

### PRELIMINARY PROGRAM

General Chairman: Gaylord P. Harnwell  
(President Emeritus, University of Pennsylvania)

#### AAAS INVITED LECTURES AND PANELS

- **Special Lecture I (26 Dec.).**  
Constantinos A. Doxiadis (President, Athens Technological Organization, Athens, Greece).
- **Distinguished Lecture (27 Dec.).**  
Louis S. B. Leakey (Director, Center for Prehistory and Palaeontology, National Museum, Nairobi, Kenya).
- **Address of the Retiring AAAS President (28 Dec.).**  
Athelstan Spilhaus (Fellow, Woodrow Wilson International Center for Scholars, Smithsonian Institution).
- **RESA Annual Address and Panel Discussion (29 Dec.).**  
Jack E. Goldman (Senior Vice President, Research and Development, Xerox Corporation, Stamford).
- **Phi Beta Kappa Lecture (29 Dec.).**  
Jean Mayer (Professor, Harvard University School of Public Health).
- **Special Lecture II (30 Dec.).**  
Charles Eames (Designer, Venice, Calif.).
- **Illustrated Lectures (26–30 Dec.).**  
Carl Sagan (Professor, Center for Radiophysics and Space Research, Cornell University) (26 Dec.).  
Alvin M. Weinberg (Director, Oak Ridge National Laboratory) (27 Dec.).  
Paul D. MacLean (Director, Brain Evolution and Behavior Laboratory, National Institute of Mental Health) (28 Dec.).  
Jerome S. Bruner (Professor of Psychology, Harvard University) (29 Dec.).  
William J. L. Sladen (Professor, The Johns Hopkins University School of Hygiene and Public Health) (30 Dec.).

#### PHYSICAL UNIVERSE

- **Acoustics of Orchestral Musical Instruments (27 Dec.).**  
Arranged by Arthur Benade (Case Western Reserve University). [Part of a symposium on Sound and Music]
- **Architectural Acoustics (28 Dec.).**  
Arranged by R. S. Shankland (Case Western Reserve University). [Part of a symposium on Sound and Music]
- **Contributions of Operations Research to Mathematics (27 Dec.).**  
Arranged by Saul I. Gass (Mathematica, Inc., Bethesda, Md.).

- **Lightning (27 Dec.).**  
Arranged by Richard E. Orville (NSF).
- **Astronomy from a Space Platform (27–28 Dec.).**  
Arranged by G. W. Morgenthaler (Martin Marietta Corporation, Denver).
- **The Early History of the Earth and Moon (28 Dec.).**  
Arranged by S. Fred Singer (University of Virginia).
- **Oceanography—Its Status Today and Outlook for the Future (28–29 Dec.).**  
Arranged by Harris B. Stewart, Jr. (NOAA Atlantic Oceanographic and Meteorological Laboratories, Miami).
- **The Cosmic Distance Scale (29 Dec.).**  
Arranged by L. W. Fredrick (University of Virginia).

#### LIVING WORLD

- **Biologic Relativity (26 Dec.).**  
Arranged by E. R. N. Grigg (Chicago Medical School).
- **Some Mathematical Questions in Biology (26–27 Dec.).**  
Arranged by Jack D. Cowan (University of Chicago).
- **The Role of Odor in Life Activities (27 Dec.).**  
Arranged by Irvin Hornstein (AID).
- **Chromosomal Analysis and Differentiation (27 Dec.).**  
Arranged by Hans Laufer (University of Connecticut).
- **Arthropod Molting (27 Dec.).**  
Arranged by John D. O'Connor (University of California, Los Angeles).
- **The Vertebrate Integument (27–28 Dec.).**  
Arranged by Paul F. A. Maderson (Brooklyn College).
- **Physics Looks at Biological Structure (28 Dec.).**  
Arranged by Britton Chance (University of Pennsylvania).
- **George Sarton Memorial Lecture (28 Dec.).**  
From Catastrophism to Evolutionism—The History of a Conceptual Transition, by Ernst Mayr (Harvard University).
- **Research in the National Parks (Centennial Symposium Commemorating the Founding of the National Park Service, 1872) (28–29 Dec.).**

Arranged by Robert M. Linn (National Park Service, Washington, D.C.).

