

Tennessee Academy of Science

EXECUTIVE COMMITTEE

President

Martin Stewart
Dept. of Chemistry
Middle Tennessee State Univ.
Murfreesboro, TN 37132

Past-president

David J. Wilson
Brown and Caldwell
501 Great Circle Road
Nashville, TN 37228

President-elect

Jack Rhoton
East Tennessee State Univ.
Box 70684
Johnson City, TN 37614-0684

Secretary

Sarah H. Swain
Dept. of Biology
Middle Tennessee State Univ.
Murfreesboro, TN 37132

Treasurer

John W. Harris
Dept. of Biology
Tennessee Tech. Univ.
Cookeville, TN 38505

Managing Editor

M. Gore Ervin
Dept. of Biology, Box 60
Middle Tennessee State Univ.
Murfreesboro, TN 37132

Meeting Coordinator

J. Michael Redding
Dept. of Biology
Tennessee Tech. Univ.
Cookeville, TN 38505

Dept. of Education Liaison

Linda Jordan
8th Floor, Gateway Plaza
710 James Robertson Pkw.
Nashville, TN 37243-0379

Director, Junior Academy

Jack Rhoton
East Tennessee State Univ.
Box 70684
Johnson City, TN 37614-0684

Director, Collegiate Division

Richard Raridon
111 Columbia Drive
Oak Ridge, TN 37830

Director, Electronic Communication

David H. Kesler
Dept. of Biology
Rhodes College
Memphis, TN 38112-1690

Director, Visiting Scientist Prog.

Michael L. Daley
Dept. of Electrical Engineering
The Univ. of Memphis
Memphis, TN 38152

Chair, Education

Cindi Smith-Walters
Dept. of Biology
Middle Tennessee State Univ.
Murfreesboro, TN 37132

Chair, Financial Oversight

Andrew Sliger
Dept. of Biological Sciences
Univ. of Tennessee, Martin
Martin, TN 38238

Chair, Industry and Government

Ted Sadler Lundy
College of Engineering
Univ. of Tennessee, Knoxville
Knoxville, TN 37996-0750

Chair, Long Range Planning

George Murphy
Dept. of Biology
Middle Tennessee State Univ.
Murfreesboro, TN 37132

Chair, Publicity

Teresa Fulcher
Natural Sciences
Pellissippi State Tech. College
Knoxville, TN 37933-0990

1999-2001 Member-at-large

Karen Kendall-Fite
Math and Science Dept., Box 1315
Columbia State Comm. College
Columbia, TN 38402-1315

2000-2002 Member-at-large

David T. Pitts
Dept. of Biological Sciences
Univ. of Tennessee, Martin
Martin, TN 38238

2001-2003 Member-at-large

Steven M. Wright
Dept. of Biology, Box 60
Middle Tennessee State Univ.
Murfreesboro, TN 37132

The TENNESSEE ACADEMY OF SCIENCE was founded in 1912 at Nashville, Tennessee. Membership is open to 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. Annual dues are \$20 for members and fellows, except students and emeritus members whose dues are \$10. Life membership is \$200. Applications for membership should be addressed to the Treasurer.

Affiliated societies of the Academy are: American Association for the Advancement of Science (AAAS); Barnard Astronomical Society, Clarence T. Jones Memorial Observatory, Chattanooga; Barnard-Seyfert Astronomical Society, Nashville; National Association of Academies of Science; Tennessee Association of Science Department Chairs; Tennessee Junior Science and Humanities Symposium; Tennessee Entomological Society; Tennessee Ornithological Society, Nashville; Tennessee Psychological Association; and Tennessee Science Teachers' Association.

The JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE (ISSN 0040313X) is published by the Tennessee Academy of Science, Department of Biology, Tennessee Technological University, 900 N. Dixie Avenue, Cookeville, TN 38505, for all members not in arrears for dues. The subscription rate is \$20 per year. Single copies of recent issues are \$10. Whole sets of back issues on microfilm are available from AMS Press, Inc., 56 E. 13th Street, New York, NY 10003. Postage paid at: Cookeville, TN, and at additional mailing offices. Send address changes to: JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE, C/O DR. JOHN W. HARRIS, DEPARTMENT OF BIOLOGY, TENNESSEE TECHNOLOGICAL UNIVERSITY, P.O. BOX 5063, COOKEVILLE, TN 38505.

