, in January, April, July and October, by the Tennessee Academy of Science at Box 186A, Tennessee Technological University, Cookeville, Tennessee 38501. The JOURNAL is sent to all members not in arrears for dues. The subscription price is \$5.00 a year, invariably in advance. Single copies \$1.25.

Second Class Postage Paid at Nashville, Tennessee.

THE TENNESSEE ACADEMY OF SCIENCE

(Founded 1912, at Nashville, Tennessee) Affiliated with the American Association Association for the Advancement of Science

Affiliated Societies

Tennessee Ornithological Society, Nashville, Tennessee Barnard Astronomical Club, Nashville Tennessee Science Teachers' Association Tennessee Psychological Association

Officers

Gus Lundberg, President, Austin Peay State University, Clarksville 37040

JAMES L. WILSON, President-elect, University of Tennessee Nashville Center, Nashville 37203

Donald Caplenor, Editor, Tenn. Tech. University, Cooke-

JAMES D. CAPONETTI, Secretary, University of Tennessee,

ROBERT WILSON, Tr. Chattanooga 37403 Treasurer, University of Chattanooga,

WILLIAM F. NELSON, Director of the Reelfoot Lake Bio-logical Station, University of Tennessee at Martin, Martin

Executive Committee

ROBERT AMY, Southwestern College, Memphis 38112 JOHN H. BAILEY, East Tennessee State University, Johnson City 37602

DONALD CAPLENOR, Tenn. Tech. University, Cookeville 38501

JAMES D. CAPONETTI, University of Tennessee, Knoxville

Gus Lundberg, Austin Peay State University, Clarksville

ALBERT MEYERS, Carson-Newman College, Jefferson City

WILLIAM F. NELSON, University of Tennessee at Martin, Martin 38237

RICHARD J. RARIDON, Oak Ridge National Laboratories, Oak Ridge 37831

ROGER RUSK, University of Tennessee, Knoxville 37916 JAMES L. WILSON, University of Tennessee Nashville Center, Nashville 37203

ROBERT WILSON, University of Chattanooga, Chattanooga 37403

NOTICE TO AUTHORS

Papers submitted for publication in the Journal may be sent to any member of the editorial staff. Manuscripts must be approved by the Editor and the appropriate Section Editor before publication. Manuscripts should be typewritten, double or triple spaced, with wide margins, and with legends for figures typed on a separate page. Recent issues should be consulted with regard to matters of style. Each table should be placed on a separate sheet. Footnotes should not be used except very rarely. Greek letters and should not be used except very rarely. Greek letters and symbols should be avoided as much as possible.

Each paper should be supplied with an abstract not to exceed 250 words.

Photographs (black and white glossy prints) may be accepted as illustrations; however, line drawings and diagrams are preferable. Drawings should be made in India ink on white paper or Bristol Board. An article containing more than 2 illustrations can be published only with financial cooperation of the author.

A per page charge of \$10.00 will be made to industrial contributors.

A blank form for ordering reprints from the printer is enclosed with the galley proof. The cost of reprints is as

	2	4	8	12	10
100 copies Ea. add. 100	pages \$12.00 2.00	pages \$20.00 3.00	pages \$38.00 8.50	pages \$47.00 12.25	\$56.00 16.00

The Tennessee Academy of Science is very anxious to include in its membership all teachers and professors of science, research workers in science both in educational institutions and industrial establishments, and all others who are interested in some phase of science.

The annual dues are \$5.00 for members except teachers below the college level, whose dues are \$3.00, and \$10.00 for sustaining members. Dues may be sent direct with your application for membership to the Secretary.

This journal is abstracted by Biological Abstracts and Chemical Abstracts, and indexed by Science Citation Index.