AAAS Annual Meeting

Philadelphia, 25–30 May 1986

Computing Through Cognition

WE ARE NOT THE SAME. THE AAAS ANNUAL MEETING IS not limited to the developments and concerns within a single discipline or problem area; rather, we consider the whole picture, all of the disciplines that encompass the natural and social sciences and engineering, what is new and exciting and what has important impacts for society. Each year, several hundred people submit ideas for symposia at our AAAS Annual Meeting and, through peer review, these are winnowed down to what we believe are some of the most important developments and issues in all of science. I then organize these into what I believe is a coherent program. The next few pages list the titles and volunteer organizers of the sessions that make up half of our symposia for the AAAS meeting in Philadelphia (the second half will appear in *Science* in 2 weeks). Because the titles tend to be rather elliptic, permit me to give a somewhat idiosyncratic guided tour of some of the exciting and important ideas that the session organizers have prepared for your edification and enjoyment this May, directing you along our path and pointing out some of the highlights you can see along the way.

General Interest. We start at the beginning with the frontiers of the natural sciences, where such topics as gravitational lenses, computational intractability, and new approaches to the nervous system are featured. The frontiers of the social sciences present an approach toward a unified viewpoint using economic concepts. We next present new approaches to engineering research. To complete this area, some new work in physics and chemistry will be presented in a way accessible to lay audiences (meaning all of us outside of our specialties).

Expert Systems ◆ Computing. This approach is continued with a tutorial on expert systems (presented by Bruce Buchanan and Edward Shortcliffe of Stanford), followed by specific applications of this increasingly important technique in geology, agriculture, and medical imaging. Further developments in computing are considered in the discussion of supercomputers and of recent developments in the handling of nonlinear phenomena and complexity theory.

Science and Engineering. We move on to consider the physics of condensed matter, including such topics as the quantum Hall effect, artificially layered structures, new magnetic materials, and quasicrystals. (These sessions will also feature a coordinated midday lecture by Philip W. Anderson of Princeton and Bell Labs.) Then, looking at materials from the viewpoints of engineering and of chemistry, researchers will discuss ceramics, composites, fiber-optics materials, polymers, amorphous materials, custom alloys, and biological applications, with a special emphasis on those materials that can be used as replacement parts in the human body. Further discussions in chemistry and chemical technology will complete this subject.

Astronomy ◆ Space Science and Technology. Space may or may not be the final frontier, but it still exerts a romantic pull on all of us. This topic begins with an overview of what is known of the structure of the universe and the connection between that knowledge and studies at the limits of elementary-particle research. We then go on to a presentation of recent work on a class of objects midway between stars and large gaseous planets. We continue our narrowing down from the universe to stars to the solar system with a look at the results of the Comet Halley explorations and the Voyager exploration of Uranus, then on to the possible exploration of the moons of Mars. The trek continues with a look at the possibilities for travel and communications in space, to find habitable regions and to see who or what is out there. We then proceed to a discussion of potential use and the political and economic limitations on using the toehold humans now have in space.

Geology ◆ Ecology. A biologist friend was very distressed by this juxtaposition: "Ecology is a *biological* science," he said, and of course he is right. But what we are examining in this category is the habitability of our planet. (I have used ◆ to represent a convenient concordance between fields that might otherwise be considered somewhat disparate to help us span the broad scope of our program.) In the first few symposia, Earth is considered in the broadest sense: the view from space, issues in predicting earthquakes, the possibility of a rise in sea level. We next turn our attention to barely habitable regions of Earth and what is being done in and to them, and then end with a look at the complex workings of a real biological microcommunity. In our next installment (2 weeks from now), we will look into the role that food, resources, and our environmental manipulations play in the habitability of our planet.

Biology ◆ Evolution. This, another combinatorial bête noire of my friend, deals with knowledge at the frontiers of biology. In "Oncogenes, Growth Factors, and Cancer," we learn how it has become possible to develop molecular probes for a variety of human leukemias. This is a result of the discovery of the homology between growth factors and some oncogenes (associated with specific nonrandom chromosomal changes). We continue with symposia on the form and function of proteins and the details of an experimental technique for studying cells and protoplasts, as well as some practical applications of new knowledge in biotechnology. The second component of this look at the frontiers of biology focuses on some constraints in the evolution of the form of animals, with a special emphasis on a living fossil, the nautilus. We conclude this category with a look at current problems in teaching the central paradigm of modern biology in the face of religious controversy.

