

# AAAS ANNUAL MEETING

26-31 December 1968 • Dallas, Texas

## • PERFORMANCE

**In the Matter of J. Robert Oppenheimer**

(A Play in Three Acts by H. Kipphardt)

Department of Theater, School of Fine Arts, Southern Methodist University

## • EXHIBITS

**The Circle of Knowledge**

The Newberry Library, Chicago (*B. Wells*) and The Dallas Public Library

**The Art of Organic Form**

The Smithsonian Institution, Washington, D.C. (*P. C. Ritterbush*)

**G. E. Hale Centennial Exhibit**

The American Institute of Physics (*C. Weiner*)

**Vibrating World**

I. B. M. Galleries

**Exhibit of Scientific Equipment and Books**

## • SCIENCE FILM THEATRE

Arranged by P. Morris (National Science Film Library, Canadian Film Institute)

Animals and Man: Challenge for Change; Cybernetic Serendipity; The Last Continent; Experimental Man; The Developing Countries; Foreign Films; Environmental Man.

## • TELEVISION BROADCASTS

(To be shown on Channel 13, Dallas, and on the stations affiliated with the Eastern Educational Network)

New Developments in Educational Technology

Genetic Technology: Some Public Considerations

Global Effects of Environmental Pollution

Financial Crisis in Science

Technology, Living Cities and Human Environment

United States Science Policy

Earth-Oriented Applications of Unmanned Satellites

The Analysis and Communication of Biological Form

The Social Relevance of Physics

Informal Interviews

## • SYMPOSIA AND DISCUSSIONS CONCERNED WITH THE PUBLIC UNDERSTANDING OF THE EFFECTS OF SCIENCE

Symposia and Discussions of Problems Affecting the Public

Reviews of Large Research Programs

Discussions of Interactions of Science with Other Human Activities

## • CROSS-DISCIPLINARY SYMPOSIA CONCERNED WITH THE ADVANCEMENT OF THE CONTENT OF SCIENCE AND TECHNOLOGY

### Special Lecture I (26 Dec.)

Speaker: Loren Eiseley (Benjamin Franklin Professor, Anthropology and the History of Science, University Museum, University of Pennsylvania).

*The Odyssean Voyage in Science and Literature.*

"Begin with a journey," runs the adage of a famous editor. Since the days of Homer's *Odyssey* over two thousand years ago the public hunger for vicarious adventure has fed upon tales of travel. It is not sufficiently recognized, however, that the modern world of evolutionary science has been the creation of the great voyager-naturalists. The year 1968 marks the 200th anniversary of the voyage of the intrepid navigator Captain James Cook into the South Pacific—a voyage to be twice repeated before his death by violence in Hawaii in 1779. Cook and his accompanying naturalists were the first to penetrate across the Antarctic Circle as well as to voyage extensively in Polynesia and northward to the high latitudes of Bering Strait. Strangely, they and those who followed them repeat in reality what Odysseus' nineteen-year wanderings symbolically prefigured. Cook observed the Polynesian peoples in their as yet untouched Edenic isles. It was the country of Homer's Lotus Eaters in which men forgot their homeland and which persistently haunted them with nostalgic yearnings upon their return.

Later, in the nineteenth century, Charles Darwin in the Galapagos would glimpse the Circean powers hidden in that moon landscape. It was the power of time and isolation to transform, not just men, but all things living into wraiths and flitting shadows. Finally the novelist Melville in the valley of Typee would experience Odysseus' life with the nymph Calypso and voyage home to brood his life away as Odysseus must have done upon his return to barren, sea-girt Ithaca after the long enchantment of the summer isles.

Thus from Cook's 200-year old observation, onward to Darwin's deeper penetration of the Circean labyrinth of change, even to the great novelist's war with fate in the pages of *Moby Dick* or his final wanderings in the Holy Land, one grows aware of a pattern, a repeated pattern in both science and literature. That pattern consists of the great voyage of youth and discovery forecast symbolically in the *Odyssey* and repeated by each man who sought and found both insight and final disillusionment upon the chartless waters of the sea.

### Special Lecture II (26 Dec.)

Speaker: Marshall W. Nirenberg (Nobel Laureate 1968; Chief, Biochemical Genetic Laboratory, National Institutes of Health).