This Journal is abstracted by Biological Abstracts, Chemical Abstracts, and Nuclear Abstracts, and is indexed by Science Citation Index and Agricola Citations.

JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE

MANAGING EDITOR

M. Gore Ervin
Dept. of Biology, Box 60
Middle Tennessee State Univ.
1500 Greenland Drive
Murfreesboro, TN 37132
Phone: 615-898-2045
FAX: 615-898-5093
E-mail: mervin@mtsu.edu

EDITORIAL BOARD

Botany

James D. Caponetti
Dept. of Botany
Univ. of Tennessee, Knoxville
Knoxville, TN 37916

Ethics in Science and Technology

Robert Riser
Computer and Information Sci.
East Tennessee State Univ.
Johnson City, TN 37614

Medical Sciences

Robert O'Bannon
Dept. of Biology
Lee College
Cleveland, TN 37311

Cell and Molecular Biology

Charles J. Biggers
Dept. of Biology
The Univ. of Memphis
Memphis, TN 38152

Geology and Geography

David N. Lumsden
Dept. of Geological Sciences
The Univ. of Memphis
Memphis, TN 38152

Microbiology

Anthony L. Newsome
Dept. of Biology
Middle Tennessee State Univ.
Murfreesboro, TN 37132

Zoology I

James A. Huggins
Dept. of Biology
Union Univ.
Jackson, TN 38305

Chemistry

Martin V. Stewart
Dept. of Chemistry
Middle Tennessee State Univ.
Murfreesboro, TN 37132

History of Science

George E. Webb
Dept. of History
Tennessee Tech. Univ.
Cookeville, TN 38505

Physics and Astronomy

Martha Weller
Dept. of Physics and Astronomy
Middle Tennessee State Univ.
Murfreesboro, TN 37132

Zoology II

Karl H. Joplin
Dept. of Biological Sciences
East Tennessee State Univ.
Johnson City, TN 37614-0703

Engineering

Michael L. Daley
Dept. of Electrical Engineering
The Univ. of Memphis
Memphis, TN 38152

Math and Computer Science

William K. Glunt
Dept. of Math. and Computer Sci.
Austin Peay State Univ.
Clarksville, TN 37044

Science and Math Teachers

Sarah F. Barlow
Dept. of Biology
Middle Tennessee State Univ.
Murfreesboro, TN 37132

INFORMATION FOR CONTRIBUTORS

THE JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE is open to papers dealing with science. Acceptable topics include biology, chemistry, engineering, geology, geography, history of science, mathematics, computer science, medical sciences, physics, astronomy, and science teaching. Papers must be of interest to people residing and working in Tennessee.

Manuscripts should include a brief but explicit title, and the name, affiliation, and address for each author. All manuscripts must have an abstract consisting of one paragraph of 250 words or less. An introduction (with no heading) follows the abstract and includes the purpose of the study or paper. The text follows the introduction and should be divided by central main headings such as materials and methods, results, and discussion. However, organization of the main headings will vary depending on the discipline. The text should be followed with sections such as literature cited, appendix, figure legends, and tables, as needed. Figure legends and tables should be on a separate page.

Type and double space all materials including abstract, text, literature cited, figure legends, and tables on one side of a substantial grade of standard size (22 by 28 cm) white paper. Leave 2.5 cm margins on all text pages. Do not right-justify, and avoid hyphenated words at right-hand margins. All text to be printed in italics should be typed in italics. Do not use boldface or underline.

Submit three copies of each manuscript, including figures, to the Managing Editor. Manuscripts will be reviewed by at least two appropriate reviewers and are subject to editing. Final acceptance of the paper is decided by the Managing Editor. At least one author of any accepted paper must be a member of the TENNESSEE ACADEMY OF SCIENCE before the paper can be published. A charge of \$45 per printed page is required to help defray the costs of publication. Payment of the total cost of publication (\$90 per printed page) normally will result in early publication. Reprints (in multiples of 100) may be ordered at the time proofs are received. Payment of page charges and reprint costs is expected prior to publication.

Prospective authors can consult a recent *Journal* issue for general style. Detailed instructions are available from the Managing Editor and on the TENNESSEE ACADEMY OF SCIENCE Website (<http://tas.rhodes.edu/tas/.htm>). Manuscripts that are not in proper form may be returned to the authors without review.