Medical Physiology. We now return to our leitmotif dealing, if you will, with the "habitability" of our own bodies. Beginning with what is known of circadian rhythms and human chronobiology, the presentations will look more deeply into the nature of sleep and its problems. Next, we will learn about the immunologic aspects of diabetes, the pivotal role of calcium metabolism, and the role of magnesium and polyunsaturated fats in our health—all important to the question, How viable are we?

Medical Science ◆ Health Policy. How viable are the institutions that help us guard our health? In this category we address this concern. A distinguished panel of physicians, lawyers, and insurance experts considers medical practice and malpractice. Three sessions

explore biomedical experimentation from computer modeling, through the use of nonmammals, to the issues involved in animal experimentation. Our concern about our health institutions is explored further with discussions of civil liberties aspects of the AIDS epidemic, the question of genetic predisposition to disease, post-polio sequelae, and the implications of drug delivery by implantation. This section ends with two specific aspects of health care: oral pathogenicity and the problem of restoring voice to those who lost it due to cancer.

Aging ◆ The Family. Our own viability is again the thread that joins these topics. We look at the biology of aging, the evolution of longevity, health care and family care for the elderly, as well as the promise and pitfalls of new technologies for the elderly. Then we see how the structure of American families is changing due to changing demographics and a rise in our divorce rate, and finally we consider the situation of families in the Third World.

Brain, Behavior, and Cognition. We continue narrowing our focus, from our families and bodies down to our minds. What do we know at this new frontier? We will explore the interaction of mind and body, looking at neurobehavioral influences on immunity and the effects of sex chromosome abnormalities on cognitive dysfunctions. We will see what violent behavior and brain damage can tell us about our cognitive processes and how those with brain injuries can be helped. We will see what such complex behaviors as the understanding of melody and rhythm can tell us about cognition, and finally, we will explore the depths of ourselves in symposia on depression and self-deception.

Having gone from computers to cognition, from the universe to our inner selves, we have traveled through but half of what we will offer you this May in Philadelphia. I have tried to pique your interest and unabashedly to induce you to come and experience it all firsthand. If I have succeeded, you will find registration forms a few pages further on. Register early and often! If further convincing is needed, tune in again to this station in 2 weeks when our story will resume with a new cast of characters. Thank you for joining me. ■ ARTHUR HERSCHMAN

Preliminary Program, I

1. General Interest

1-1. Frontiers of the Natural Sciences, 1986 (26 May, 2 sessions). Organized by ROLF M. SINCLAIR (*National Science Foundation*).

1-2. The Frontiers of the Social Sciences: Toward Integration of Economics and Other Social Sciences (27 May, 2 sessions). Organized by AMITAI ETZIONI (*The George Washington University*).

1-3. Directions in Engineering Research: An Assessment of Opportunities and Needs (28 May). Organized by JACK L. KERREBROCK (*Massachusetts Institute of Technology*) and RALPH D. COOPER (*National Research Council*).

1-4. Engineering Research Centers (28 May). Organized by F. KARL WILLENBROCK (*Southern Methodist University*).

1-5. Science for the Naked Eye; or, The Physics of Everyday Experience, XIII (29 May, 2 sessions). Organized by ROLF M. SINCLAIR (*National Science Foundation*).

1-6. Chemistry Is Fun—and Fruitful (30 May). Organized by ROBERT C. BRASTED (*University of Minnesota*).

2. Expert Systems ◆ Computing

2-1. Expert Systems: Theory and Practice (A Tutorial) (28 May, 2 sessions). Organized by ELLIOT R. SIEGEL (*National Library of Medicine*).

2-2. Knowledge-Based Systems in Geology (29 May). Organized by RICHARD B. MCCAMMON (*U.S. Geological Survey*).

2-3. Expert Systems in Agriculture (30 May). Organized by FRANK D. WHISLER (*Mississippi State University*).

2-4. Biomedical Imagery: Functional Mapping and Real Intelligence, I (26 May). Organized by ROBERT S. LEDLEY (*Georgetown University*) and DONALD L. MCEACHRON (*Drexel University*).

2-5. Biomedical Imagery: Functional Mapping and Real Intelligence, II (26 May). Organized by DONALD L. MCEACHRON (*Drexel University*) and ROBERT S. LEDLEY (*Georgetown University*).

2-6. Recent Trends in Supercomputers (28 May, 2 sessions). Organized by RAUL H. MENDEZ (*Naval Postgraduate School*) and K. O. BOWMAN (*Oak Ridge National Laboratory*).

2-7. The Status of the NSF Supercomputer Initiative (29 May). Organized by GLIGOR TASHKOVICH and DENNIS M. JENNINGS (*National Science Foundation*).

