Front Matter
92nd Annual Meeting
Bowling Green State University
April 22, 23, 24, 1983

"CONFRONTING THE CRISIS IN
SCIENCE AND MATH EDUCATION"

Please bring this Program to the meeting.
Single issues for Academy members and
subscribers: $5; others: $7.
THE OHIO JOURNAL OF SCIENCE

ISSN 0030–0950

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The Ohio Academy of Science
Bowling Green State University
April 22-23-24, 1983

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GENERAL SCHEDULE

Friday, April 22, 1983

8:00 a.m. - Registration: Impact of the Increasing Service/Manufacturing Ratio and Library Section. Life Science Building.

8:30 a.m. - Colloquium: Impact of The Increasing Service/Manufacturing Ratio. McFall Center Gallery.

12:00 noon - Luncheon: Economics Colloquium and Library Sections participants. Alumni Room, Student Union.

12:00 noon - Registration: Dungeons and Dragons Library Workshop. Life Science Building.

1:00 p.m. - Workshop: Dungeons and Dragons: Through the Maze of Scientific Literature. Science Library, Mathematical Sciences Building.

4:30 p.m. - Tea Commemorating the Retirement of Milton A. Lessler as Editor of The Ohio Journal of Science. Browsing Room, University Union.

8:00 p.m. - Annual Council Meeting
The Ohio Academy of Science
Campus Room, University Union

Saturday, April 23, 1983

8:00 a.m. - Registration, Life Science Building.

3:00

8:30 a.m. - Technical Sessions, including Poster Sessions
See various Sections for room locations.

11:00

11:00 a.m. - All-Academy Lecture, Main Auditorium, University Hall.

12:00 noon

Presiding: Dr. John Schaff, Associate Dean
College of Education
University of Toledo

Welcome and Introduction by
Dr. Richard H. Mahard, President
The Ohio Academy of Science

and

Dr. Garrett T. Heberlein
Dean of The Graduate College and
Vice Provost for Research
Bowling Green State University
Speaker: Dr. Sherwood L. Fawcett  
Chairman of the Board and Chief  
Executive Officer of Battelle  
Memorial Institute  
Columbus, Ohio  

"Confronting the Crisis in Science and Math Education"

12:00 noon -  
Battelle Awards and Academy Luncheon, Ballroom,  
University Union  
Address: "The Current Role of NSF in Science and  
Math Education"  
Dr. Walter Gillespie, Director  
Office of Scientific and Engineering  
Personnel and Education  
National Science Foundation  
Washington, D.C.

1:30 p.m. -  
Business Meetings for all Technical Sections.  
(Section Q, Economics business meeting, 10:30 a.m.).

1:45 p.m. -  
Technical Sessions and Special Symposia.

5:00 p.m. -  
Hospitality Hour, Browsing Room, University Union.  
A cash bar will be available.

6:30 p.m. -  
Academy Banquet, Community Suite, University Union.

Toastmaster: Dr. Joseph Spinelli, Chair  
Department of Geography  
Bowling Green State University  
Greetings: Dr. Kendall Baker, Dean  
College of Arts and Sciences  
Bowling Green State University  
Response: Dr. John Crites, Past President  
The Ohio Academy of Science  

Awards and Recognitions:  
•Battelle/Acker Outstanding Teachers  
•Battelle Award for Professional Development  
•Academy Fellows  

President's Address: "Draining the Black Swamp -  
A Positive Modification of  
A Landscape"  
Dr. Richard H. Mahard  
Professor Emeritus, Geology  
and Geography  
Denison University

9:00 p.m. -  
Annual Business Meeting and Election of Officers.
Sunday, April 24, 1983

8:30 a.m. - Botany Field Trip: Oak Openings. Field trip will leave from the parking lot north of the Life Science Building at 8:30 a.m.

12:00 noon

9:00 a.m. - Geology Field Trip. The field trip will leave at 9:00 a.m. from McPherson Cemetery at the northeast corner of the junction of US 20 and Ohio 101 in Clyde, Ohio.

PARKING

Friday, April 22, 1983

Parking for the Impact of the Increasing Service/Manufacturing Ratio Symposium, The Library and Informational Services Section, and The Dungeons and Dragons Library Workshop will be Lots 7 and 8 north of Offenhauer Towers

Saturday, April 23, 1983

Parking for all Saturday sessions will be available for no charge in all unmetered university parking lots. See map.

REGISTRATION

Friday, April 22, 1983

A special registration fee ($15) is required for the Impact of The Increasing Service/Manufacturing Ratio. The fee includes a luncheon meal. See registration form.

The same fee ($15) is required for The Library and Informational Science: Section Meeting. Lunch is included in this fee. See registration form.