*The Genetic Code.*

### Frontiers of Science: Lecture I (27 Dec.)

Speaker: Patrick Suppes (Executive Head and Professor, Department of Philosophy and Director, Institute for Mathematical Studies in the Social Sciences, Stanford University).

*Computer Technology and the Science of Curriculum.*

This paper is concerned to discuss the possibilities for a

science of curriculum and how such a science can be deepened by use of computer technology. An extended analytical example from elementary mathematics is discussed. The paper attempts to show how specific empirical parameters can be estimated from data and how the underlying model of the curriculum can be modified on the basis of empirical data in a systematic fashion.

### Distinguished Lecture (27 Dec.)

Speaker: James A. Shannon (Special Advisor to the President, National Academy of Sciences).

*Science and Social Purpose: First Principles for a National Science Policy.*

Over the next decade, a general reordering of national priorities will strongly affect all science programs supported by the Federal Government. Whether those programs gain a high priority and take their proper place in the service of the Nation will depend largely on the efforts of scientific societies and institutions. The task of such programs is to lead and influence, and they should do so in the light of a broad science policy.

Such a policy must be grounded in certain basic principles. One is that our progress and strength as a nation have come to depend primarily on our intellectual capability. Two, this in turn depends upon a strong science base in higher education and in action programs. Three, the science base needs adequate support in stabilized institutions. Four, it needs a central locus of leadership, coordination, and responsibility. Five, this body must concern itself with general advancement of the "state of the art," which can only be accomplished through the support of science on a broad front. And six, a system of dynamic planning and programming must evolve to ensure the most effective and meaningful allocation of limited resources.

### The Scientific Research Society of America (RESA) Annual Address and Panel Discussion (28 Dec.)

Arranged by Chauncey Starr.

Speaker: Athelstan Spilhaus (President, Franklin Institute, Philadelphia).

*Technology, Living Cities, and Human Environment.*

Panel Members: Chauncey Starr, Thomas F. Rogers, R. G. Studer, and J. Erik Jonsson.

### Panel Discussion on the Financial Crisis in Science (28 Dec.)

Arranged by H. Bentley Glass.

*H. B. Glass, H. Hollomon, P. H. Abelson, J. A. Shannon, and others.*

### George Sarton Memorial Lecture (28 Dec.)

Speaker: Owsei Temkin (William H. Welch Professor Emeritus of the History of Medicine, Johns Hopkins University).

*Historical Reflections on the Scientist's Virtue.*

## Address of the Retiring President (28 Dec.)

Speaker: Don K. Price (Chairman of the Board, AAAS and Dean, John Fitzgerald Kennedy School of Government, Harvard University).

### *Purists and Politicians.*

## Review of United States Science Policy (29 Dec.)

Arranged by E. B. Skolnikoff.

This two-part symposium will be concerned with an evaluation of United States science policy and science policy machinery and with a discussion of the issues that should be brought into focus in the next Administration.

The first speaker, who was a member of the O.E.C.D. team of examiners that reviewed U.S. science policy in 1967 and early 1968, will present a critique based on their perspective from Europe and Canada. Dr. King will present a more general evaluation based on his many years of involvement in issues of science policy of concern to most Western nations. The morning session will be chaired by Dr. Herbert Hollomon.

The second session in the afternoon will have Donald Hornig as the primary speaker who will present his own views of current and future issues in U.S. science policy-making. This session will be chaired by Dean Don Price. Following Hornig's talk, there will be opportunities for questions from the floor that may be addressed to any of the panelists from the morning or afternoon session.

*Herbert Hollomon, Conrad H. Waddington, O. M. Solandt, Alexander King, Don K. Price, and Donald F. Hornig.*

## Frontiers of Science: Lecture II (29 Dec.)

Speaker: Robert B. Livingston (Professor of Neurosciences, University of California at San Diego, La Jolla).