2-8. Complexity Theory and Problem Solving (27 May). Organized by MANFRED KOCHEN (*University of Michigan*).

Symposium Proposals for AAAS Chicago Meeting

The 1987 Annual Meeting will be held 14–19 February in Chicago, less than 9 months after the Philadelphia Meeting. It is not too early to send in your symposium suggestions (deadline: 15 April 1986). See "Call for 1987 Symposium Proposals" in the 17 January and 21 February issues of *Science*, or contact the AAAS Meetings Office (1333 H Street NW, Washington, DC 20005; telephone, 202/326-6448) for proposal forms.

2-9. Nonlinear Phenomena, Computer Graphics, and Mathematics (27 May). Organized by MEL S. BERGER (*University of Massachusetts*).

2-10. Computers and Society: Is There a Computer Revolution? (29 May). Organized by PETER LYMAN (*Michigan State University*).

3. Materials Science and Engineering

3-1. Physics of Condensed Matter (28 May, 2 sessions). Organized by JILL C. BONNER (*University of Rhode Island*) and EUGEN MERZBACHER (*University of North Carolina*).

3-2. Quasicrystals (29 May). Organized by RALPH D. AMADO (*University of Pennsylvania*).

3-3. The Changing World of Materials (27 May, 2 sessions). Organized by WITOLD BROSTOW (*Drexel University*).

3-4. The Replaceable Human Body: New Parts for Old Using Ceramic and Polymer Biomaterials (26 May). Organized by DONALD ULRICH (*USAF Office of Scientific Research*) and FRANK KARASZ (*University of Massachusetts*).

3-5. Chemically Solvable Problems (30 May, 2 sessions). Organized by SEYMOUR Z. LEWIN (*New York University*).

3-6. Reaction Chemistry in Supercritical Fluids (26 May). Organized by MICHAEL J. ANTAL, JR. (*University of Hawaii*).

3-7. Applications of Lasers in Medicine and Industry (29 May). Organized by HENRY MCGEE (*Virginia Polytechnic Institute and State University*).

4. Astronomy ◆ Space Science and Technology

4-1. Dark Matters: Exotic Particles and the Structure of the Universe (29 May). Organized by GARY STEIGMAN (*University of Delaware*).

4-2. Brown Dwarfs (29 May). Organized by R. S. HARRINGTON (*U.S. Naval Observatory*).

4-3. Comet P/Halley and Voyager at Uranus (30 May). Organized by ROBERT H. KOCH (*University of Pennsylvania*), DAVID MORRISON (*University of Arizona*), and EDWARD C. STONE (*California Institute of Technology*).

4-4. Phobos and Deimos: First Steps Toward the Habitation of Mars (30 May). Organized by S. FRED SINGER (*George Mason University*).

4-5. Interstellar Communication and Travel (28 May, 2 sessions). Organized by JAMES R. POWELL (*Brookhaven National Laboratory*) and CHARLES R. PELLIGRINO (*Adelphi University*).

4-6. Moving Industry into Space (26/27 May, 3 sessions). Organized by MORRIE SCHNEIDERMAN (*Wester' Shore R&D Centre*), and MICKEY FARRANCE and KAZ KAWAMURA (*Lockheed Missiles & Space Co.*).

4-7. Medicine and Drug Therapy in Space (27 May). Organized

by STUART FELDMAN (*University of Houston*) and NITZA M. CITRON (*NASA*).

5. Geology ◆ Ecology

5-1. The Changing Health of Our Planet: Observing the Earth from Space (28 May, 2 sessions). Organized by WILLIAM W. KELLOGG and FRANCIS P. BRETHERTON (*National Center for Atmospheric Research*).

5-2. The Parkfield Prediction Experiment: The Geophysical, Political, and Social Dimensions of an Earthquake Prediction (26 May, 2 sessions). Organized by ALLAN G. LINDH and WILLIAM ELLSWORTH (*U.S. Geological Survey*).

5-3. Onshore Impact of Worldwide Sea Level Rise (27 May). Organized by JOHN L. PLACE (*U.S. Geological Survey*).

5-4. Reconstruction of Disturbed Arid Ecosystems (30 May, 2 sessions). Organized by EDITH B. ALLEN (*Utah State University*).

5-5. Groundwater Pollution in Karst Terrain (29 May). Organized by WILLIAM B. WHITE (*Pennsylvania State University*).

5-6. Microcommunity Ecology (26 May). Organized by JAMES R. PHILIPS (*Cooper Ornithological Society*).

