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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

17 December 1976, Volume 194, No. 4271

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Volume 194, No. 4271

SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Computer-enhanced martian sunset over Chryse Planitia, taken by Viking 1, 20 August 1976. The camera began scanning the scene from the left (back cover) about 4 minutes after the sun had dipped below the horizon, continuing for 10 minutes and covering 120 degrees from left to right (front cover). See page 1274. [National Aeronautics and Space Administration, Washington, D.C.]

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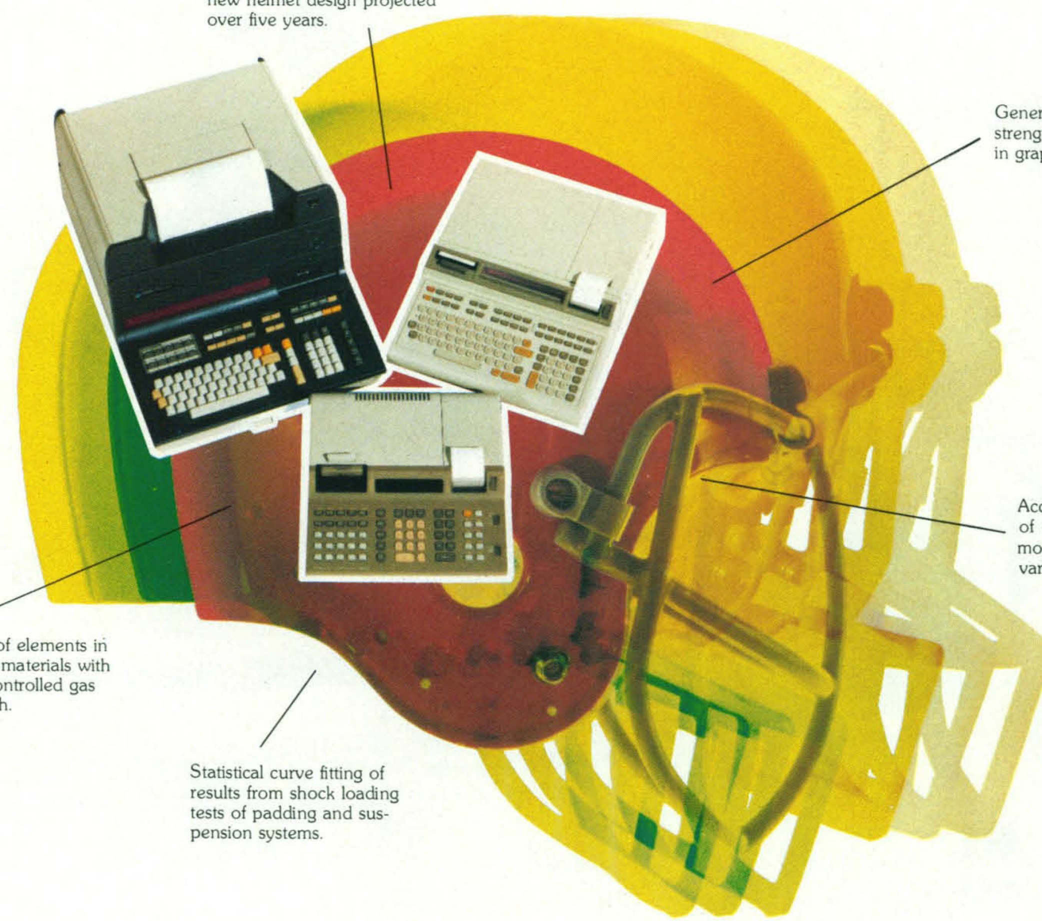

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LETTERS

A Bank of Mammalian DNA Fragments

On 16 June 1976, the National Institutes of Health published guidelines for recombinant DNA research. The guidelines were adopted after much discussion and debate within both the scientific and the lay communities. They are intended to facilitate the pursuit of research while at the same time minimizing the risk to the public. Certain types of experiments, particularly those involving the creation of DNA chimeras between bacterial and mammalian genes, can only be performed under the most restrictive conditions. Despite these concerns, there are likely to be very significant uses of such materials for biomedical research and diagnostic purposes.

Since the complex large genomes of man and other mammals are now amenable to more detailed study as a consequence of advances in recombinant DNA technology, it is important that a safe, uniform, and reproducible method be developed for replicating and storing their fragments. It has been suggested to the National Institute of General Medical Sciences (NIGMS) by members of the scientific community that a repository or bank of mammalian DNA fragments might provide a useful means for achieving these objectives. A bank of DNA fragments, containing reference portions of the human and other mammalian genomes, could help keep order in this rapidly growing field and provide an invaluable national resource for investigators. Use of this bank to replicate the reference material for distribution in a safe form would foster full utilization of this new technology while maintaining compliance with the guidelines, and minimizing risk.

