You Are Cordially Invited to Attend the

110th Annual Meeting

The Ohio Academy of Science

Hosted by

Mount Union College

Alliance, Ohio

March 30-31; April 1, 2001

Theme:

The Future of Undergraduate Science Education
THE OHIO JOURNAL OF SCIENCE
AN INTERNATIONAL MULTIDISCIPLINARY JOURNAL
Volume 101 Annual Meeting Program Abstracts Number 1

110th Annual Meeting -- March 30-31; April 1, 2001
The Ohio Academy of Science
MEETING THEME:
The Future of Undergraduate Science Education
HOSTED BY MOUNT UNION COLLEGE, ALLIANCE, OHIO
YOU ARE CORDIALLY INVITED TO JOIN
THE OHIO ACADEMY OF SCIENCE

Please Type or PRINT

Circle title: Ms. Mrs. Mr. Dr. Prof.
Name
Employer, organization, school, or institution
Department, Street
or PO Box
City/State/Zip
Is this a home address?  Yes  No
Ohio County
Home  (____)  Office  (____)  FAX Number  (____)
E-mail Address
FIELD OF INTEREST

Please Check Appropriate Lines

$1,000  LIFE (installment plan available)
$1,000  Sponsor of the Academy
$750  Sustainer of the Academy
$500  Advocate of the Academy
$500  Corporate Member
$250  Supporter of the Academy
$100  Institution, Organization or Agency Member
$100  Friend of the Academy
$85  Booster of the Academy
$75  Family (maximum of 3 persons)
$65  Regular Member
$30  Retired (age 59 & over) Member with Journal
$30  College Student (under age 30) with Journal
$30  Student (age 17 & under) with Journal
$15  Retired Member without Journal
$15  Student (age 17 & under) without Journal

Method of Payment

☐ Enclosed is a check made payable to
The Ohio Academy of Science for $___________

☐ Please charge my credit card $___________
plus a $2.00 processing fee.

If paying by credit card, please print your name as it appears on your card:
First  Middle  Last
☐ VISA  ☐ MASTERCARD

Card Number ____________________________
Exp. Date ____________________________
Signature ____________________________

PLEASE RETURN TO:
The Ohio Academy of Science
1500 W. Third Ave. Ste. 223
Columbus OH 43212-2817

Phone or FAX (614) 488-2228 or TOLL-FREE, if needed, outside of 614 Area Code 1-800-OHIO-SCIENCE

THE OHIO JOURNAL OF SCIENCE
ISSN 0030-0950

General:
THE OHIO JOURNAL OF SCIENCE considers original contributions from members and non-members of the Academy in all fields of science. While special consideration will be given to manuscripts concerned with Ohio subject matter, all reports with scientific merit will be reviewed for publication. Submission of a manuscript is understood to mean that the work is original and unpublished, and is not being considered for publication elsewhere. All manuscripts considered for publication will be peer-reviewed. The opinions expressed by reviewers are their own, and do not represent the views of The Ohio Academy of Science or THE OHIO JOURNAL OF SCIENCE. Manuscripts and illustrations should be prepared in triplicate in accordance with current guidelines published in THE JOURNAL and submitted to:

Dr. Isadore Newman, Editor
THE OHIO JOURNAL OF SCIENCE
Idabelle Firestone Center
41 Arch Street
Akron OH 44304-1499

Phone 330/972-6955
Email: inewman@uakron.edu

Page Charges:
Publication of THE OHIO JOURNAL OF SCIENCE requires that authors assist in meeting publication expenses. These costs will be assessed at $75 per page for members of the Academy and $110 per page for non-members. In multi-authored papers, each author must be a member of the Academy at the time of publication to be eligible for the reduced member rate. Papers which exceed 12 printed pages may be charged full production costs. A bill for page charges will be sent to the communicating author by The Ohio Academy of Science at the time of publication.

Failure to Receive THE JOURNAL:
Any claim of failure to receive subscription issues of THE JOURNAL must be submitted to The Ohio Academy of Science within six months of date of issue of the missing number.

Listing and Abstracting Services:
THE OHIO JOURNAL OF SCIENCE is listed or abstracted in several sources including: AcadSci Abstracts • Bibliography of Agriculture • Biological Abstracts • Chemical Abstracts • Current Contents (Agriculture, Biology & Environmental Sciences) • Deep Sea Research and Oceanography Abstracts • Environment Abstracts • Environmental Information Center • Forest Products Abstracts • Forest Abstracts • Geo Abstracts • GEOBASE • Geology Abstracts • Geodet • Helminthological Abstracts • Nuclear Science Abstracts • Review of Plant Pathology • Selected Water Resources Abstracts • World Agricultural Economics and Rural Sociology Abstracts.

FUTURE ACADEMY MEETINGS

2002 Capital University
April 5-7, 2002

date of Issue—March 2001
Copyright © 2001 by The Ohio Academy of Science. All Rights Reserved.
Printing—CPMM Services, Inc. Columbus, OH USA
CONTENTS

110th Annual Meeting

THE OHIO ACADEMY OF SCIENCE

Hosted by
MOUNT UNION COLLEGE
Alliance, Ohio
March 30-31; April 1, 2001

THEME:
The Future of Undergraduate Science Education

Registration .................................................. 2
Registration Form ......................................... 51
Maps .......................................................... 48
Local Arrangements ....................................... 2
Parking ........................................................ 2
Meals .......................................................... 2
Housing ....................................................... 2, 5
General Schedule .......................................... 2
Friday Dinner & President's Address ..................... 2
All-Academy Lecture ........................................ 3
Recognition of Fellows .................................... 3
Official Notice of Business Meeting ...................... 3, 47
Workshop
Animal Research in the Undergraduate Classroom ........ 3
Field Trips
Earth Science .............................................. 4
Plant Science .............................................. 4
Environmental Science .................................... 4
About Our Host ........................................... 4
Peer-Reviewed Abstracts & Undergraduate Research Summaries
Posters ....................................................... 7
Podium Sessions .......................................... 27
Indices
Session Abstracts .......................................... 6
First Authors of Abstracts ................................. 49

Cover photograph of Chapman Hall, Mount Union College,
by LYNN E. ELFNER