All registration will take place in the Life Science Building.

Saturday, April 23, 1983

Registration is required for all Saturday activities (exhibits, poster sessions, meals, technical sessions and special symposia), except for the All-Academy Public Lecture. Registration will be in the Life Science building.

Please send registrations to meet the April 15, 1983, deadline for planning of meals. On site registration is permitted, but meal reservations cannot be guaranteed. Registration is $5.00 for student members of the Academy, $7.50 for student non-members, $10 for professional members and $15 for professional non-members. Registration fees do not include luncheon or dinner charges. Make checks payable to Bowling Green State University and mail to:

Phone (419) 372-2058 OAS Annual Meeting Registration
BOWLING GREEN STATE UNIVERSITY
Attn: Dr. Robert Romans
Dept. of Biological Sciences
Bowling Green, Ohio 43403
MEALS

Friday, April 22, 1983

Lunch is included in the $15 registration fee for the Impact of The Increasing Service/Manufacturing Ratio Colloquium and The Library and Informational Services Section Meeting.

Saturday, April 23, 1983

The Academy Luncheon will be held in the Grand Ballroom of the University Union (2nd Floor). It will be served from 12:00 - 1:00 p.m. with a cost of $5.00. Registrants must indicate prior to April 15 if they will participate in the luncheon.

The Academy's Annual Banquet will be held in the Community Suite of the University Union beginning at 6:30 p.m. Cost of the meal is $6.50 and reservations must be made prior to April 15.

The Banquet will be preceded by a Hospitality Hour in the Browsing Room of the University Union from 5:00 p.m. - 6:30 p.m. A cash bar will be available for participants.

Registrants without meal reservations may eat at the University Union or at any of the numerous facilities on Wooster Street and Main Street.

HOUSING

Registrants wishing to remain in Bowling Green over the weekend are expected to make their own accommodations. See contents page for location of a list of nearby motels.

SYMPOSIA, WORKSHOPS, AND FIELD TRIPS

Friday, April 22, 1983

8:00 a.m. - IMPACT OF THE INCREASING SERVICE/MANUFACTURING RATIO. There has been a dramatic increase in the number of people employed in the service sector compared to those in manufacturing industries. This conference examines the immediate effect of this shift on business, labor, and the economy. It will explore the potential for further profound changes in our economic and business structure. See Section Q, Economics abstracts.

1:00 p.m. - DUNGEONS AND DRAGONS: THROUGH THE MAZE OF SCIENTIFIC LITERATURE. An informal workshop for high school students seeking methods of locating scientific information on topics of interest. See Section S, Information and Library Services Abstracts.
Saturday, April 23, 1983

9:00 a.m. - SCIENCE AND MATHEMATICS PROGRAMS SYMPOSIUM. See Section H, Science Education abstracts.
4:00 p.m.

9:30 a.m. - INTERDISCIPLINARY EFFORTS IN GERONTOLOGY: BOOM OR BUST.
10:45
See Section M, Psychology abstracts.

1:45 p.m. - COMPUTERS IN MATH AND SCIENCE SYMPOSIUM. Presentations by representative of Apple, Radio Shack, and Commodore/Pet on science and math materials plus presentations by computer-using educators and a program swap session. See Section H, Science Education abstracts.
5:00

1:45 p.m. - UNIVERSITY EXPECTATIONS OF INCOMING STUDENTS IN MATH AND THE SCIENCES. See Section H, Science Education abstracts.
5:00

2:00 p.m. - CURRENT RESEARCH IN OHIO AREA ARCHAEOLOGY SYMPOSIUM. See Section I, Anthropology and Sociology abstracts.
4:30

Sunday, April 24, 1983

8:30 a.m. - BOTANY FIELD TRIP: OAK OPENINGS. The habitats of the Oak Openings region of western Lucas County formed on the remains of ancient glacial lake beaches and sand bars. Some of the more interesting habitats include those in the 3600-acre Oak Openings Metropark, Schwamberger Preserve, Irwin Prairie, Maumee State Forest, and Lou Campbell Preserve. At this time of year, we can observe the sand dune area along Monclova Road where the Sand Cherry grows. A little to the north is another sand ridge where Jack Pine has been found. The wet prairies at Irwin and Lou Campbell Preserves include species such as Speckled Alder, Winterberry, and several species of Buckthorn.
12:00 noon

The field trip will leave from the parking lot on the north side of the Life Science building at 8:30 a.m., Sunday, April 24. Transportation will be by private car, however, carpooling is encouraged to reduce parking problems at stops. The trip will be conducted by Dr. N. William Easterly, and Mr. H. Gordon Bailey, Biological Sciences, Bowling Green State University.