The NIGMS is therefore specifically interested in receiving comments on the desirability of establishing a repository of mammalian DNA fragments. Suggestions as to its operation and maintenance will also be welcome. For example, such a repository might solicit and accept defined fragments of DNA in an appropriate form. It is conceivable that the bank might also produce DNA fragments de novo, if this proved desirable. These fragments would then be stored, replicated, characterized, and distributed with strict attention to safety.

Although interested in the possibility of establishing a repository for mammalian DNA fragments, the NIGMS has come to no conclusion as to its advisability. A decision to proceed will, in part, be based on an evaluation of responses to this letter.

Comments should be sent to the undersigned within 6 weeks of the date of publication of this letter.

FRED H. BERGMANN

Genetics Program, National Institute of General Medical Sciences, Bethesda, Maryland 20014

Utility Accounting and Energy Policy

Luther J. Carter, in his article "Nuclear initiatives: Two sides disagree on meaning of defeat" (News and Comment, 19 Nov., p. 811), discusses the Missouri utility rate reform referendum and says, "This initiative, which was approved by a 62 percent majority, makes it impossible for the Union Electric Company to bill ratepayers for the interest it owes on construction work in progress."

Since the construction work in progress (CWIP) issue is an important one for both energy policy and utility financing, it would be worth getting straight the concept and the terminology.

The Missouri electorate voted to exclude CWIP from the rate base. What does this mean? In many jurisdictions, CWIP is excluded from the rate base, the rationale being that a plant not completed is not serving the public, and therefore the public should not pay a return on it. This is the "used and useful" concept. The utility, though, is incurring costs to support the construction work (that is, interest on borrowed funds, dividends on preferred stock, and return on common stock sold to finance the work). These costs are capitalized, which means that they are added to the final cost of the power plant. If, for instance, the utility had to invest $100 in a construction project for a year, and the cost of that money was 9 percent, the project would go on the books at $109. The utility would earn a return on $109 and also recover its investment through depreciation on $109, not $100. The extra $9 is referred to as the allowance for funds used during construction. It is a noncash credit that appears in the income statement.

In other jurisdictions, such as Missouri until the referendum, some or all of CWIP is placed in the rate base and customers must pay higher rates to provide that extra $9 cost during the construction period. The choice is between making the customer pay over the life of the plant or while the plant is being built. There is no way of escaping payment.

What does the arcane art of utility accounting have to do with energy policy? Consider that CWIP makes up 20 percent of net plant investment and that the allowance for funds used during construction accounts for 35 percent of net income. Companies have to raise enormous sums of money and, for prolonged periods, pay out cash to the suppliers of the funds; but they receive only a bookkeeping entry as an offset. This puts tremendous pressure on the utilities. Furthermore, the longer the period of construction and the greater the capital cost of the plant, the heavier the burden. Nuclear units take the longest time to construct and have the highest first cost.

Adding CWIP to the rate base can be rationalized by claiming that the new plant is primarily for the benefit of current ratepayers (most growth does come from present customers), so they are not being harmed if they pay now. From a practical standpoint, regulators might prefer to deal with a larger rate base and give a lower rate of return, rather than to have to justify a seemingly high return on a smaller base. Certainly, there was a big push by the federal government and by the industry to add CWIP to the rate base during the post-oil-boycott turmoil. And, if energy policy is geared solely to producing more electricity, there are virtues to this attempt. However, there is another point to consider. As long as utilities can be assured of returns on CWIP, they will not have as much incentive to find ways of meeting power needs other than building new plants.

LEONARD S. HYMAN
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Networks of Amateurs for Science

Deborah Shapley's intriguing article "Chinese earthquakes: The Maoist approach to seismology" (News and Comment, 20 Aug., p. 656) reports use in China of vast networks of amateurs in the earthquake prediction program there. Use of amateurs in science, if appropriately planned and applied, can prove a service to science, a learning experience for amateurs, and a means by which to sensitize citizens to scientific programs and needs.

