JOURNAL

OF THE Tennessee Academy of Science

VOLUME 94 NUMBERS 1–2

CONTENTS

President of the Tennessee Academy of Science for 2019	1
Proceedings of the Tennessee Academy of Science 2018	3
Executive Committee Meeting, April	3
Executive Committee Meeting, November	6
Tennessee Academy of Science 128th Meeting	9
Host of the 128th Meeting: Austin Peay State University	11
Distinguished Secondary School Science Teacher Award: 2018	11
Abstracts of Papers Presented at the 128th Meeting	12
Abstracts of Posters Presented at the 128th Meeting	28
Best Student Presentation Awards	46
New Members of the Tennessee Academy of Science: 2018 Membership Year	50
Re-Discovery of the Globally-Rare Crataegus harbisonii Beadle (Rosaceae) in Obion County, Tennessee, and an Update on Other Historically-Reported	
Populations in the State. Edward W. Chester, Barry Hart, and Ron Lance	51
Associations Between Fish and Benthic Macroinvertebrate Biotic Integrity and Non-Point Source Pollution Estimates in the Nolichucky River Watershed. <i>J.</i>	
Brian Alford and Hayley S. Gotwald	56
Section Chairpersons for the 129th Meeting of the Tennessee Academy of Science	71

Tennessee Academy of Science

EXECUTIVE COMMITTEE 2019

President Dr. Allyn Smith

Department of Physics and Astronomy

Austin Peay State University Sundquist Science Complex, Room B339

Clarksville, TN 37044 Phone: 931-221-6104 Email: smithj@apsu.edu

Treasurer

Dr. C. Steven Murphree Department of Biology Belmont University 1900 Belmont Boulevard Nashville, TN 37212-3758 Phone: 615-460-6221

Email: steve.murphree@belmont.edu

Past-President Dr. Daniel Swartling

Department of Chemistry PO Box 5055

Tennessee Technological University Cookeville, TN 38505

Phone: 931-372-3431 Email: dswart@tntech.edu

Managing Editor

Department of Chemistry Belmont University 1900 Belmont Boulevard Nashville, TN 37212-3758

Email: rachel.rigsby@belmont.edu

President-Flect

Dr. Darlene Panvini Department of Biology

Belmont University Nashville, TN 37212 Phone: 615-460-6224

Email: darlene.panvini@belmont.edu

Secretary

Teresa L. Fulcher

Department of Natural and Behavioral Sciences

Pellissippi State Community College 10915 Hardin Valley Road Knoxville, TN 37933

Phone: 865-539-7048 Email: tfulcher@pstcc.edu

Dr. Rachel Rigsby

Phone: 615-460-6425

Assistant Editor

Department of Education Liaison

Brian Caine

Teaching and Learning Andrew Johnson Tower, 12th Floor 710 James Robertson Parkway Nashville, TN 37243

Phone: 615-815-7135 Email: brian.caine@tn.gov

Director, Junior Academy

Dr. Preston MacDougall Middle Tennessee State University

Department of Chemistry

Box X101 Murphreesboro, TN 37132 Phone: 615-898-5265

FAX: 615-989-5182 Email: pmacdougall@mtsu.edu Director, Collegiate Division

Dr. Fred Matthews Department of Chemistry Austin Peay State University Clarksville, TN 37044

Phone: 931-221-7622 Fax: 931-221-6261

Email: matthewsf@apsu.edu

Director, Electronic Communications

Dr. Gilbert Pitts

Department of Biology Austin Peay State University P.O. Box 4718

Clarksville, TN 37044 Phone: 931-221-7777

Fax: 931-221-6323 Email: pittsg@apsu.edu Director, Visiting Scientist Program

Dr. Tony Johnston

Department of Agribusiness and

Agriscience

Middle Tennessee State University

Box 0005

Murfreesboro, TN 37132 Phone: 615-898-2421

Email: tony.johnston@mtsu.edu

Cindi Smith-Walters

Center for Environmental Education Middle Tennessee University

Box 60 Murfreesboro, TN 37132 Phone: 615-898-5449

Email: cindi.smith-walters@mtsu.edu

Chairperson of Education and Research Annual Meeting Coordinator Dr. Allyn Smith

Department of Physics and Astronomy Austin Peay State University Sundquist Science Complex, Room

Clarksville, TN 37044

Phone: 931-221-6104 Email: smithj@apsu.edu

Member-at-Large, 2017-2019: Dr. Duane Hatch

Department of Chemistry & Physics Belmont University

1900 Belmont Blvd Nashville, TN 37212 Phone: 615-460-6880

Email: duane.hatch@belmont.edu

Member-at-Large, 2018-2020:

Dr. Greg Vieira

Department of Physics Rhodes College

Peyton Nalle Rhodes Tower, 406

Memphis, TN 38112 Phone: 901-843-3481 Email: vieirag@rhodes.edu

Member-at-Large, 2019-2021

Dr. Aruna Kilaru

Department of Biological Sciences East Tennessee State University Brown Hall, Room 427

Johnson City, TN 37614 Phone: 423-439-6931 Email: kilaru@etsu.edu

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 for various categories of membership follow: student member—\$10; emeritus member—\$10; regular member—\$40; sustaining member—\$50; supporting member—\$100; life member—\$400 (single payment). Applications for membership should be addressed to the Treasurer.

The Journal of the Tennessee Academy of Science (ISSN 0040313X) is published by the Tennessee Academy of Science, Department of Biology, Belmont University, 1900 Belmont Boulevard, Nashville, TN 37212-3757, for all members not in arrears for dues. Back issues, if available, are \$10 per copy. Whole sets of back issues on microfilm are available from AMS Press, Inc., 56 E. 13th St., New York, NY 10003. Postage paid at Nashville, TN, and at other mailing offices. Send address change to the following: Journal of the Tennessee Academy of Science, c/o Dr. Steven Murphree, Department of Biology, Belmont University, 1900 Belmont Boulevard, Nashville, TN

This journal is abstracted in Biological Abstracts, Chemical Abstracts, and the Zoological Record, and is indexed by Science Citation Index and Agricola Citations.