9:00 a.m. - GEOLOGY FIELD TRIP. The annual Ohio Academy of Science geology field trip will visit the cuesta of the Devonian Columbus Limestone north of Bellevue, with stops to observe the bedrock, associated karst features (sinkholes and free Blue Hole), and related glacio-lacustrine beach ridges and sand dunes, as well as to consider Bellevue's groundwater problems. Leaders will be Jane L. Forsyth and Charles F. Kahle, both of Bowling Green State University.
4:00 p.m.
Field trip will leave at 9:00 a.m. from McPherson Cemetery, at the northeast corner of the junction of US 20 and Ohio Route 101 in Clyde (carpooling is encouraged — cars left in Clyde may not be left in cemetery). Field trip will terminate about 4:00 p.m. in quarry west of Castalia (about 10 miles northeast of Clyde on Route 101).

Financial support for the 92nd meeting of The Academy was provided by Bowling Green State University through the Office of the Vice President for Academic Affairs, the Colleges of Arts and Sciences, Education, Health and Community Services, the Graduate College and the Library. The Academy is deeply appreciative of this support.
ALL-Academy Lecture
11:00 a.m., Saturday, April 23, 1983
Main Auditorium
University Hall

CONFRONTING THE CRISIS IN SCIENCE AND MATH EDUCATION
by
Dr. Sherwood L. Fawcett
Chairman of the Board and Chief Executive Officer
Battelle Memorial Institute
Columbus, Ohio

Dr. Sherwood L. Fawcett, Chairman of the Board and Chief Executive Officer of Battelle Memorial Institute will give the All-Academy Lecture at 11:00 a.m. on Saturday, April 23, 1983 at the Academy's 92nd Annual Meeting at Bowling Green State University. Dr. Fawcett is expected to address the meeting's general theme of "Confronting the Crisis in Science and Math Education."

Battelle Memorial Institute is an organization of 7,100 scientists, engineers and supporting specialists engaged in worldwide research, educational and technology development activities. A pioneer in contract research, Battelle is the world's largest non-profit, independent research institute.

As Battelle's chief executive since 1968, Dr. Fawcett has spearheaded the Institute's entry into new areas of research and new working relationships with business, industry, education, and government that further the use of science to meet human needs. Active in national and international policy-making groups, he is a frequent spokesman on science's role in dealing with complex social problems.

A civic leader, he is Past President and a member of the Board of Trustees of Children's Hospital in Columbus, a Director of the Ohio Chamber of Commerce, Past Chairman of the Board of Trustees of the Columbus Area Chamber of Commerce, and a Trustee of the Columbus Museum of Art.

Recently he was Chairman of the Advisory Commission on Articulation Between Secondary Education and Colleges.

A member of the postwar generation of nuclear physicists, Dr. Fawcett began his career at Battelle's Columbus Laboratories in 1950, participating in research directed toward the development of nuclear reactors for power and naval propulsion. Subsequently, he supervised programs to determine the performance and reliability of reactor fuel and structural components, directed evaluations of reactor concepts, and coordinated engineering and design studies of reactor cooling and moderating systems.

Dr. Fawcett is the author of some 50 technical articles and papers. He was formerly a vice president of the American Association for the Advancement of Science and chairman of the Association's Section on Industrial Science. Currently, he is a Director of The Atlantic Council of the United States and Battelle's representative to The Atlantic Institute for International Affairs (Paris). He is also a member of the Board of Trustees of the National Security Industrial Association.
Other affiliations include the Atomic Industrial Forum, the American Nuclear Society, the American Physical Society, the American Society for Metals, the Metallurgical Society of AIME, the Ohio Society of Professional Engineers, Sigma Pi Sigma (physics), Sigma Xi (science), Tau Beta Pi (engineering), the Newcomen Society, and Delta Chi social fraternity.

Dr. Fawcett is a Trustee of Case Western Reserve University, a member of the Board of Overseers of Whitman College, and the Board of Regents of Capital University.

He earned his B.S. degree in engineering physics from The Ohio State University and his M.S. and Ph.D. degrees in physics from Case Institute of Technology. In addition, he holds an Honorary Doctor of Science degree from The Ohio State University, an Honorary Doctor of Public Service degree from The Detroit Institute of Technology, an Honorary Doctor of Laws degree from Otterbein College, an Honorary Doctor of Science degree from Whitman College, and an Honorary Doctor of Laws degree from Gonzaga University.