It may be enlightening to point out a few instances of the successful use of large-scale networks of amateurs in science, particularly with regard to data or sample collection and monitoring. In the late 1800's, Joseph Henry, the first secretary of the Smithsonian Institution, orga-

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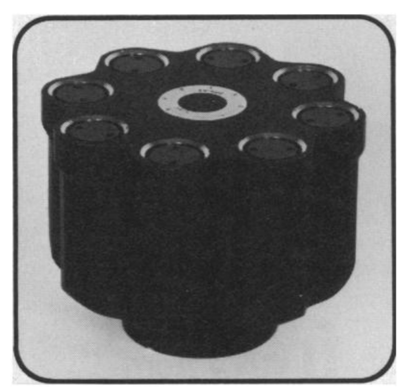

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nized laymen along the first transnational telegraph line to report local weather conditions. This network laid the foundation for the U.S. weather bureau. Oehser (*1*) recounts:

> Henry outlined his meteorological proposals in his annual report for 1848. The plan was to obtain weather reports from a great network of voluntary observers scattered over the country, particularly for the purpose of assembling long-range data on climate and weather from stations in every region. In this way, the studies would furnish a sound foundation upon which the science of meteorology could build. It was an original idea, and one that eminently illustrated the principle of cooperation in Henry's program. It gave the people in general a kind of grass-roots stake in this new Institution, about which most of them knew so little. . . .
>
> There would be, Henry said, three classes of observers:
>
> > One class, without instruments, to observe the face of the sky as to its clearness, the extent of cloud, the direction and force of wind, the beginning and end of rain, snow, etc. A second class, furnished with thermometers, who besides making the observations above mentioned, will record variations of temperature. The third class, furnished with full sets of instruments, to observe all the elements at present deemed important in the science of meteorology.
>
> By 1852, the voluntary observers reporting directly to the Smithsonian numbered about two hundred.

A fuller account of Henry's meteorological program appears in the first volume of the *Smithsonian Series* (*2*).

In the late 1950's, Fred Whipple, then director of the Smithsonian Astrophysical Observatory, organized amateur astronomers around the world in the world's first observational satellite tracking network, called Moonwatch. Parts of Moonwatch were operational just in time to track Sputnik. In a highly readable book on the satellite tracking program, Hayes (*3*) reports:

> Whipple's conviction proved to be correct. He had earlier insisted that the Moonwatch program be an effort of amateur astronomers and science enthusiasts, at a time when the military services and other Government agencies felt that amateurs could not be trusted to carry on such a complex and vital program. The unique success of Moonwatch demonstrated what amateurs could do when properly inspired and led. And it should not be overlooked that it was certainly the least expensive effort of the entire IGY [International Geophysical Year] program of the United States.

In 1973, two Smithsonian botanists, T. Soderstrom and C. Calderón, utilized a network of students throughout the United States to collect samples of bamboo in a study of the rare flowering phenomenon in the Ma-dake species (*Phyllostachys bambusoides*) (*4*).

A division of the Sigma-Aldrich Corporation has reportedly organized a network of sixth-, seventh-, and eighth-grade schoolchildren in 20 states to collect fireflies, whose luminescent substance is useful in medical research (*5*).

The Audubon Society has used networks of amateur ornithologists to count and track birds for years.

C. Barry Raleigh, of the U.S. Geological Survey, is considering organizing students and other volunteers in California to monitor the occurrence of events that may be precursors to earthquakes (*6*). Ralph Turner, professor of sociology at the University of California at Los Angeles, is urging that 4-H clubs be contacted so that members can observe any abnormal behavior in animals before earthquakes (*7*). Turner also has prepared a unique account of the Chinese experience in mobilizing the masses in China for earthquake prediction (*8*).

We are organizing a North American network of secondary school teachers interested in mobilizing their students to collect observational data and samples for scientists. The program, called Internet (the International Environmental Resources Network), is being developed in cooperation with the environmental education unit of the Unesco/U.N. Environment Program as part of a worldwide approach to environmental education. Internet will link together classrooms in the United States and Canada for the purpose of increasing student awareness of the range and complexity of worldwide environmental issues and assisting principal scientists to collect data and samples over broad geographic areas.

Scientists who could utilize a labor-intensive, unskilled, nontechnical network of enthusiastic students and teachers are invited to contact us to discuss the possibilities of using Internet as a tool for science. We are especially interested in hearing from scientists who are being, or have been, assisted by networks of amateurs, so that we may learn from, and perhaps contribute to, their experience.

