Science and Change:
Hopes and Dilemmas

"You could not step twice into the same rivers, for other and yet other waters are ever flowing," is perhaps one of the less obscure of the surviving fragments of that early Greek philosopher, Heraclitus of Ephesus, some 2500 years ago, in his observations on the primacy of change in nature; observations of little influence in early science with its emphasis on description and classification of what appeared to be immutable. Science, as we have come to know it, blossoming forth out of the 17th century as a means for studying change/process (Newton even invents a new language for describing change, fluxions or calculus, as we now call it), has given us new insights into the nature of what appears to remain unchanged.

Science is the study of change, a study which has proven so effective as to give us the means for controlling some processes in nature and of effecting new changes. Our powers, although still rather meager with respect to the processes of nature, have proven quite formidable with respect to ourselves and our social structures; our world of the 20th century bears little resemblance to that of the 17th. The profound social effects of the changes wrought by science have been both salutary and detrimental; to the degree that the former has prevailed, hopes have risen; the spectre of the latter has only increased fears—the horns of the dilemma of change.

The forthcoming AAAS Annual Meeting in Denver (20 to 25 February 1977) has as its theme: Science and Change: Hopes and Dilemmas, and the Meeting Program contains many symposia (listed in the following pages) which explore various aspects of the dilemma of change: the issues in scientific freedom and responsibility, legal questions in weather modification, our political future, the results of our exploration of another world, implications for death, and a host of other topics in 16 subject areas ranging from the physical and mathematical sciences, through energy, environment, and education, to history and philosophy of science. In addition to the 121 symposia, the Meeting features ten public lectures discussing our western heritage, questions of research and of health, and prospects for our environment and for energy.

As a further enrichment of our program this year, with the kind assistance of the AAAS Southwestern and Rocky Mountain (SWARM) Division, meeting with us in Denver, we will have a large number of sessions devoted to contributed papers, both in the traditional slide format and in the new poster format. See page 51 for a schedule of these sessions.

All in all, we modestly believe that we have arranged a truly impressive program for you, one eminently worth your attendance in Denver. In addition to all of this, the Denver Advisory Committee, under the co-chairmanship of Maurice Mitchell (Chancellor of the University of Denver) and John McKinney (President of the Johns-Manville Corporation), has provided an excellent selection of tours and special events (for details, see pages 827 to 829 of the November issue of Science). These activities provide a fine survey and introduction to the scientific and ecological resources of the Greater Denver area and, taken with the unsurpassed recreational facilities of Colorado (available for you and your family’s post-meeting enjoyment), give yet another good reason to meet with us in Denver this February (the height of the ski season).

Come join us at your Meeting in Denver; add your perceptions to our considerations of the dilemmas of change; partake of the vistas of the Rocky Mountains; broaden all of your horizons.

—ARTHUR HERSCHMAN

Molly Brown House. [Convention and Visitors Bureau of Denver and Colorado]
Science and Change: 
Hopes and Dilemmas

Public Lectures

• National Geographic Society Public Lecture (20 Feb., 8:30 p.m., DH).
  Douglas W. Schwartz (Director, School of American Research, Santa Fe, N.M.).
  *The Rio Grande's Pueblo Past.*

• Co-Chairmen's Public Lecture (21 Feb., 1:45 p.m., DH).
  Richard D. Lamm (Governor of Colorado).
  *The Environment and Public Policy.*

• AAAS Public Lecture (21 Feb., 8:30 p.m., DH).
  Lewis Thomas (President, Memorial Sloan-Kettering Cancer Center, New York, N.Y.).
  *Biomedical Science and Human Health: The Long-Range Prospects.*

• AAAS Public Lecture (22 Feb., 1:45 p.m., DH).
  Mary F. Berry (Chancellor, University of Colorado, Boulder).
  *Public Support for University Research: What Is It Worth to Us?*

• AAAS Public Lecture (22 Feb., 8:30 p.m., DH).
  John A. Eddy (Visiting Fellow, Center for Astrophysics, Harvard College Observatory and Smithsonian Astrophysical Observatory, Cambridge, Mass.).
  *Astronomy and the Early Plains Indian.*

• George Sarton Memorial Public Lecture (23 Feb., 1:45 p.m., DH).
  Jane M. Oppenheimer (William R. Kenan, Jr. Professor of the History of Science, Bryn Mawr College).
  *A Biologist Looks at History.*

• AAAS Retiring President’s Public Lecture (23 Feb., 8:30 p.m., DH).
  William D. McElroy (Chancellor, University of California at San Diego).
  *Basic and Problem-Oriented Research: A New Emphasis.*

• Phi Beta Kappa Public Lecture (24 Feb., 1:45 p.m., DH).
  June Goodfield (Visiting Professor, Rockefeller University, New York, N.Y.).
  *Humanity in Science: A Perspective and a Plea.*

• John Wesley Powell Memorial Public Lecture (24 Feb., 8:30 p.m., DH).
  William A. Dick-Peddie (Professor of Biology, New Mexico State University, Las Cruces).
  *Safeguarding Our Natural Diversity: The Role of Scientists.*

• AAAS Public Lecture (25 Feb., 1:45 p.m., DH).
  Peter L. Auer (Professor, Sibley School of Mechanical and Aerospace Engineering, Cornell University).
  *Fusion Power—Its Promises and Prospects.*

1. General Interest


Technical and Legal Aspects of Weather Modification (22 Feb., DH): Uncertainties, alternatives and prospects, development of the technology, interaction of scientists and lawyers.