- **Mineral Elements in the Food Chain (28–29 Dec.).**  
Arranged by Michael A. Farrell (State College, Pa.) and Matthias Stelly (American Society of Agronomy).
- **Living Systems: Synthesis, Assembly, Origins (29 Dec.).**  
Arranged by Sidney Fox (University of Miami).
- **Recent Advances in Pollination Biology: Quantification and Case Studies (29 Dec.).**  
Arranged by Herbert G. Baker (University of California, Berkeley).
- **Polar Deserts (29–30 Dec.).**  
Arranged by Terah L. Smiley and James H. Zumberge (University of Arizona).
- **Cave Biology of Bats: Their Ecology, Physiology, Behavior, and Future Survival (30 Dec.).**  
Arranged by Robert E. Henshaw (Pennsylvania State University).
- **The Formation of Diploid Neospecies (30 Dec.).**  
Arranged by Hampton L. Carson (University of Hawaii).

#### HEALTH, DISEASE, BEHAVIOR

- **The Role of Aggression in Human Adaptation (26 Dec.).**  
Arranged by Jacob A. Arlow (State University of New York, New York City).
- **Urban Health Care (27 Dec.).**  
Arranged by Alfred Gellhorn (University of Pennsylvania). [Part of a symposium on The Sciences in the Service of Urban Philadelphia]
- **AAAS Vice Presidential Address (Anthropology), and Population Control in Social and Economic Perspective (27 Dec.).**  
Given and arranged by Ward Goodenough (University of Pennsylvania).
- **Human Response to Environmental Stimulation: From the Laboratory to the Field (27 Dec.).**  
Arranged by Joachim F. Wohlwill (Pennsylvania State University).
- **Articulation Phenomena and Disorders (27 Dec.).**  
Arranged by Ralph Shelton (University of Arizona).
- **Confronting the Violence of Normal Man (27 Dec.).**  
Arranged by Israel W. Charny (Group for Research in the Psychology of Aggression and Nonviolence, Paoli, Pa.).
- **Scientific Aspects of Contraception (27 Dec.).**  
Arranged by George B. Koelle (University of Pennsylvania).
- **AAAS Vice Presidential Address (Pharmaceutical Sciences) (27 Dec.).**  
The Role of the Hospital Pharmacist and the Pharm. D.

—A Problem in Curriculum Development, by Wallace L. Guess (University of Texas, Austin).

- **Distinguished Lecture of the AAAS Section on Pharmaceutical Sciences (27 Dec.).**  
Human Variability and Safer, More Effective Pharmacotherapy, by George J. Cosmides (National Institute of General Medical Sciences).
- **Invertebrate Behavior (27–28 Dec.).**  
Arranged by Peter N. Witt (North Carolina Department of Mental Health).
- **Musical Perception (28 Dec.).**  
Arranged by W. Dixon Ward (University of Minnesota). [Part of a symposium on Sound and Music]
- **Comparative Aspects of Ovarian Function and Control (28 Dec.).**  
Arranged by Ian P. Callard (Boston University).
- **Biological and Cultural Bases of Sex Role Differentiation (28 Dec.).**  
Arranged by Alexander Alland, Jr. (Columbia University) and Adrienne Zihlman (University of California, Santa Cruz).
- **On the Relations between Basic Research and Applications of Psychology (28 Dec.).**  
Arranged by James J. Jenkins (University of Minnesota).
- **The Over-Medicated Society (28 Dec.).**  
Arranged by M. C. Smith (University of Mississippi).
- **Smoking and Health Now (28 Dec.).**  
Arranged by Abraham M. Lilienfeld (The Johns Hopkins University).
- **Data from EEG and Other Areas of Parapsychology (28 Dec.).**  
Arranged by E. Douglas Dean (Newark College of Engineering).
- **Comparative Immunology of the Oral Cavity (28–29 Dec.).**  
Arranged by Henry W. Scherp (National Institute of Dental Research).
- **Thirst: New Findings and Advances in Concepts (28–29 Dec.).**  
Arranged by Alan N. Epstein and Eliot Stellar (University of Pennsylvania).
- **Prenatal Ontogeny of Behavior and the Nervous System (28–30 Dec.).**  
Arranged by Gilbert Gottlieb (North Carolina Department of Mental Health).
- **Differences in Viewpoint: The Drug Addict and His Physician (29 Dec.).**  
Arranged by John C. Ball (Temple University).
- **How Valuable Is Human Health? (29 Dec.).**  
Arranged by Edmund D. Pellegrino (State University of New York, Stony Brook) and Ronald W. McNeur (Society for Health and Human Values, Philadelphia).