JOHN WHITMAN

Internet, Post Office Box 417, Concord, Massachusetts 01742

References

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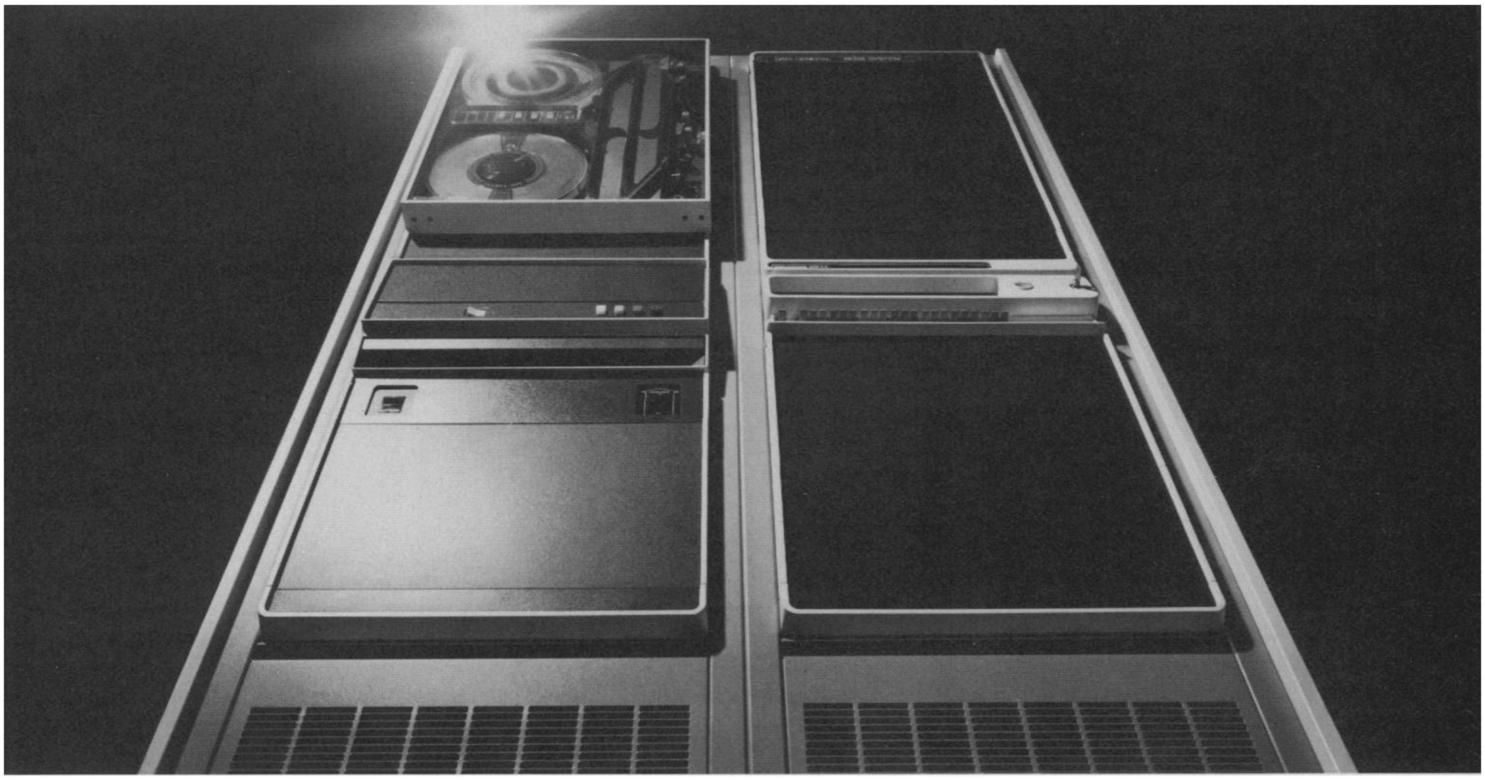
2. W. P. True, in *The Smithsonian Series* (Smithsonian Press, Washington, D.C., 1944), vol. 1, pp. 299–310.
3. E. N. Hayes, *Trackers of the Skies* (Doyle, Cambridge, Mass., 1968).
4. T. R. Soderstrom and C. E. Calderón, "Report on the national Ma-dake bamboo survey undertaken by the Smithsonian International Environmental Alert Network" (unpublished), (Smithsonian Institution, Washington, D.C., 1974).
5. D. P. Garino, *Wall Street Journal*, 18 October 1976, p. 1.
6. C. B. Raleigh, personal communication.
7. R. H. Turner, personal communication.
8. Laoning Earthquake Delegation to China, Committee on Scholarly Communication with the People's Republic of China, National Academy of Sciences–Social Science Research Council–American Council of Learned Societies, in preparation.

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17 December 1976, Volume 194, Number 4271

SCIENCE

A Question of Checks and Balances

The Carter government's inheritance includes the science policy structure which emerged from five predecessor administrations. All things considered, it has worked, and many would say that this is a boat that should not be rocked. But the science policy structure is not as ideal as it may seem, and in some ways it is a house of cards. Some "zero-based" thought is therefore in order.