Science: The Key to Our Political Future (22 Feb., DH): Crowded world, world food, raw materials, human habitation and urbanization, fragile environment.
  Ian MacGregor, George W. Ball, Charles J. Hitch, Lord Zuckerman.

The Viking Missions to Mars (22 and 23 Feb., DH): Mission profile, geology, surface material, search for motion, weather stations, carbon assimilation, gas exchange, labeled release, organic compounds, inorganic chemistry, physical and magnetic properties, cratering, volcanic processes, fluvial activity, atmospheric phenomena, variable features, polar deposits, martian atmosphere, water, temperatures, Marsquakes.

HOTEL CODES: Denver Hilton ...... DH; Holiday Inn ...... HI; Cosmopolitan ...... CO.
The Frontiers of the Natural Sciences (24 Feb., DH): Chemistry, geology, fundamental forces in nature, biological heritage, combinatorial mathematics, astronomy.
Rolf M. Sinclair, John Margrave, Peter J. Wyllie, Chen Ning Yang, James D. Ebert, Ronald L. Graham, Bart J. Bok.

The Right to Die (25 Feb., DH): Death attitudes, function of medicine, definition of death, conflict and responsibility, judicial dilemma, mercy killing, right to live.

2. Physical and Mathematical Sciences

The Promise of High Energy Physics (21 Feb., DH): Building blocks of matter, accelerators, the infinitely small, inside of matter.
Victor F. Weisskopf, Murray Gell-Mann, Robert R. Wilson, Leon M. Lederman.


Science for the Naked Eye: Or the Physics of Everyday Experience, IV (22 Feb., DH): Skiing, biological clocks, lasers and light, karate, meteorology, the violin.


Cleve B. Moler, Larry F. Shampine, Ronald A. Sweet.

David S. Crosby, Otto N. Strand, Ed R. Westwater, Michael P. Weinreb.


Laser Chemistry (25 Feb., DH): Photochemistry, magnetic resonance studies, free radicals, negative ions, picosecond spectroscopy, anti-Stokes Raman spectroscopy, supersonic molecular beams, isotope separation.

3. Energy

Frances J. Laner, Robert N. Meroney, Louis V. Divone, Robert E. Wilson, Richard H. Braasch, Ugo A. Coty, Donald A. Wiederecht.

Franklyn K. Levin, Milton B. Dobrin, John S. Sumner, George V. Keller.

Solar Energy in the 20th Century (22 Feb., DH): Heating, cooling, industrial applications, homes and commercial buildings, remote applications, agricultural and food production applications, solar electric power, central collector systems, distributed systems, orbital systems, utilities.


The Fusion Program (25 Feb., DH): Some perspectives, history and physics of fusion, ERDA Program, user’s perspective.

4. Resource Policy

Policy Planning for Recreational Land-Use in the Rockies (21 Feb., DH): Making land-use decisions, land-use trade-offs, recreation pricing, public administration, spiritual dimension, consumerism.


John R. Craig, Donald E. Cunningham, Donald Craven, John Steinhart, A. Berry Crawford.

Energy Development in the Rocky Mountain West (22 Feb., DH): Geophysical perspective, political perspective, environmental perspective, Kaiparowits decision, shale oil develop-
opment, environmental impact, coal mining, coal gasification.

Jerrold H. Krenz, Don L. Boyer, Robert S. Houston, William R.
Keefer, Harris D. Sherman, David Freudenthal, John W. Firor,
H. Anthony Ruckel, John W. Hand, Katherine Fletcher, C. E.
Smith, Jr., Andrew Decorra.

The Impact of Energy Development on Indian Lands (23 Feb.,
DH): Tribal lands, legal status, water rights, tribal control, economic
development.

Tillie Walker, Duane T. Birdbear, Tim Vollmann, John Echow-
 hawk, Patrick Stands Over Bull, Peter MacDonald.

Energy from the Rockies: Fueling the Nation or Fouling the
States? (23 Feb., CO): Rocky Mountain energy, national needs,
environment and energy, alternate energy sources, states' rights.

Thomas L. Wright, John W. Rold, William L. Fisher, Michael
McCloskey, Donald A. Henriksen, Richard T. Meyer.

Applied Policy Research: A Review of Energy Resource Devel-
opment in the Western United States (24 Feb., DH): Western
energy development, Southwestern regions, technology assessment,
status of research.

Irvin L. White, Philip M. Burgess, Joyce M. Kelley, Allen V.
Knee, Lee Brown, R. Leon Leonard, Michael A. Chartock.

5. Biological Science

Herbivore–Secondary Plant Metabolite Interactions (21 Feb.,
DH): Feeding patterns, plant chemical defenses, cy-
anogenesis, canavanine-insect interactions, seeds, ecology of the
Cruceferae.