- **Regulation of Organ and Tissue Growth (29-30 Dec.).**  
Arranged by Richard J. Goss (Brown University).
- **Sentics, Brain Function, and Sources of Human Values (29-30 Dec.).**  
Arranged by Manfred Clynes (Rockland State Hospital, Orangeburg, N.Y.).
- **Heavy Metals as an Environmental Hazard to Fish, Birds, and Man (30 Dec.).**  
Arranged by Gerald J. Lauer (New York University).
- **Encounter Groups (30 Dec.).**  
Arranged by Kurt W. Back (Duke University).
- **Studies in Sexuality (30 Dec.).**  
Arranged by Leo Madow (Medical College of Pennsylvania).

**ENVIRONMENTAL PROBLEMS AND URBAN AFFAIRS**

- **University-Black Ghetto Relations: A Case Study (27 Dec.).**  
Arranged by Russell L. Ackoff (University of Pennsylvania). [Part of a symposium on The Sciences in the Service of Urban Philadelphia]
- **Environmental Education Workshop and Seminar (27 Dec.).**  
Arranged by Robert E. Samples, Manert Kennedy, and Nicholas Helburn (University of Colorado).
- **Experimental Manipulation of Natural Systems (27 Dec.).**  
Arranged by William E. Cooper (Michigan State University).
- **The Role of State and Local Academies in Providing Information Concerning Environmental Education (27 Dec.).**  
Arranged by Wilmer W. Tanner (Brigham Young University).
- **Academies and Environmental Education (27 Dec.).**  
Arranged by Wilmer W. Tanner.
- **Indicators of Environmental Quality (27-28 Dec.).**  
Arranged by William A. Thomas (Oak Ridge National Laboratory).
- **Nature Study for Impact and Action (27-29 Dec.).**  
Arranged by Kingsley L. Greene (State University of New York, Morrisville).
- **Environmental Sciences and International Development (27-30 Dec.).**  
Arranged by M. Taghi Farvar, Michael W. Corr, and Alan H. McGowan (Washington University).
- **General Systems of the World Environment (27-30 Dec.).**  
Arranged by Philip C. Nunn (Center for Environmental Studies, Grand Rapids, Mich.) and Richard F. Ericson (George Washington University).

- **New Towns and Old Cities: Prospects for Partnership in Urban Planning (28 Dec.).**  
Arranged by William L. Rafsky (Greater Philadelphia Movement). [Part of a symposium on The Sciences in the Service of Urban Philadelphia]
- **City Life (28 Dec.).**  
Arranged by John Szwed (University of Pennsylvania).
- **Alternative Approaches to National Delivery of Health Care (28 Dec.).**  
Arranged by George K. Chacko (Institute of Aerospace Safety and Management, Washington, D.C.).
- **Student-Originated Studies: An Ongoing Experiment in Undergraduate Student-Directed Studies of Environmental Problems (28-29 Dec.).**  
Arranged by Alexander J. Barton and Charles H. Dickens (National Science Foundation).
- **Interactions Between Natural and Urban Ecological Communities (29 Dec.).**  
Arranged by Ruth Patrick (Academy of Natural Sciences). [Part of a symposium on The Sciences in the Service of Urban Philadelphia]
- **Environmental Noise and Its Control (29 Dec.).**  
Arranged by R. L. Bannister (Westinghouse Electric Corporation). [Part of a symposium on Sound and Music]
- **Geological Implications of Solid Waste Landfill (29 Dec.).**  
Arranged by Arthur A. Socolow (Pennsylvania Geological Survey, Harrisburg).
- **The Future of the Cities: An Overview Panel Discussion (30 Dec.).**  
Arranged by David R. Goddard (University of Pennsylvania). [Part of a symposium on The Sciences in the Service of Urban Philadelphia]

**TECHNOLOGY**

- **Energy Production from Nuclear Fusion (27 Dec.).**  
Arranged by Roy Gould (U.S. Atomic Energy Commission).
- **Technology and the Humanization of Work (27 Dec.).**  
Arranged by Michael Maccoby (Institute for Policy Studies, Washington, D.C.) and Neal Q. Herrick (U.S. Department of Labor).
- **Practical Solutions to Metric Conversion (27 Dec.).**  
Arranged by Edward A. Munns (Myrtle Beach, S.C.).
- **Radical Approaches to Ecology (28 Dec.).**  
Arranged by Garland Allen (Washington University).
- **Engineering—For the Survival of Man (28 Dec.).**  
Arranged by T. Todd Reboul (RCA Corporation, Moorestown, N.J.).