What is masked by the scope, variety, and general bullishness of the American research and development scene is the de facto federalization of science. It is more apparent in fundamental research, where only the federal presence makes it possible for those endless horizons to be pursued. Certainly there can be little question but that federal attitudes can make or break academic science. There is hardly a scientific discipline where all eyes are not riveted nervously on the fluttering federal wind sock. What saves the much-admired pluralism of American science and technology is that old habits of decentralization remain strong. Though government holds all the high cards, the working arrangements permit fundamental research to carry on as a discovery process, industrial technology to react (within limits) to competitive stimuli, and government agencies to operate in what amounts to an open R & D market.

So it is a benign federalization of science, so far. An accommodation has been reached. How it was reached, and on what principles of mutual expediency, is worth considering. The social warrant which legitimized the government's assumption of primacy in the affairs of science was the public fascination with science's role in war, defense, biomedicine, and space. Social consent was given implicitly, without the benefit of anything like the divisive battles over government's role in medicine, education, public power, or welfare. It was a silent transition, with few questions asked and few minority opinions noted. In a very significant sense, the outcome was rooted in the difference between the small society and the big society—a hardly noticed consequence of the altered scale of postwar industrial society with its contradictions, stresses, and shrunken reaction times.

It is all very well to speak at black-tie dinners of the warm partnership of science and government, for there is some truth in it. The problem is that it is the sort of partnership which government, when and if it chooses, can sweeten, sour, or dissolve. It is no longer unthinkable that as science provokes more and more questions about its social accountability, the federal partner will exact an increasing conformity with limits on the legitimate boundaries of pure and applied science.

The question is whether the postwar science policy structure has left science without those necessary "checks and balances" whose praises we sang so recently. Science has conceded a great deal of its policy independence in exchange for de facto federalization. It would be difficult, to understate the case, to point to effective checks and balances which demonstrate that science has retained genuine negotiating authority. And without that, the meanings of the quiet revolution in which the whole balance shifted in government's favor become serious indeed. If the price for regaining negotiating room has to be a less uxorious relationship with government, it may be for the best.

Restoring workable checks and balances will be a slow business. The goal itself is modest enough: to restore *balance* to the relationship between science and government. It can be helped if the scientific societies will invest more effort and initiative in science policy activities. Large federations such as AAAS need to adapt to Boulding's concept of the "intersect organization" as a means for linking science, for reinforcing purposes, with such sectors of society as law, business, and public interest groups. In this role may well lie the future value of AAAS and its affiliates to the scientific community and to government as well.—WILLIAM D. CAREY

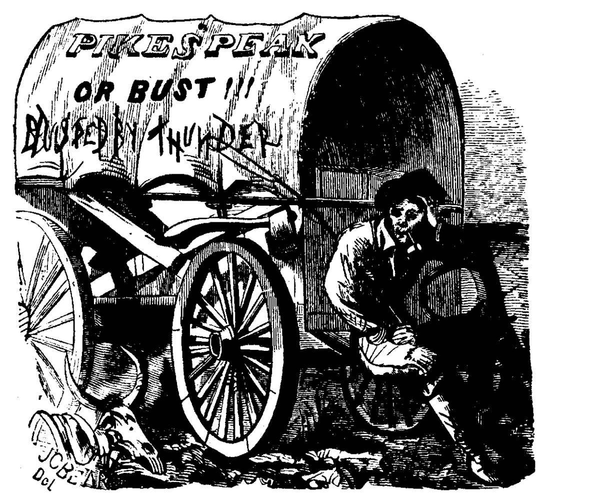
Annual Meeting
Denver
20-25 February 1977

Meeting Program—Part II

For further details, see the Preliminary Program, *Science*, 5 November, pages 599 to 608, and Tours and Cultural Events, *Science*, 19 November, pages 827 and 828.
HOTEL CODES: Denver Hilton . . . DH; Holiday Inn . . . HI; Cosmopolitan . . . CO.

The theme of the forthcoming AAAS Annual Meeting in Denver is "Science and Change: Hopes and Dilemmas" and it is exemplified in the ten Public Lectures (see the Preliminary Program, *Science*, 5 November, pages 599 to 608) and 121 symposia. Details about the first 55 symposia were presented in the 3 December issue of *Science*, pages 1039 to 1042.

Listed below are the 66 symposia which make up the second half of the Meeting Program, grouped by category into medicine and health, anthropology, technological implications, behavioral science, education, economic and social science, science and public policy, and history and philosophy of science. I am sure that you will find the list impressive with many things you want to experience in person. Plan to come and bring the family for a unique winter experience in the Rockies. Housing and Registration forms will also be found in the 3 December issue of *Science*.—ARTHUR HERSCHMAN



From Albert D. Richardson's *Beyond the Mississippi* (American Publishing Co., Hartford, Conn., 1867) [State Historical Society of Colorado]

9. Medicine and Health

Health Services for Rural Areas (21 Feb., HI): Family practice center, medical school outreach, community decisions, guidance, incentives.
Bond L. Bible, S. Jack Locke, Ben N. Saltzman, M. Gene Aldridge, Richard M. Spears, Sholom Pearlman.