Gerald A. Rosenthal, Daniel H. Janzen, Rex G. Cates, Eric E.
Conn, Paul P. Feeny.

Physiological Reactions in Plants Initiated by Environmental
Stress (21 Feb., DH): Membrane form and function, plant
hormone systems, metabolic dysfunction, plant function.

M. N. Christiansen, James M. Lyons, R. Hilton Biggs, Charles
Y. Sullivan, John C. Brown.

Polar Research: To the Present, and the Future (22 Feb., DH):
Emergence of Antarctica, Gondwanaland, polar glaciology,
global climate change, polar oceans, productivity, marine
mammals, marine ectotherms, adaptations, international per-
spectives.

Mary A. McWhinnie, Duwayne M. Anderson, Laurence M.
Gould, George A. Llano, Campbell Craddock, Richard L. Cam-
eron, George H. Denton, Joseph O. Fletcher, John J. Kelley,
Theodore D. Foster, Sayer Z. El-Sayed, Donald B. Siniff, Ian G.
Stirling, L. Lee Eberhardt, Arthur L. DeVries, Bruce C. Parker,
Robert H. Rutford.

Design of Cell Organelles (23 Feb., DH): Ribosomal architec-
ture, Golgi apparatus, mitochondrial biogenesis, cilia.
Ellen Roter Dirsken, James A. Lake, Becca Fleischer, Ronald A.
Butow, Peter Satir.

Science Information: International Communication for Re-
search in Biomedicine (23 Feb., DH): United Kingdom, Western
Europe, Canada, Scandinavia, United States, the World
System.

Arthur W. Elias, Brian Perry, Rolf Fritz, George Ember, GORan
Falkenberg, Mary Corning, Lee Burchinal.

Some Mathematical Questions in Biology (24 and 25 Feb., DH):
Wave patterns, compartamentalization, complex systems, non-
reciprocating circuits, occluding contour, catastrophe and
chaos.

Simon A. Levin, Stuart Kauffman, Ronald Shymko, Kenneth
Trabert, Sydney Brenner, Jack Cowan, David Marr, George
Oster, Giles Auehmuty, John Guckenheimer.

When Biologists and Mathematicians Work Together: A New
Theoretical Biology (25 Feb., DH): Multi-gene families, pattern
regulation, community structure.

Charles F. Walter, Daniel L. Solomon, Myron Hood, Lee Hood,
Peter Bryant, Stuart Kauffman, Simon A. Levin, Robert Paine.

6. Agriculture and Ecology

Biology and Agriculture in the People's Republic of China (21
Feb., DH): Agricultural ecosystems, biological control of in-
sects, plant disease control.

Arthur Kelman, Jack R. Harlan, Carl B. Hufnaker, R. James
Cook.

World Food, Pest Losses, and the Environment (22 Feb., DH):
Insect pest losses, plant pathogens, weeds, animal pests,
social aspects, environmental impact, post-harvest food loss-
es.

David Pimentel, Ray F. Smith, J. Lawrence Apple, W. Furtick,
Roger O. Drummond, Ruff Bram, Nels Konnerup, Hans Guggen-
heim, Max Milner, John R. Pederson.

Coyotes, Wildlife, and Meat Production (23 Feb., DH): Coyote
populations, nongame wildlife, wild game, coyote predation,
predator damage control, meat production.

Clair E. Terrill, Frederick F. Knowlton, Frederic H. Wagner,
Samuel L. Beasom, J. Maurice Shelton, John R. Wood, Carl S.
Menzies.

The EQ Index for Wildlife: Blueprint for Survival (23 Feb.,
DH): Critical water problems, soil resources, forestry, living
space, wildlife management.

Donald J. Zinn, Allen V. Knee, Chester E. Evans, Wayne O.

Renewable Resource Management for Agriculture and Forestry
(24 Feb., DH): Food and fiber, land resources, assessment of
technology, energy requirements, institutional restrictions,
economic considerations.

James S. Bethel, Martin A. Massengale, Emory Castle, Wynne
Thorne, Sylvan Wittwer, William Splinter, George Staebler, Eric
Ellwood, John Zivnsuka, Del Gardner, Gary A. Ritchie.

High Altitude Geocology (25 Feb., DH): Physical environ-
ment, monitoring, ice and snow, physiology, biology, human
occupation.

Patrick J. Webber, Jack D. Ives, Roger G. Barry, Daniel H.
Knepper, Malcolm Mellor, Harold W. Steinhoff, Robert F. Gro-
er, W. Dwight Billings, Brooke Thomas.

7. Environment

How Well Are We Equipped to Cope with Environmental
Problems? (21 Feb., HI): Environmental policies, adequacy of
science and information, industrial perspective, systems ecol-
ogy, epidemiology, urban planning, legal profession, econom-
ic.

William J. Snodgrass, Lynton K. Caldwell, Toufik A. Siddiqi,
Richard Carpenter, Wilson Talley, William J. Coppoc, Don
Kash, Gilbert White, Howard T. Odum, Robert N. Hoover,
Joachim Tourbier, Charles Conklin, William Schulze.

Benefit-Cost Analysis and Environmental Decisions: Viable
Decision Tool or Economists' Pipe Dream? (22 Feb., HI): Alaska
pipeline, river development, Tocks Island Dam, pollution,
policy tool.