- **The Energy Crisis: Some Implications and Alternatives (28–29 Dec.).**  
Arranged by Dean Abrahamson (University of Minnesota).
- **Man-Machine Interactions and Implications for Society (29 Dec.).**  
Arranged by Carl L. Sandler (Battelle Memorial Institute, Seattle).
- **Communications Technology and Its Effect on People (29 Dec.).**  
Arranged by Walter Baer (Rand Corp., Santa Monica).
- **Social Control of Science and Technology (30 Dec.).**  
Arranged by Michael Baram (Massachusetts Institute of Technology).
- **The Navigation Sciences (30 Dec.).**  
Arranged by C. Towner French (P. R. Mallory & Co., Inc., Washington, D.C.) and Raynor L. Duncombe (U.S. Naval Observatory).
- **Organizing Quantitative Data for Scientific Application: Issues Faced by the President's Commission on Federal Statistics (28 Dec.).**  
Arranged by Morris B. Ullman (Bethesda, Md.) and Daniel Rathbun (President's Commission on Federal Statistics).
- **Crucial Transitions in Civilization: A Problem in Macrocultural Interpretation (29 Dec.).**  
Arranged by Roger W. Wescott (Drew University).
- **AAAS Vice Presidential Address (Social and Economic Sciences) (29 Dec.).**  
Waste Disposal in an Age of Rubbish: Social Science Interpretations of American Society in the 1960's, by Daniel P. Moynihan (Harvard University).
- **The Changing American Population: The Social and Economic Implications of the 1970 Census and Other National Surveys (29 Dec.).**  
Arranged by Harvey M. Sapolsky.

## SOCIAL, POLITICAL, ECONOMIC INTERACTIONS

- **Educational Finances and Revenue Sharing (26 Dec.).**  
Arranged by Janos Horvath (Columbia University).
- **Religious Inter-marriage (26 Dec.).**  
Arranged by John E. Hughes (Villanova University).
- **Employment and Utilization of Scientists (27 Dec.).**  
Arranged by H. William Koch (American Institute of Physics).
- **Scientific Institutions of the Future (27 Dec.).**  
Arranged by Philip C. Ritterbush (Organization: Response, Washington, D.C.).
- **Fair Hiring Practices (27 Dec.).**  
Arranged by Harvey M. Sapolsky (University of Michigan).
- **Interreligious Conflict in Northern Ireland (27 Dec.).**  
Arranged by John E. Hughes.
- **Operations Research and Management Science in the Administration of Justice (27–28 Dec.).**  
Arranged by Carl M. Harris (George Washington University) and Alfred Blumstein (Carnegie-Mellon University).
- **The Use of Scientific Information in Policy-Making (28 Dec.).**  
Arranged by Richard H. Bolt (Bolt Beranek & Newman, Inc., Cambridge).
- **Science and Medicine in the Peoples Republic of China: Contemporary Observations (28 Dec.).**  
Arranged by Robert J. Rutman (University of Pennsylvania).
- **Population Trends in Nonmetropolitan Areas: Research and Policy (28 Dec.).**  
Arranged by Gordon de Jong (Pennsylvania State University).
- **The New Radicalism in Science (29 Dec.).**  
Arranged by David Nichols (Case Western Reserve University).
- **Federal Policy Goals and R & D Programs: Where They Mesh and Where They Don't (29 Dec.).**  
Arranged by Juergen Schmandt (University of Texas, Austin).
- **AAAS Vice Presidential Address (Statistics) (29 Dec.).**  
How Does One Measure Discrimination Against Women?, by Elizabeth Scott (University of California, Berkeley).
- **Can We Develop an Index for Quality of Life? (30 Dec.).**  
Arranged by S. Fred Singer (University of Virginia).
- **Women in Academia: Evolving Policies toward Equal Opportunities (30 Dec.).**  
Arranged by Arie Y. Lewin (New York University).
- **Congress and Future Trends in American Politics (30 Dec.).**  
Arranged by Robert Puckett (Indiana State University).
- **New Conceptual Frameworks for Science and Public Policy Studies (30 Dec.).**  
Arranged by Harvey M. Sapolsky.
- **The Older Family and Bureaucracy (30 Dec.).**  
Arranged by Gordon F. Streib (Cornell University).

## ETHICS, PHILOSOPHY, HISTORY

- **Problems in 19th Century American Science (27 Dec.).**  
Arranged by Charles A. Culotta (Bryn Mawr College).
- **Science, Technology, and Medicine in Philadelphia, 1750–1815 (27 Dec.).**  
Arranged by W. B. Bell, Jr. (American Philosophical Society).