6. Cell Biology ◆ Evolution

6-1. Growth Factor, Oncogenes, and Cancer (27 May, 2 sessions). Organized by HILARY KOPROWSKI (*Wistar Institute*).

6-2. Designing Proteins (29 May). Organized by JONATHAN KING (*Massachusetts Institute of Technology*).

6-3. Electrofusion and Electroporation of Cells and Protoplasts (28 May). Organized by THOMAS C. ROZZELL (*U.S. Office of Naval Research*) and CAROL A. JORDAN (*Science Applications International*).

6-4. Pharmaceutical Development of Biotechnology Products (26 May, 2 sessions). Organized by ARTHUR R. MLODOZENIEC (*University of Kentucky*) and ANTHONY A. SINKULA (*Upjohn Co.*).

6-5. How Many Kinds of Animals? Opportunity and Constraint in the Evolution of Organic Form (28 May). Organized by R. D. K. THOMAS (*Franklin and Marshall College*) and W. E. REIF (*University of Tuebingen*).

6-6. Living Nautilus: The Biology and Paleobiology of a Living Fossil (28 May). Organized by BRUCE W. SAUNDERS (*Bryn Mawr College*) and NEIL H. LANDMAN (*American Museum of Natural History*).

6-7. The Creation-Evolution Controversy, 1986 Update (30 May). Organized by STANLEY L. WEINBERG (*National Center for Science Education*).

7. Medical Physiology

7-1. Some Mathematical Questions in Biology: Modeling Circadian Rhythms (28 May, 2 sessions). Organized by GAIL A. CARPENTER (*Northeastern University*).

7-2. Human Chronobiology: Emerging Impact in the Clinic and the Workplace (30 May). Organized by DAVID F. DINGES and PETER C. WHYBROW (*University of Pennsylvania*).

7-3. Arteriovenous Diffusion and Gas Exchange in Mammalian Organs (26 May). Organized by RICHARD M. EFFROS (*Harbor–UCLA Medical Center*).

7-4. Snoring and Sleepiness: New Observations on Old Problems (26 May). Organized by DAVID N. F. FAIRBANKS (*The George Washington University*).

7-5. Diabetes: Immunologic Aspects (27 May). Organized by CLYDE F. BARKER (*University of Pennsylvania Medical School*).

7-6. Calcium Biology, Homeostasis, and Pathophysiology in Hereditary or Acquired Disorders of Calcium Metabolism (27 May). Organized by JOHN T. POTTS, JR. (*Massachusetts General Hospital*).

7-7. Magnesium in Health and Disease (29 May). Organized by HERTA SPENCER (*V.A. Hospital, Hines, IL*) and BURTON M. ALTURA (*SUNY Downstate Medical Center*).

7-8. Health Effects of Marine Oils and Polyunsaturated Fats from Other Sources (29 May). Organized by GLEN D. LAWRENCE (*Long Island University*).

AAAS ANNUAL MEETING

Philadelphia ✦ 25–30 May 1986

Meeting Information

Registration fees are shown on the AAAS Registration Form. We encourage you to register in advance since on-site fees will be 15–20% higher.

More detailed information about the program and other Annual Meeting events, as well as housing and registration forms, appear in these issues of ***Science:***

- 14 Feb.: Preliminary Program I; registration/housing forms
- 28 Feb.: Preliminary Program II; registration/housing forms
- 14 Mar.: Tours: description and ticket order forms
- 28 Mar.: Preconvention Program; schedules for all events; registration/housing forms
- 11 Apr.: Last-minute information; registration/housing forms

Housing and registration forms may also be obtained from the Meetings Office at the AAAS address, or call 202/326-6450.

8. Medical Science ◆ Health Policy

8-1. Medical Practice and Malpractice: Who Shall Set the Standards? (28 May, 2 sessions). Organized by THOMAS EHRLICH and ANDREA GRADDIS (*University of Pennsylvania*).

8-2. Organization of Knowledge in Biology: New Modeling Perspectives (29 May). Organized by MANFRED KOCHEN (*University of Michigan*).

8-3. Use of Nonmammalian Animal Models in Research and Testing (29 May). Organized by THOMAS D. SABOURIN and L. BARRY GOSS (*Batelle Columbus Division*).

8-4. The Use of Animals in Biomedical Research and Safety Testing (30 May). Organized by ANDREW N. ROWAN (*Tufts University*).

8-5. AIDS Epidemic: Uncertainty, Risk, and Civil Liberties (26 May). Organized by DAVID P. WILLIS (*Milbank Memorial Fund*) and RONALD BAYER (*The Hastings Center*).