Michael D. Yokell, Charles Cicchetti, Richard Norgaard, Hal
Feiveson, Lester Silverman, Alan Carlin.

Nature and Government (23 Feb., HI): Nature and urban
concerns, energy policy conflicts, the Front Range, solid
waste master plan.

Millard C. Davis, Richard L. James, Ruth W. Melvin, Helen
Ross Russell, John E. Martin, Martin Seybold.

The Measurement of Air Pollution (23 Feb., DH): Ozone,
remote areas, Clean Air Act, lung health study, SO2, particu-
lates.

William S. Cleveland, Thomas E. Graedel, James P. Lodge,
Stanley M. Blacker, Wayne Ott, Benjamin G. Ferris, Jr.,
Yvonne M. Bishop, John D. Spengler.

Weather and Geochemistry of the Urban Environment: Process-

es and Impacts—So What! (23 Feb., HI): Severe weather anomalies, inadvertent weather alternation, pollutant measurements in METROMEX, agricultural production, respiratory health study, urban environment.


Societal and Technical Aspects of Denver Area Air Pollution (24 Feb., HI): Atmospheric chemistry, atmospheric physics, health effects, biological effects, control strategies, national policy.


William W. Kellogg, Jean French, Ellis B. Cowling, David Tingey, Lawrence C. Ranieri.


Laura M. Lake, Peter B. Clark, Donald B. Straus, Paul Wehr, Christopher Wright, Dorothy Nelkin, Helen Ingram.

8. Arid Lands

American Droughts (21 Feb., DH): History and intensity, agricultural productivity, impacts, strategies, technological options, forecasting.


Howard Drege, Priscilla Reining, Mostaffa Tolba, Dean F. Peterson, M. G. C. McDonald Dow, Bill L. Long, Walter Orr Roberts, Irene Tinker, Robert Stein, Robert Kates.

Desert Dust: Origin, Characteristics, and Effect on Man (22 and 23 Feb., DH): Nature, rates of deposition, eolian quartz dust, morphology, duststorms on Mars, oxygen isotopic ratios, dust carried great distances, Asian desert dust, oceanic sediments, climatology and mineralogy, dust transport, effect on weather, effect of erosion and cropping, highway transportation.


The Reclamation of Disturbed Arid Lands (23 and 24 Feb., DH): Surface mine reclamation, woody plants on mine spoils, native shrubs and oil shale, restoration of productivity, coal reclamation research, aquatic impacts, geochemical aspects, economics, socioeconomic impacts, semiarid mined lands, revegetation, shrub growth, humate deposits, hydrologic design.


9. Medicine and Health

Health Services for Rural Areas (21 Feb., HI): Family practice center, medical school outreach, community decisions, guidance, incentives.


James H. Abbs, Eric S. Luschei, Louis J. Goldberg, Ronald W. Netsell.

Behavioral Research in Medicine and Health: Careers and Training (22 Feb., HI): Biobehavioral approach, coronary prone behavior, sociocultural approach, interdisciplinary approach, federal role, implications.

Pamela C. Ebert, William Bevan, Henry W. Riecken, Neal E. Miller, David C. Glass, M. Margaret Clark, Carl Pfaffmann, Stephen M. Weiss, David Mechanic.

Organ Transplantation and Tumor Immunity (22 Feb., HI): Kidney as a model, liver transplantation, portal hepatotropic concept, splanchnic hormones, shared antigens, active immunotherapy, tumor-associated antigens, transfer factor.

Charles W. Putnam, Thomas E. Starzl, Ariel C. Hollinshead, Richard Weil, III, Lawrence Koep, Percy Minden, Evan Hersh, Robert Yonemoto, Barbara Jacobs.


Medical Decision-Making (23 Feb., HI): Probabilities, utilities, perceptual inference, cost-benefit analysis.


Pharmacokinetics: Implications for Patient Care (23 Feb., HI): Absorption, distribution, metabolism, excretion of drugs, optimizing dosage, therapeutic efficacy, reduction in side effects.


Scientific Information and Public Policy: Regulating the Use of Psychotropic Drugs (24 Feb., HI): Social dimensions, emerging needs, formulation of policy, legislation, opportunities and barriers.


Health Goals and Health Indicators (24 Feb., HI): National health policy, health care needs, health planning, health data, health status indicators, psychological well-being, methodological perspectives.

Jack Elinson, Anne Mooney Hudson, Odin W. Anderson, Samuel Wolfe, Harry Cain, Dorothy P. Rice, Athilia E. Siegmund,
11. Technological Implications


Can the Appropriate Technology Movement Really Significantly Enhance Freedom and Quality of Life? (22 Feb., HI): Rural communities, urban communities, enhancing freedom, institutional barriers.

Craig A. Decker, Joseph F. Coates, Mary Ann MacKenzie, David Morris, John Todd, Langdon Winner.

Beyond Gutenberg: Communication Without Paper? (23 Feb., HI): On-Line intellectual community, scientific information, computer-readable data, newly discovered information, integrated communication system.


