

# 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](mailto:mervin@mtsu.edu)

## EDITORIAL BOARD

### *Botany*

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

### *Ethics in Science and Technology*

Norman Tolk  
Dept. of Physics and Astronomy  
Vanderbilt University  
Nashville, TN 37235

### *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*

Jon H. Lowrance  
Dept. of Biology  
Lipscomb Univ.  
Nashville, TN 37204

### *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 was established in 1925 to publish science-based papers that are of interest to people residing and working in Tennessee. Acceptable topics include biology, chemistry, engineering, geology, geography, history of science, mathematics, computer science, medical sciences, physics, astronomy, and science teaching. 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 x 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.

**INSTITUTIONAL SUSTAINING MEMBERS  
OF THE TENNESSEE ACADEMY OF SCIENCE**

Austin Peay State University, Clarksville, Tennessee

Middle Tennessee State University, Murfreesboro, Tennessee

The University of the South, Sewanee, Tennessee

Tennessee Technological University, Cookeville, Tennessee

The University of Tennessee, Martin, Martin, Tennessee

**FUTURE MEETINGS OF THE  
TENNESSEE ACADEMY OF SCIENCE**

2002

East Tennessee State University  
Johnson City, Tennessee