8-6. Genetic Predisposition to Disease (28 May). Organized by DAPHNE KAMELY (*U.S. Environmental Protection Agency*).

8-7. Research Implications of Post-Polio Sequelae (27 May). Organized by DEBORAH BREWER (*Post-Polio League for Information and Outreach*), RICHARD BRUNO (*Felician College*), and MARTHA ROSS REDDEN (*AAAS*).

8-8. Controlled Drug Delivery by Implantation: Prospects and Legal/Ethical Dilemmas (27 May). Organized by RONALD A. SIEGEL (*University of California, San Francisco*).

8-9. Determinants of Oral Pathogenicity (30 May). Organized by GORDON H. ROVELSTAD (*American College of Dentists*) and STEPHEN E. MERGENHAGEN (*National Institutes of Health*).

8-10. Artificial Voice and Voice Substitutes for Head and Neck Cancer Patients (27 May). Organized by EHUD YAIRI (*University of Illinois*).

9. Aging ◆ The Family

9-1. In Pursuit of the Fountain of Youth (27 May). Organized by RICHARD C. ADELMAN (*University of Michigan*).

SB&F Science Film Festival

The 1986 *Science Books & Films* Film Festival is scheduled for May 26-29. More than 50 science films will be presented; festival times are 10 a.m. to 3 p.m. each day. Films, on topics in the life, social, and physical sciences, are for audiences ranging from elementary school students through professional scientists.

Advance program information is available from *SB&F* Film Festival, AAAS, 1333 H St., NW, Washington, DC 20005. A full listing of all festival films will appear in the 28 March issue of *Science*.

9-2. Health Promotion and Disease Prevention in the Second Half of Life (over 50) (27 May). Organized by GILBERT S. OMENN (*University of Washington*) and MICHAEL K. GEMMELL (*Association of Schools of Public Health*).

9-3. Family Care-Giving and the Elderly: Implications for Long-Term Care Public Policy (28 May). Organized by RAYMOND T. COWARD (*University of Vermont*).

9-4. Biocultural Evolution of Longevity: Genes, Sex, and Social Organization (29 May). Organized by EVELYN J. BOWERS (*University of Medicine and Dentistry of New Jersey*) and SOLOMON H. KATZ (*University of Pennsylvania*).

9-5. Barriers to the Design, Development, and Adaptation of New Technology for Elders: Bridging the Gap to the Technical Community (28 May). Organized by SAMUEL I. DOCTORS (*California State University–Hayward*) and JUDITH B. COHEN (*University of California–San Francisco*).

9-6. The Political Economy of Changing Age and Family Structures (29 May). Organized by JOSEPH E. POTTER (*Harvard University*) and KENNETH M. CHOMITZ (*National Academy of Sciences*).

9-7. The Social and Psychological Worlds of Children in Divorced and Stepparent Families (30 May). Organized by THOMAS J. TIGHE and JOHN W. SANTROCK (*University of Texas–Dallas*).

9-8. Women's Work and Infant Welfare in the Third World (30 May). Organized by JOANNE LESLIE and MAYRA BUVINIC (*International Center for Research on Women*).

10. Brain, Behavior, and Cognition

10-1. Neurobehavioral Influence on Immunity: An Emerging Field (26 May, 2 sessions). Organized by JAY M. WEISS (*Duke University*).

10-2. Behavioral Neuropsychology: Treatments of the Brain Injured (29 May). Organized by ARTHUR MACNEIL HORTON, JR. (*V.A. Medical Center, Baltimore*) and LAWRENCE C. HARTLAGE (*Medical College of Georgia*).

10-3. Cognitive and Psychosocial Dysfunctions Associated with Sex Chromosome Abnormalities (27 May). Organized by DANIEL B. BERCH (*Cincinnati Center for Developmental Disorders*).

10-4. Neurobiological Aspects of Violent Action (27 May). Organized by ANNELIESE A. PONTIUS (*Harvard Medical School*).

10-5. Brain Damage: A Window on the Mind (29 May). Organized by GRACE H. YENI-KOMSHIAN (*University of Maryland*).

10-6. The Understanding of Melody and Rhythm (30 May). Organized by THOMAS J. TIGHE and W. JAY DOWLING (*University of Texas–Dallas*).

10-7. Depression: Risk and Treatment (28 May). Organized by MARTIN E. P. SELIGMAN (*University of Pennsylvania*).

10-8. Self-Deception in Daily Life: Secrets We Keep from Ourselves (28 May). Organized by DANIEL GOLEMAN (The New York Times).