Hand-Held Calculators—Trends and Impacts (23 Feb., HI): The consumer, calculator technology, educational impact, social implications.

Thomas N. Pyke, Jr., George E. Lindamood, Leonard J. Donohoe, Max S. Bell.

The Consequences of Reduced Building Ventilation (25 Feb., HI): Energy saved, airborne infections, indoor air pollution, sampling in confined atmospheres.

Charles M. Hunt, Tamami Kusuda, George F. Mallison, S. David Shearer, James J. DeCorpo.

Political and Social Aspects of Remote Sensing from Space (25 Feb., HI): Technical capability, international cooperation, international law, politicized science, business view.

George A. Rabchevsky, Roger M. Hoffer, Frederick J. Doyle, James V. Zimmerman, Ronald F. Stowe, Merrill Conitiz, Paul M. Maughan.

12. Behavioral Science


Creativity (21 Feb., HI): Emotional blocks, interdisciplinary, sensory imagination, common patterns.


Individual Differences, Cognition, and Learning (22 Feb., HI): Language processing, individual differences, verbal IQ, information processing.


Values of Screening and Assessment for Early Intervention in the Management of the Special-Needs Child (22 Feb., HI): The


13. Education


14. Economic and Social Sciences


Environmental Issues and the Social and Behavioral Sciences
Judith A. Ramaley, Elske Smith, Doris Wooten, Carol Bonosaro, Irene Frieze, Ellen Weaver.

15. Science and Public Policy


Why Run Scared? (21 Feb., HI): Adventure and misadventure, science court experiment, balanced judgment in toxicology.
Homer J. Hall, Anna J. Harrison, Arthur Kantrowitz, Leon Goldberg.

Emerging National and International Policy on Information (22 Feb., HI): Information systems, national copyright policy, computers and communication, responsible computer systems, international information sharing.

Scientists and Congress: Making a Difference (22 Feb., HI): Congressional agenda, ozone-fluorocarbon controversy, the political arena, congressional science fellowships.

Knowledge for Policy-Making: Integrating Information, Opinion, and Values (23 Feb., HI): Intermediate knowledge, research applied to national needs, holistic technology assessments.


The Utilization of Social Science Information by Congress (24 Feb., HI): Social impact assessment, social legislation, social indicators, congressional oversight, evaluating social R & D.
Lawrence Froman, C. P. Wolf, Genevieve J. Knezo, Harrison W. Fox, Jr., Osmund T. Fundingsland, Pamela C. Ebert, Oliver C. Mole, Sally Schurr.

Utilization of Scientific Knowledge in Planning and Implementing Public Policy (24 Feb., HI): Usable social research, relevant scientific data, knowledge utilization, minority students, science policy implications.

Energy Analysis: A New Public Policy Tool (25 Feb., HI): Information for policy-makers, environmental work, second law efficiencies, economic costs, energy planning.

16. History and Philosophy of Science

Technology and Public Policy: A Retrospective View (21 Feb., HI): The atomic bomb, Jacksonian era relations, submarine telegraphy, the telephone, wastewater systems.

Two Martian Centenaries: The Real Moons and the Illusory Canals of Mars (21 Feb., HI): Discovery of the moons, surfaces of the moons, dynamics of the moons, modern observations.
Carl Sagan, Richard Berendzen, Owen Gingerich, Joseph Verkerka, Thomas C. Duxbury, George Born, Michael Mendillo, David DeVorkin, Bradford Smith.


Solutions to Problems Encountered in Running an Academy of Science (22 Feb., CO): Membership drive, Oklahoma, Montana, visiting scientist, fund raising, advisory panel, technical writing, Texas, publications.

New Light on Newton: To Honor the 250th Anniversary of His Death (23 Feb., HI): Newton’s years of discovery, Newton’s dynamics, absolute space, optical lectures, algebraic versus geometric techniques.
Ernan McMullin, Richard S. Westfall, James E. McGuire, Alan Shapiro, Michael Mahoney.


The Many Faces of Information Science (25 Feb., DH): Information transfer, theories of information, information structures, knowledge transfer, signs and symbols.


Race, Sex, and the Maturing of Social Theory (25 Feb., DH): Biological and physical sciences, slavery, family, kinship, racism and sexism.
Eleanor Leacock, Ethel Tobach, Herbert Gutman, Niara M. Sudarkasa, Jessie Bernard.
Meeting Information

Listed below are the Denver hotels which are used by the AAAS for housing and/or program activities during the Annual Meeting. (The two letters in parentheses are the codes that identify session locations in the preconvention program.)

**Denver Hilton (DH):** Symposia and Public Lectures; Registration, Information, and Ticket Desks; Message Center; Welcome Center (hospitality); Resource Center for the Disabled; Student Hospitality Center; **SCIENCE INTERNATIONAL** (exhibits); Science Film Festival; Headquarters Office; Newsroom; Business Meetings.

**Holiday Inn—Downtown (HI):** Symposia; Business Meetings.

**Cosmopolitan (CO):** Symposia; Workshops on Minorities in Science; Business Meetings.

**Executive Tower Inn:** Meeting of the AAAS Southwestern and Rocky Mountain (SWARM) Division; Contributed-Paper (Poster and Slide) Sessions; Registration Desk; AAAS Office and Information Center.