Mechanisms of Orofacial Motor Control: Masticatory and Speech Functions (21 Feb., HI): Muscle spindle function, biting force, neural mechanisms, nervous system damage.
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 hepatotrophic 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.

Financial Incentives Promoting Practice in Underserved Areas—Do They Work? (23 Feb., HI): Scarcity area practice, loan forgiveness programs, Illinois' program, Colorado's program.
Ellen P. Sax, Walter J. McNerney, Charles E. Lewis, Jack L. Gibbs, Sholom Pearlman.

Medical Decision-Making (23 Feb., HI): Probabilities, utilities, perceptual inference, cost-benefit analysis.
John A. Swets, Harvey V. Fineberg, Emmett B. Keeler, Milton C. Weinstein, Charles E. Metz, Barbara J. McNeil.

Pharmacokinetics: Implications for Patient Care (23 Feb., HI): Absorption, distribution, metabolism, excretion of drugs, optimizing dosage, therapeutic efficacy, reduction in side effects.
Raymond Jang, John G. Wagner, Thomas F. Patton, Curt R. Freed, Thomas N. Tozer, Stuart Feldman, Michael E. Winter, Clarence T. Ueda.

Scientific Information and the Public Policy: Regulating the Use of Psychotropic Drugs (24 Feb., HI): Social dimensions, emerging needs, formulation of policy, legislation, opportunities and barriers.
James J. Bosco, Stanley S. Robin, J. Richard Crout, Carl Taylor, Jane Frank, Keith Connors.

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. Siegmann, Mari-

lyn Bergner, Norman Bradburn, Mata K. Nikias, Thomas W. Bice.

Perinatal Factors and Developmental Hazards (24 Feb., HI): Reproductive casualty, neonatal experience, crib death, taste and smell.
Frances Degen Horowitz, Arnold J. Sameroff, P. Herbert Leiderman, Lewis P. Lipsitt, Trygg Engen, Heinz W. Berendes.

Continuing Evaluation of the Use of Fluorides (25 Feb., HI): Historical perspective, normal fluoride intake, human plasma, caries prevention, osteoporosis, renal clearance, anesthetics, cell cultures.
Erling Johansen, Donald R. Taves, Sholom Pearlman, Reidar F. Sognnaes, Warren S. Guy, Thomas M. Marthaler, Harold C. Hodge, John A. Gray, Jennifer O. Jowsey, Gary M. Whitford, William J. Johnson, Russell A. Van Dyke, John W. Suttie.

10. Anthropology

An Account of the Visual Mode: Man versus Ape (21 Feb., DH): Sign language elements, fingerspelled sequences, technical sign vocabulary, culture and code, sign language and culture, chimpanzees, lowland gorilla.
Fred C. C. Peng, William C. Stokoe, Richard Blasdell, Frank Caccamise, Nancy Frishberg, Gordon W. Hewes, Roger S. Fouts, Francince Patterson.

Effects of Early Experience on Development in Human and Nonhuman Primates (22 Feb., DH): Fear, human affects, langur monkey, first and second siblings, sex roles.
Phyllis C. Dolhinow, Joseph J. Campos, Robert N. Emde, I. Charles Kaufman, James J. McKenna.

Differences in Nutritional Requirements Among and Within Human Populations: Their Significance (22 Feb., DH): Fatness and fertility, genetic aspects, vitamin E and malaria, Pima Indians and diabetes, sucrose intolerance.
Irving I. Gottesman, Rose E. Frisch, Baruch S. Blumberg, John W. Eaton, Peter H. Bennett, H. H. Draper.

Ethnoscience in Native America (23 Feb., DH): Historical overview, ethnobotanical studies, subsistence in Amazonia, mathematical development.
Rayna Green, Richard Ford, Robert Bye, Brent Berlin, Michael P. Closs, Clara Sue Kidwell, Keewaydinoquay Peschel, Joseph Mitchell, Urbiratan D'Ambrosio.

Migration: New Directions and Policy in America (24 Feb., DH): Migration trends, mobility expectations, residential preferences, impacts of migration, migration policy.
Edwin H. Carpenter, Vincent H. Whitney, Glenn V. Fuguitt, James J. Zuiches, Gordon F. DeJong, Peter A. Morrison, Everett S. Lee.