Other honors conferred on Dr. Fawcett include the American Society for Metals' Medal for the Advancement of Research, the Case-Western Reserve Achievement Award, and the Preston David Award, presented by Citizens Research, Inc. for outstanding civic contributions to enrich the Columbus community.
OUR HOST

Through its five undergraduate colleges, Bowling Green State University offers more than 150 degree programs in the traditional arts and sciences, as well as business, education, music and the growing field of health and community services. In addition, the Graduate College has 60 master's degree and nine doctoral degree programs.

About 16,000 students, including 14,000 undergraduates, are enrolled at Bowling Green. More than half of these undergraduates live in campus residence halls and most of the remainder within a couple of miles of the University.

For this closely-knit community of students, the University encourages and supports a large number of weekly extracurricular activities— including academic, cultural and social programs. On any given day, these events may include a concert, lecture, panel discussion, theatre or dance performance, film, mixer or other social get-together. The University also has a strong fraternity and sorority system and the campus is home to more than 200 clubs and organizations. Sports are also a major part of Bowling Green, and the University offers an extensive varsity and club program for both men and women.

Another dimension of this residential University is its recreational facilities. At the hub is the Student Recreation Center, which houses basketball, volleyball, racquetball and tennis courts, two swimming pools, weight rooms, a running track, a golf and archery range and numerous all-purpose activity areas.

At Bowling Green, students learn as much outside the classroom as they do in it. It is a concept to which the University is committed, making certain that learning is a non-stop activity and that at the end of four years, the University graduates an intelligent, mature and well-rounded individual.

This out-of-class learning is enhanced by the diverse backgrounds, ideas and beliefs of our students. Bowling Green students come from nearly all of Ohio's 88 counties, all 50 states and more than 60 foreign countries. This mix of students helps to create an exciting atmosphere for intellectual and cultural exchange.

This exchange is encouraged and directed by more than 700 full-time faculty members. These men and women are experts in their fields of study, and many are on the cutting edge of scientific research and discovery. During the past several years, faculty members have annually received approximately $4 million from outside agencies and foundations to conduct research.

At the center of this intellectual activity is the University's nine-story Jerome Library, housing a collection of more than 700,000 books, 1.2 million pieces of microfilm, and 4,700 subscriptions to magazines, journals and other periodicals. The Jerome Library is also home to 175,000 sound recordings, 375,000 government documents and a Popular Culture Library which supports the studies of the University's nationally known Popular Culture Program.
While most of the University's programs are geared to the residential student, Bowling Green has a commitment to the non-traditional student. Many courses, especially graduate courses, are offered at night to enable persons to continue their education while working full time.

Also, the University offers counseling services to persons who would like to return to college but are not certain how to begin or what areas of study might be best for them.

As a service to the community, the University's Office of Continuing Education also sponsors one-day and short-course sessions on everything from child psychology to sign language to being a better secretary. Some of these courses are offered for academic credit, but many are made available simply for the enjoyment and education of those who enroll.

In addition to courses on the main campus, the University's Firelands College campus, located in Huron, Ohio, offers 17 two-year associate degree programs, as well as courses which fulfill the first two years of a bachelor's degree requirement. Firelands College enrolls about 1,200 students.

As with everything, the cost of attending Bowling Green is on the rise but the University offers a wide range of financial aid programs (including scholarships and loans) to assist a student and his or her parents with the cost of a college education. There are also a variety of student employment opportunities available on the campus.

For the student who lives in on-campus housing, Bowling Green is much like a mini-city. With a cafeteria in each housing complex, laundry facilities down the hall, classes on a wide variety of subjects only a short walk away, a non-stop schedule of activities, a bookstore which sells everything from the latest magazines to toiletries, Bowling Green is truly its own city—a city alive with activity, a city alive with learning.

**HOUSING**

Best Western Falcon Plaza Motel  
1450 E. Wooster St.  
(419) 352-4671

Holiday Inn  
1550 E. Wooster St.  
(419) 352-5211

Buckeye Budget Motor Inn  
1740 E. Wooster St.  
(419) 352-1520

Angel Motel  
1024 N. Main St.  
(419) 352-3170

Howard Johnson's Motor Lodge  
1630 E. Wooster St.  
(419) 352-2521

BGSU University Union Hotel  
University Union  
(419) 372-2741
**LOCAL SECTION HOSTS**

Dr. Robert C. Romans, Co-Chair  
Department of Biological Sciences  
Bowling Green State University  

and  

Dr. Joseph Spinelli, Co-Chair  
Department of Geography  
Bowling Green State University  

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<td>Library</td>
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**Acknowledgements**

Appreciation must be expressed to Patti McCann, Nick Bandescu and Magda Bandescu for their help in preparing this program. Grateful appreciation is also given to Lorraine DeVenney and Jane Trumbull.