### *Neurosciences: Man's Most Valuable Frontier.*

Convergence among several powerful neurosciences disciplines is producing a renaissance in what is perhaps the oldest field of human inquiry: how does the brain arrange sensory experiences, motor performances, and social communications and how does it provide the capacities for learning? In sensory and motor competence many other animals exceed human capabilities; the complexity of human social organizations are rivalled by organisms that have far smaller nervous systems; in learning we are often no faster and frequently less retentive than many other animals. It is more by the scope and freedom of opportunities throughout all of these categories that the human brain excels. This flexibility probably arises from internal neuronal activities relating to input and output signals. Such central neuronal activities would provide an ability to postpone immediate response in favor of internal trial of alternatives. They would provide escape from the explicit of the here and now. It is undoubtedly by formation of some such activity patterns—or images—that man enjoys flexibility and creativeness of response, his richest endowment for survival and well-being. Image formation accumulates according to past experiences of the individual. Images are of controlling significance in processes of perception, judgment, language

and behavior; images are the main generating source of human behavior; they are the most critical factors on which the precariousness of human survival and other basic conditions of human life depend.

The thesis is developed that when man better understands the biological, psychological and cultural mechanisms affecting his perceptions and learning—the mechanisms of his image formation—he will have more substantial grounds than religious, political, and moral imperatives for empathy, tolerance, and tentativeness of judgment. He will gain more reliable means for predicting and shaping the social consequences of actions. He will be better equipped to cope with confrontations, individual and international. It is for practical as well as exciting human interest reasons that the neurosciences are conceived to be man's most valuable frontier.

There is a phylogeny of imagery and an ontogeny, the latter relating to the formation of individually idiosyncratic images. As yet, no one can trace image formation in the nervous system beyond certain rudimentary stages, yet there is no question that image formation will be readily enough understood in the near future to make a great difference in the potentialities for survival, in the character and impact of education, and in other far-reaching conditions affecting mankind.

Already some useful guidelines for understanding image formation are at hand, stemming from neuroanatomical, physiological, behavioral, chemical, pharmacological, and pathological investigations of sensory systems and of frontal-limbic-brain stem mechanisms instrumental in learning. Some of the specifics of current investigations of perception and learning will be recounted. The anatomical aspects of this discussion will be revealed by portrayal of the whole human brain in cinemorphology.

## Sigma Xi—Phi Beta Kappa Lecture (29 Dec.)

Speaker: Robert K. Merton (Giddings Professor of Sociology, Columbia University).

### *Behavior Patterns of Scientists.*

## Frontiers of Science: Lecture III (30 Dec.)

Speaker: John B. Calhoun (Unit for Research on Behavioral Systems, Laboratory of Psychology, National Institute of Mental Health).

### *Space and the Strategy of Life.*

Space has value to life as a continuum which contains resources and provides experiences. Effective utilization of resources has culminated in the evolution of both aggressive defense of area and the formation of groups which share the same range. To the extent that an individual is alone when he experiences some aspect of his environment, he incorporates that item into his personality. The presence of others within his extended ego boundary may generate anxiety and produce defensive antagonism. This process of developing an identity with surroundings initiates the formation of a second kind of space within which we spend our lives. The experience of things becomes transformed into concepts about them until evolution produces a conceptual space in which values are related to relationships between abstract ideas



rather than to ways of behaving in relation to physical situations. The responsible choice among ideas forming one's conceptual space replaces the search for resources in physical space. Commitment to abstract values which guide action replaces aggressive defense of physical objects incorporated into one's ego. Compassion—the understanding support of others with differing values—replaces submission to aggressive action. Evolutionary progression tends to increase the time and energy devoted to conceptual space. Herein lies a partial solution to the population dilemma. Increase in numbers must cease within the next century. Nevertheless, evolutionary progression may continue through enlargement of conceptual space. Promoting enlargement of conceptual space requires increasing diversity of physical and ideational resources, kinds of living units, and assemblies they form, while increasing the number and effectiveness of links between these diverse elements and assemblies. Promotion in this sense will replace conservation as we—with compassion—guide the destiny of Earth toward creative exploitation of conceptual space through responsible commitments.

## AAAS COMMITTEE SYMPOSIA

### Unanticipated Environmental Hazards Resulting from Technological Intrusions (28–29 Dec.)

Arranged by W. Modell and R. E. Light.

Nothing has marked recent history more than the increase in man's ability to change aspects of the natural world. But these striking achievements in science are a mixed blessing. Under the pressure of modern technology and increased population, some of the changes in the environment, if extended, seriously threaten man's continued existence in that environment.