Administration of Fertility Control Programs: A Fourth Dimension (24 Feb., DH): Participative management, community versus clinical approaches, community involvement, rural development programs.
Nirmala Narula, Gaines B. Turner, Allen Jedlicka, David C. Korten, Rolf P. Lynton, Everett M. Rogers, Arch T. Dotson.

Frontiers of Folklore (25 Feb., DH): Context of folklore, performance, enactment, overview.
William R. Bascom, Alan Dundes, Dan Ben-Amos, Harold Scheub, Roger D. Abrahams, Richard Bauman.

American Mountain People (25 Feb., DH): Folk culture, mountain environment, mountain music, storytelling, in-migration.
Stuart M. Leiderman, Ted Landers, Rosemary Landers, Joel Davidson, Sherri Davidson.

11. Technological Implications

Indigenous Scientific and Technological Research in Developing Countries: Where, How Much, What Kind, What Directions? (21 Feb., HI): Issues involved, Indonesia, Mexico, university in the Third World, anthropological research, appropriate technology, village level technology, arid countries.
Dilmus D. James, Allen Jedlicka, James H. Street, Iskandar Alisjahbana, Felino Harahap, Miguel S. Wionczek, J. W. Powell, George N. Appell, Thomas Fox, E. F. Schumacher, A. K. Roy, Robert Bulfin, Millidge Walker, Robert Pierson, Edgar Owens.

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.
Harold E. Bamford, Jr., Murray Turoff, William Paisley, Roger K. Summit, David L. Staiger, George K. Chacko.

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 Conitz, Paul M. Maughan.

12. Behavioral Science

Psychoanalytic Research: The Naturalistic and the Experimental Behavioral Science Methods (21 Feb., HI): Nonhuman research, objective-behavioral science approach, gender identity, intuitive approach.
Norman D. Tabachnick, I. Charles Kaufman, Robert J. Stoller, Herbert J. Schlesinger.

Creativity (21 Feb., HI): Emotional blocks, interdisciplinary, sensory imagination, common patterns.
Eileen Sullivan, Milton Christian, Eugene Sagan, Sidney J. Parnes, Robert H. McKim, William J. Gordon, Donald Koberg.

Individual Differences, Cognition, and Learning (22 Feb., HI): Language processing, individual differences, verbal IQ, information processing.
Wilbert J. McKeachie, James G. Greeno, Michael Cole, Earl B. Hunt, Richard E. Snow.

Values of Screening and Assessment for Early Intervention in the Management of the Special-Needs Child (22 Feb., HI): The newborn, metabolic disorders, at-risk children, educational planning, issues and policies.

Selcuk T. Sahin, T. Berry Brazelton, Harvey L. Levy, Allen C. Crocker, John H. Meier.

Found: Long-Term Gains from Early Intervention (23 Feb., HI): Center-based studies, New Haven project, sleeper effects, home-based early intervention programs.
Bernard Brown, John H. Meier, Francis H. Palmer, Victoria Seitz, Sheldon H. White, Robert D. Hess.

Toward the Human Use of Human Beings: A Cybernetic Approach to Assessment of Children (23 Feb., HI): Infant-child interaction, psychological testing, cybernetic testing, assessment.
Mark N. Ozer, Frank Baker, T. Berry Brazelton, Irving E. Sigel, Bernard Brown, William Powers.

Families Across the Life Cycle: Issues and Perspectives (24 Feb., HI): Adolescent experience, early marriage, reciprocal socialization, status passage, school-age children, empty nest parent.
Helen K. Grace, Paul A. Reichelt, Kathleen Astin Knafl, Karen Skerrett, Katherine Cavallari Malm, Dorothy Camilleri, Janice K. Janken.

Encounter Groups and Social Change (24 Feb., HI): Search for community, development of communes, humanistic psychology, destructive *gemeinschaft*.
Kurt W. Back, James W. Fernandez, Benjamin D. Zablocki, M. Brewster Smith, Richard Sennett.

Somatosensory Experiences in Infancy and Childhood: Implications for Later Development (24 Feb., HI): Human development, therapeutic techniques, gross motor activities, schizophrenia.
Betty P. Broadhurst, James W. Prescott, Foster W. Cline, Carl R. Guthals, Lorna Jean King, Gordon K. Farley, Jan Vanderburgh.

Violence at Home and at School (25 Feb., HI): Violence toward children, child abuse, family stress, violence and vandalism, classroom violence, reduction of violence.
Rodger W. Bybee, F. James Rutherford, Richard J. Gelles, Brandt F. Steele, Elizabeth Elmer, Donald Bross, Robyn J. Ducharme, C. Henry Kempe, Birch Bayh, Michael Marvin, Tilford Cole, Judy Eruland, Robert Hussey, Madge Zietlow.