**Brown Palace:** Housing only.

All the above facilities are located in the downtown area of Denver (for precise locations see map on page 51). Most are within walking distance from one another, but special AAAS shuttle buses will be operated between all hotels.

**Registration**

Meeting attendees are encouraged to register in advance to obtain a detailed preview of the symposia, lectures, special events, and other activities scheduled during the Meeting. Registration fees are listed on the Registration Form on page 52 in this issue. Please note that special 1-day attendance registration is available on site at the Meeting Registration Desks at $10 (regular) and $5 (student). Program, badge, and condensed program (foldout) will be mailed to advance registrants on or about 20 January 1977. On-site Registration Desks will be located in the Denver Hilton (Convention Lobby) and the Executive Tower Inn (Third Floor). Registration hours are as follows:

- **Sunday, 20 February** ............... 2:00 p.m. to 6:00 p.m.  
  (Denver Hilton only)

- **Monday through Thursday,**  
  21–24 February ............... 8:00 a.m. to 6:00 p.m.

- **Friday, 25 February** ............... 8:00 a.m. to 12 noon  
  (Denver Hilton only)

**Registration Refunds**

The AAAS will refund advance registration fees for all cancellations received in writing or by telegram prior to 14 February 1977. NO REFUNDS WILL BE MADE ON CANCELLATION NOTICES RECEIVED AFTER THIS DATE. Refunds will be mailed from the AAAS Offices in Washington, following the Annual Meeting.

**Tax Deduction for Educational Expenses**

Please note that U.S. Treasury Regulation § 1.162-5 permits an income tax deduction for educational expenses (registration fees, and cost of travel, meals, and lodging) undertaken to: (1) maintain or improve skills required in one's employment or other trade or business, or (2) meet express requirements of an employer or a law imposed as a condition to retention of employment, job status, or rate of compensation. This is true even for education which leads to a degree.

**Housing**

In cooperation with the AAAS, the five Denver hotels used for housing and/or meetings have set aside—at guaran-
ted reduced rates—blocks of guestrooms for attendees of the Annual Meeting. The Reservation Form on page 53 of this issue lists the participating hotels and their rates. These rates are guaranteed only when reservations are made through the AAAS Housing Bureau on the official Reservation Form prior to 4 February 1977.

Hotel rooms are assigned on a first-come, first-served basis. Persons submitting their housing requests late cannot be guaranteed assignment of rooms at the hotel of their choice or at the requested rates. If the room rate specified is no longer available, the next available higher rate will be assigned. If the first choice hotel specified is no longer available, the Housing Bureau will make every effort to assign the second choice requested. Confirmation will come to you directly from the hotel. You should notify the hotel directly of any changes in your reservation. Room assignments will be delayed if any information is omitted from the form.

On request, the hotels will accommodate additional persons in guestrooms (e.g., three persons in a double or twin room). Charges per additional person vary between $5 and $10 per night, depending on the hotel; charges for rollaway beds and cots vary between $2 and $10, depending on the hotel. The Holiday Inn, Executive Tower Inn, and Brown Palace accommodate children under age 12 free of charge in same room with parents. The Cosmopolitan's age limit is 18; the Denver Hilton does not set any age limit.

**Resources for Disabled Attendees**

The AAAS, in cooperation with the Denver Advisory Committee, is once again making every effort to make the Annual Meeting fully accessible to disabled individuals. In addition to hotel rooms which can accommodate wheelchairs, and accessible meeting areas, the following resources will be available:

- A Resource Center staffed with volunteers to offer assistance on request as part of the hospitality and registration center.
- Shuttle service between meeting hotels in buses or vans equipped with lifts for wheelchairs.
- Transportation service to and from airport, train, and bus stations.
- Interpreters (sign language and oral) at all Public Lectures, and for other sessions on request.
- Repair service for wheelchairs.
- Round-the-clock telephone service responding to emergency needs.
- Special tour and sightseeing information for disabled persons.

The Denver Advisory Committee is making a special effort to ensure that every aspect of the Meeting is barrier-free. Persons needing special hotel accommodations, interpreting services, or other assistance are strongly urged to so indicate on the advance registration and hotel reservation forms. Early response will help us to plan and serve you better. For additional information or suggestions, contact Martha Redden or Wayne Schwandt, Project on the Handicapped in Science, AAAS, 1776 Massachusetts Avenue, NW, Washington, D.C. 20006 (Phone: 202-487-4497).

**Child Care Services**

For meeting attendees who require babysitters for infants and small children, or companion care for children 8 years and up, we have obtained the services of Columbine Sitters (Phone: 303-722-9364). The agency is open seven days a week, 9:00 a.m. through 9:00 p.m.; 24 hours' notice is requested.

**Rates:** Initial $1 fee plus $6.50 for the first three hours (includes transportation); $1.50 for every subsequent hour. All sitters are licensed, bonded, and over age 21.

—ELISABETH ZEUTSCHEL
Schedule of Contributed-Paper Sessions

Listed below are the room and time assignments for the various contributed-paper sessions by general topic of the papers. Except where explicitly noted, all sessions are of the traditional slide format. All contributed-paper sessions will be held in the Executive Tower Inn.

