

THE OHIO JOURNAL OF

SCIENCE

Volume 96 No. 2

April Program Abstracts

105TH ANNUAL MEETING OF THE OHIO ACADEMY OF SCIENCE

HOSTED BY
MALONE COLLEGE, CANTON, OHIO
MAY 3, 4, 5, 1996

THEME: *SUSTAINABLE DEVELOPMENT*



Editorial Policy:

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, other 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 Submission of a manuscript is understood to mean that the work is original and unpublished, and is not being considered for publication elsewhere.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* at least once a year, and submitted (after 1 January 1996) to:

Dr. Thomas W. Schmidlin, Editor
THE OHIO JOURNAL OF SCIENCE
Department of Geography
Kent State University
Kent, OH 44242-0001

Page Charges:

Publication of *THE OHIO JOURNAL OF SCIENCE* requires that authors assist in meeting publication expenses. These costs will be assessed at \$70 per page for members of the Academy and \$105 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, to be recognized.

Listing Services:

THE OHIO JOURNAL OF SCIENCE is listed or abstracted in several sources including:

Bibliography of Agriculture
Biological Abstracts
Chemical Abstracts
Current Advances in Ecological Sciences
Current Contents (Agriculture, Biology & Environmental Sciences)
Deep Sea Research and Oceanography Abstracts
Environment Abstracts
Environmental Information Center
Forest Products Abstracts
Forestry Abstracts
Geo Abstracts
GEOBASE
Geology Abstracts
GeoRef
Helminthological Abstracts
Horticulture Abstracts
Nuclear Science Abstracts
Review of Plant Pathology
Selected Water Resources Abstracts
World Agricultural Economics and Rural Sociology Abstracts

FUTURE ANNUAL MEETINGS

1996 Malone College—May 3-5
1997 Bowling Green State University—April 4-6

Date of issue—March 1996
Copyright © 1996 by The Ohio Academy of Science
Printing—Leshner Printers, Inc., Fremont, Ohio

The Ohio Journal of Science

Volume 96 No. 2

April Program Abstracts



The Ohio Journal of Science

Editor - TOM SCHMIDLIN
Kent State University
Department of Geography
P.O. Box 5190
Kent OH 44242-0001

April Program Abstracts Editor-
LYNN E. ELFNER.
Assisted by JEFFREY GRUBER.

Editorial Board

BARBARA K. ANDREAS
ANNA BELLISARI
KELLY J. KOHLS
MARY ANNE SWARDSON
JOHN P. SABO
EDWARD WEILANT

The Ohio Academy of Science

1500 W. Third Ave. Ste. 223
Columbus OH 43212-2817
Phone or FAX (614) 488-2228

OFFICERS

President - CHARLES E. HERDENDORF
Chief Executive Officer- LYNN E. ELFNER
President-Elect- Jim Jackson
Past President -RONALD L. STUCKEY
Secretary- ROBIN TREICHEL
Treasurer - MICHAEL S. HERSCHLER
Junior Academy Director- LOIS A. COOK
Senior Academy Director- ISADORE NEWMAN
Industrial Council Director -R. LYNN
GILLILAND
Development Council Chair- RICHARD H.
MAHARD

The Ohio Journal of Science (ISSN 0030-0950) is published in March, April (Annual Meeting Program Abstracts Issue), June, September, and December by The Ohio Academy of Science, 1500 West Third Avenue Suite 223, Columbus OH 43212-2817. Individual membership and subscription: \$50. Domestic institutional subscription: \$50; Foreign institutional subscription: \$55. Single issues for Academy members: \$10; others \$12. © 1996 by The Ohio Academy of Science. ALL RIGHTS RESERVED. Printed in The United States of America.

POSTMASTER: Send address changes to:
The Ohio Journal of Science, 1500 W Third
Ave Ste 223, Columbus OH 43212-2817.

C O N T E N T S

105th Annual Meeting The Ohio Academy of Science

Hosted by
Malone College, Canton
MAY 3-4-5, 1996

THEME: *SUSTAINABLE DEVELOPMENT*

Registration	2
Registration Form	Last Page
Parking	2
Meals	2
Housing	2
Map	46
General Schedule	3
All-Academy Lecture	3
President's Address	4
Arrangements	
Special Acknowledgements	4, 44
Local Committee	4
Academic Highlights of the Host	4
Official Notice of Business Meeting	4, 48
Friday Meeting of The Ohio Alliance for the Environment . . .	5
Friday Workshop on Assessment of Inquiry-Based Education . . .	6
Friday and Saturday Internet Workshops	7
Sunday Geology and Plant Science Field Trips	7
The Power of "If" - Integration of Science and the Arts	8
Peer-Reviewed Abstracts	
Posters	10
Podium Sessions	19
Special Interdisciplinary Session	43
Indices	
Session Abstracts	9
First Authors of Abstracts	45

Cover illustration: Malone College