- **Value and Knowledge Requirements for Peace (27–30 Dec.).**  
Arranged by Vincent P. Rock (National Research Council).
- **"The Descent of Man"—Charles Darwin, 1871: A Review of a Century of Progress in Understanding Man's Origins (28 Dec.).**  
Arranged by Elwyn Simons (Yale University).
- **400th Anniversary of the Birth of Johannes Kepler (28 Dec.).**  
Arranged by Raymond J. Seeger (AAAS, Washington, D.C.).
- **Teaching the History and Philosophy of Science in Science Courses (28 Dec.).**  
Arranged by Raymond J. Seeger.
- **The Role of Mathematics in the Development of Science (29 Dec.).**  
Arranged by Raymond J. Seeger.
- **Looting the Past: An International Scandal (29 Dec.).**  
Arranged by Richard I. Ford (University of Michigan).
- **Nonlinear Research in the Sciences and Humanities (29–30 Dec.).**  
Arranged by Michael Kosok (Fairleigh Dickinson University).
- **Youth Speaks about Itself (30 Dec.)**  
Arranged by Ruth S. Freed (Seton Hall University) and Stephanie Miller (New York University).

## EDUCATION, LEARNING, COMMUNICATION

- **The Graduate Student (27 Dec.).**  
Arranged by Hazel Fox (University of Nebraska).
- **Humor in Science (27 Dec.).**  
Arranged by James V. McConnell (University of Michigan).
- **The Information Conscious Society (27 Dec.).**  
Arranged by Eugene Garfield and Morton V. Malin (Institute for Scientific Information, Philadelphia).
- **Science Writing as Literature (27 Dec.).**  
Arranged by Eugene H. Kone (Rockefeller University).
- **Science and the Humanities (27–28 Dec.).**  
Arranged by Frederick D. Horn (Westminster College).
- **Socially Responsive Actions by Institutions of Higher Education (28 Dec.).**  
Arranged by Millard E. Gladfelter (Temple University). [Part of a symposium on The Sciences in the Service of Urban Philadelphia]
- **Urban Education in the Schools (28 Dec.).**  
Arranged by Ezra Staples (Philadelphia Board of Public Education). [Part of a symposium on The Sciences in the Service of Urban Philadelphia]

- **The Relation between Applications of Mathematics and Teaching of Mathematics (28 Dec.).**  
Arranged by Henry O. Pollak (Bell Telephone Laboratories).
- **The Cerebral Librarian: Functions and Malfunctions (28 Dec.).**  
Arranged by James E. Deese (The Johns Hopkins University).
- **Education Planning in Government: 1972–1980 (28 Dec.).**  
Arranged by Francis X. Sutman (Temple University).
- **Directions in Science Education: Asia 1971 (28 Dec.).**  
Arranged by Francis X. Sutman.
- **Computers and Music (29 Dec.).**  
Arranged by M. V. Mathews (Bell Telephone Laboratories). [Part of a symposium on Sound and Music]
- **Sources of Knowledge for Child Rearing (29 Dec.).**  
Dale B. Harris (Pennsylvania State University).
- **The Social Science Disciplines: Contributions to Basic Research in Education (29 Dec.).**  
Arranged by Howard F. Hjelm and Lloyd K. Johnson (U.S. Office of Education, Washington, D.C.).
- **AAAS Vice Presidential Address (Information and Communication) (29 Dec.).**  
Quality Control: The Key Issue in Information Systems, by Edward L. Brady (National Bureau of Standards, Washington, D.C.).
- **Communicative Behavior and the Public Welfare (29 Dec.).**  
Arranged by Robert S. Goyer (Ohio University).
- **The Effect of Educational Experience in Subsequent Education and Adult Life—Models, Measurement, and Interpretation (29 Dec.).**  
Arranged by Ezra Glaser (U.S. Office of Education, Washington, D.C.).
- **Education in Acoustics (30 Dec.).**  
Mary L. Harbold (Temple University). [Part of a symposium on Sound and Music]
- **Teaching Musical Acoustics (30 Dec.).**  
Arranged by Joseph F. Pizzirusso (Scott Paper Company, Chester, Pa.). [Part of a symposium on Sound and Music]
- **Mathematics and Science for the Man and Woman in the Street (30 Dec.).**  
Arranged by R. A. Rosenbaum (Wesleyan University).
- **National Assessment of Educational Progress: New Findings on Achievement in Science (30 Dec.).**  
Arranged by Lloyd K. Johnson (U.S. Office of Education, Washington, D.C.).

# Science

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