Monday, 21 February
Education: 9 a.m. and 3 p.m. ......... Blue Room
Psychology: 9 a.m. and 3 p.m. .... Curtis/Caucus Room
Biology: 9 a.m. and 3 p.m. ........ Brahms Room
Biology: 9 a.m. and 3 p.m. .......... Beethoven Room
POSTER (General): 9 a.m. ............ Forum Room

Tuesday, 22 February
Education: 9 a.m. and 3 p.m. ......... Blue Room
Physics: 9 a.m. ........................ Tower Room
Chemistry: 3 p.m. ...................... Tower Room
Psychology: 9 a.m. and 3 p.m. .... Curtis/Caucus Room
Biology: 9 a.m. and 3 p.m. ......... Brahms Room
Biology: 9 a.m. and 3 p.m. .......... Beethoven Room
POSTER (General): 9 a.m. ............ Forum Room

Wednesday, 23 February
Education: 9 a.m. and 3 p.m. ......... Blue Room
Medical: 9 a.m. and 3 p.m. .......... Gold Room
Energy: 9 a.m. and 3 p.m. ......... Tower Room
Psychology: 9 a.m. .................. Curtis/Caucus Room
Anthropology: 3 p.m. ............... Curtis/Caucus Room
Biology: 9 a.m. and 3 p.m. ......... Brahms Room
Biology: 9 a.m. and 3 p.m. .......... Beethoven Room
POSTER (Medical): 3 p.m. ............ Forum Room

Thursday, 24 February
Education: 9 a.m. and 3 p.m. ......... Blue Room
Medical: 9 a.m. and 3 p.m. .......... Gold Room
Geology: 9 a.m. ........................ Tower Room
Information/Statistics: 3 p.m. ........ Tower Room
Social/Economic: 9 a.m. and 3 p.m.
...................................... Curtis/Caucus Room
Biology: 9 a.m. and 3 p.m. .......... Brahms Room
POSTER (Education/Atmospheric
and Biology): 9 a.m. and 3 p.m. .... Forum Room

Friday, 25 February
Education: 9 a.m. ........................ Blue Room
Medical: 9 a.m. ........................ Gold Room
Atmospheric/Hydrospheric: 9 a.m. Tower Room
POSTER (Biology): 9 a.m. ............ Forum Room
ENCLOSED IS:

AAAS Member: ☐ $20 Single Registration Fee ☐ $30 Double Registration Fee (attendee and spouse)
Non-Member: ☐ $25 Single Registration Fee ☐ $35 Double Registration Fee (attendee and spouse)

Non-Member applying for AAAS membership and meeting registration: (Annual membership dues include 52 issues of SCIENCE. Double membership—individual and spouse—includes one subscription to SCIENCE.)
☐ $45 Single Registration and Membership ($20 registration and $25 dues)
☐ $55 Double Registration and Single Membership (name of applicant)
($30 registration and $25 dues)
☐ $67 Double Registration and Membership ($30 registration and $37 dues)

Student: ☐ $10 Single Student Registration Fee ☐ $15 Double Registration Fee (student attendee and spouse)

*These rates apply to USA membership only. Inquire for Canadian or Foreign rates.

Note: Special one-day attendance registration is available at the Meeting Registration Desks ($10 regular, $5 student).

Program and badge will be mailed to each registrant in late January.
Registrations received after 30 January will be held at the AAAS Information Booth.

NAME OF REGISTRANT: ________________________________ (Last Name) (First and Initial)
NAME OF SPOUSE REGISTRANT: __________________________ (Last Name) (First and Initial)
REGISTRANT'S MAILING ADDRESS: __________________________ (Street)
[For receipt of program(s), badge(s), and SCIENCE (for new applicants)] (City/State) (Zip Code)
ADDITIONAL REGISTRANTS: (With same mailing address. Use new form if address differs)
REGISTRANT'S INSTITUTION OR COMPANY: 

(City) (State) (Zip Code)
CONVENTION ADDRESS: ____________ (Hotel or Street Address)

☐ Please check here if you need special services due to handicap. We will contact you prior to the meeting.

Mail to: American Association for the Advancement of Science, Dept. R, 1515 Massachusetts Ave., NW, Washington, D.C. 20005

SURVEY OF ATTENDEES
Annual Meeting, Denver, 20–25 February 1977

Your answers to the following questions will help us in planning future AAAS Annual Meetings. Please complete the form and either return it with your registration form or send in separately (to the same address) if you wish to respond anonymously (in any case, the two forms will be processed separately).

Principal Professional Interest
11 ☐ Physical, mathematical
12 ☐ Biological, medical
13 ☐ Engineering
14 ☐ Social, behavioral
15 ☐ Science policy
16 ☐ Other...

Principal Professional Activity
21 ☐ Teaching, education
22 ☐ Health practice
23 ☐ Other practice, consulting
24 ☐ Research, development
25 ☐ Administration
26 ☐ Other...

Institutional Affiliation Type
31 ☐ University, 4-year college
32 ☐ Other educational
33 ☐ Industrial, commercial
34 ☐ Other private
35 ☐ Government
36 ☐ Other...