The list of environmental misadventures is long. The 1964 report of the AAAS Committee on Science in the Promotion of Human Welfare, "The Integrity of Science," attributed some of the environmental hazards to a tendency to make hasty applications of new technologies without investigation into the long-range effects on nature. This symposium is being convened to consider additional environmental problems that have become evident since the Committee report. The symposium will call to attention hazards that have developed from chemical interactions in the environment, including some that are the consequence of precipitous applications of technology, and some that might have been prevented by open consideration by interdisciplinary groups.

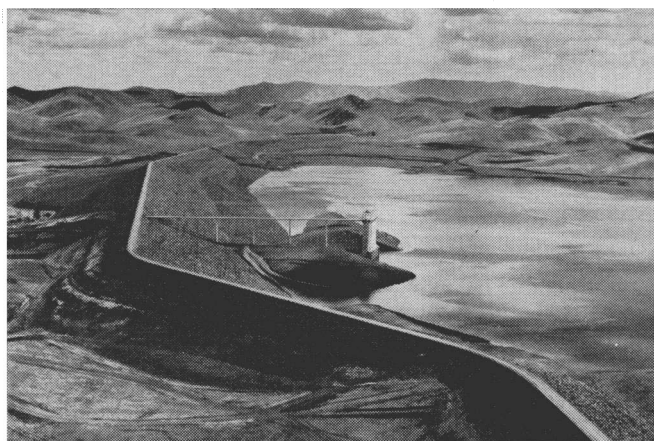
The symposium will illustrate that hazards occur in a wide variety of endeavors and in other countries as well as the United States. The symposium will explore methods to forecast and prevent serious environmental alterations. And, it will consider the need to bring relevant technical information to the public in order to help the community deal with the attending social issues.

*Walter Modell, Robert E. Light, Margaret Mead, David Evans, Albert Sjoerdsman, Allan H. Conney, Fred Tschirley, Boysie E. Day, Rene Dubois, J. E. Smith, Evan Charney, I. J. Selikoff, Barry Commoner, and Edward A. Carr.*

### Water Importation into Arid Lands (30–31 Dec.)

Arranged by J. M. Bagley and T. L. Smiley.

Schemes which involve large-scale transfer of water between regions of surplus and regions of deficiency are being



San Luis Dam and Reservoir in California. [J. C. Dahilig, Bureau of Reclamation]

more commonly proposed. Such large-scale redistributions of water have potential for major and sustained impact on both exporting and importing areas. This symposium will bring together some of the best current thinking on the problems and possibilities associated with these large-scale transfers of water. Scholars and planners from the United States and Canada will consider the physical, economic, social, legal, ecological, political, and other facets of the large-scale export-import topic.

*Jay M. Bagley, Terah L. Smiley, Calvin Warnick, Edward Weinburg, P. H. McGauhey, Thadis W. Box, Gerald W. Thomas, Irving K. Fox, Charles W. Howe, Gale Young, Dean F. Peterson, Henry P. Caulfield, Jr., E. Roy Tinney, Emery N. Castle, Sol Resnick, Earnest F. Gloyna, Harvey O. Banks, and W. R. Derrick Sewell.*

### The Social Relevance of Physics (30 Dec.)

Arranged by A. M. Stone.

It has been widely reported that a feeling is prevalent, especially among the youth, that Physics has grown remote from the major social problems of today—purpose, personality, peril, and poverty. Another view, perhaps an unsophisticated one, is that Physics in most of its areas offers no great challenges, or, more precisely, where the great challenges lie, that they are so shrouded in abstraction that they repel rather than attract. Finally, progress is ineluctably accompanied by unpredictability and most people fear the latter and transfer this fear to the former.

These views, legitimate or not, deserve discussion and call for an appraisal because, like it or not, the clock cannot be reversed: Physics can no more be abolished than can literature and art. All must maintain their relevance to the culture of today and lead the way toward the culture of tomorrow. Only the means, the controls, the goals, the pace are in question. (This is part of Section B's program.)

*Harvey Wheeler, Lewis M. Branscomb, Raymond Bowers, and Herbert H. Holloman.*

### Panel on Science, Technology, and Latin American Development (30–31 Dec.)

Arranged by Harrison Brown.

This symposium will focus on the interdisciplinary approach to problems of economic development in Latin

# Science

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