Highest Educational Level
41 ☐ Doctoral Degree
42 ☐ Master's Degree
43 ☐ Other professional
44 ☐ Bachelor's Degree
45 ☐ Other...

Age
51 ☐ Under 26 years
52 ☐ 26 to 35 years
53 ☐ 36 to 45 years
54 ☐ 46 to 55 years
55 ☐ 56 to 65 years
56 ☐ Over 65 years

Distance Traveled to Meeting
61 ☐ Under 51 miles
62 ☐ 51 to 100 miles
63 ☐ 101 to 200 miles
64 ☐ 201 to 500 miles
65 ☐ 501 to 1000 miles
66 ☐ Over 1000 miles

Last AAAS Meeting Attended
71 ☐ 1971 in Philadelphia
72 ☐ 1972 in Washington
73 ☐ 1973 in Mexico City
74 ☐ 1974 in San Francisco
75 ☐ 1975 in New York
76 ☐ 1976 in Boston
Reservations
Hotel Rates*

The American Association for the Advancement of Science will hold its 1977 Annual Meeting in Denver, 20-25 February. AAAS headquarters hotel will be the Denver Hilton; the meeting of the AAAS Southwestern and Rocky Mountain Division will be at the Executive Tower Inn, with registration and information desks located at both hotels. Sessions will also be held at the Cosmopolitan and the Holiday Inn—Downtown. The following hotels will be used for housing:

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Single</th>
<th>Double</th>
<th>Twin</th>
<th>Suites**</th>
<th>Parking</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENVER HILTON (Headquarters)</td>
<td>$22***</td>
<td>$32</td>
<td>$32</td>
<td>$104</td>
<td>$3 per 24 hours</td>
</tr>
<tr>
<td>1550 Court Place</td>
<td>25</td>
<td>35</td>
<td>35</td>
<td></td>
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<tr>
<td>(No. of rooms held: 700)</td>
<td>29</td>
<td>39</td>
<td>39</td>
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<td>EXECUTIVE TOWER INN (SWARM)</td>
<td>$24</td>
<td>$30</td>
<td>$30</td>
<td>$64</td>
<td>Free 24-hour parking for registered guests</td>
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<tr>
<td>1405 Curtis Street</td>
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<td>(No. of rooms held: 175)</td>
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<tr>
<td>COSMOPOLITAN</td>
<td>$18</td>
<td>$26</td>
<td>$26</td>
<td>$125</td>
<td>$3 (enclosed) and $2.50</td>
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<tr>
<td>1780 Broadway</td>
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<td>(out-door) per 24 hrs.</td>
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<tr>
<td>(No. of rooms held: 200)</td>
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<td></td>
<td></td>
<td></td>
<td>for registered guests</td>
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<tr>
<td>HOLIDAY INN—DOWNTOWN</td>
<td>$21</td>
<td>$26</td>
<td>$26</td>
<td>$45</td>
<td>Free for registered guests</td>
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<tr>
<td>15th Street &amp; Glenarm Place</td>
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<td>(No. of rooms held: 230)</td>
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<tr>
<td>BROWN PALACE</td>
<td>$34</td>
<td>$41</td>
<td>$41</td>
<td>$65</td>
<td>$2.50 per 24 hours</td>
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<td>321 Seventeenth Street</td>
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<td>(No. of rooms held: 50)</td>
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*Per day; add 7.5% for State and City Room Tax. Charges for additional persons per room vary between $5 and $10, depending on hotel; charges for rollaway beds and cots vary between $2 and $10, depending on hotel. Children under age 12 accommodated free in same room with parents at Executive Tower Inn, Holiday Inn, and Brown Palace; age limit higher at Hilton and Cosmopolitan.

**Lowest available rate for one-bedroom/parlor suites; rates for larger suites available upon request.

***One hundred "mini singles" are available at the $22 rate.

NOTE: If room rate specified is not available, the next available higher rate will be assigned. Confirmation will come to you directly from the hotel. You should notify the hotel of any changes in your reservation. Assignment is delayed if any information is omitted.

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### HOTEL RESERVATIONS FORM

Please type or print

**CHOICE OF HOTEL:** First ___________________________ Second ___________________________

**ROOM:** □ Single □ Double □ Twin **SUITE:** □ 1 Bedroom □ 2 Bedrooms **Preferred Rate $_________**

Please indicate any special housing needs due to a handicap:

**ARRIVAL:** Date __________ ; a.m. __________ p.m. Be sure to list definite arrival and departure date and time. Hotel reservations will be held only until 6 p.m. unless otherwise specified.

**DEPARTURE:** Date __________ ; a.m. __________ p.m.

**NAMES AND ADDRESSES OF ALL OCCUPIANTS OF ROOM**

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<tr>
<th>Name</th>
<th>Address</th>
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</table>

Hotel, confirm reservation to:

Mail to: AAAS Housing Bureau
225 West Colfax Avenue, Denver, Colo. 80202

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Science and Change: Hopes and Dilemmas

ARTHUR HERSCHMAN

Science 195 (4273), 42-53.
DOI: 10.1126/science.195.4273.42

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