13. Education

Research Techniques and Reports by High School Science Students (21 Feb., CO): Reports from students from around the country.
Frank W. Starr, Elemer Bernath, Carol McClain, Linda M. Reider, Anabel W. Preece, Beth Carlberg, Alton Johnson, Rene M. Filipowski, Philip Mitchell, Jayne Thorson, Lynn Fisher, Peter Sandborn, John Spaltro, Randy C. Elliott, Suzanne Kae Chaffee, Robert David Nabow, David Barbour, Roderick Nygaard.

Minorities, Women, and the Handicapped in Science: A Workshop on Programs that Work (21 and 22 Feb., CO.; 23 Feb., DH): Tests, programs: accessibility, funding, evaluation, engineering, biomedicine, science education, ethnoscience, ethnomedicine, handicapped, math anxiety, summer science program, projects that work.
Shirley M. Malcom, Mary Budd Rowe, Janet W. Brown, Luis Nieves, Robert C. Larson, James L. Angel, Nicholas Hobbs, Frederick Fay, Joel Aronson, Phyllis Stearner, John Gavin, S. Maria Hardy, Warren Washington, Doris Hadary, Albert Snow, Rayna D. Green, Robert Menschel, Edward C. Keller, Lucy Sells, Etta Falconer, Lynne Harrington Brown, Stanley G. Sunderwirth, Bernard Kahrahrah, Allan Franklin, Alex Cruz, James Turner, Golden Harris, Caroline Urvater.

Multidisciplinary Training in Science (23 Feb., CO): Ecological problems, energy/environmental problems, the policy world, complexity, science education, societal dimensions, systems analysis.
David Pimentel, George Sprugel, Owen Carroll, David L. Jameson, Richard L. Perrine, Laura M. Lake, Jean Johnson, Kenneth E. F. Watt.

Fungibility: A New Dimension in Biological Curricula (24 Feb., CO): Doctoral education, physical science interface, allied health profession, employment opportunities.
Richard Trumbull, Robert E. Gordon, David M. Gates, Martin D. Brown, George A. Gries.

Implications of Changeover to Metric Measurements (24 Feb., CO): South Africa, international trade, construction trades, the scientist and engineer, metric education, teacher education.
Frances J. Laner, Richard K. Milheim, Joseph M. Lightman, Andrew Lally, William J. Jaffe, Arthur H. Livermore, Vincent G. Sindt.

Public Knowledge of Science—The National Assessment of Educational Progress [NAEP] (25 Feb., CO): General trends, knowledge of science, science assessments.
Ezra Glaser, Robert C. Larson, Mary Budd Rowe, Judith M. Sauls, Norris Harms, Edward C. Bryant, Morris H. Hansen, Arthur H. Livermore, Marie D. Eldridge.

Science, Technology, Policy, and Values: The Interface with Engineering (25 Feb., CO): Technology-policy education, educational goals, government, engineering, industry.
Kan Chen, Robert P. Morgan, Robert W. Dunlap, J. C. Mathes, Joseph F. Coates, David R. Reyes-Guerra, Robert N. Mills.

14. Economic and Social Sciences

Prospects for, and Patterns of, Future U.S. Economic Growth (21 Feb., HI): Alternative growth paths, new dimensions, productivity, changing basis for growth, new concept of growth, emerging counter-economy, price system, government intervention, future growth paths.
Robert D. Hamrin, S. Fred Singer, John W. Kendrick, Nathaniel J. Mass, Carl H. Madden, Hazel Henderson, Walter Mead, William D. Nordhaus, Kenneth E. Boulding, Steve H. Hanke.

National and International Cooperation: The Institutional Limits to Growth (22 Feb., HI): National overload, private institutions, the U.N., global consciousness.
Stephen H. Schneider, C. S. Kiang, Amitai Etzioni, Lewis Branscomb, Noel Brown, W. M. Tu, Warren Bennis.

Can Research Institutions Accommodate Interdisciplinary Researchers? (22 Feb., HI): Quality review, transdisciplinary science, research universities.
Stephen H. Schneider, Michael H. Glantz, Jerome Weingart, Harrison Brown, Margaret Mead, Lee Schipper.

Technological Change, Progress or Retrogression: Private Benefit versus Social Cost (23 Feb., HI): Discontinuity, subtle factors, private and social benefit, cure or prevention.
Manoucher Parvin, Thomas Vietorisz, Sanford Bordman, Joseph F. Coates, John Walsh, William T. Hogan, S.J., Melvin Kranzberg, Guillermo A. Calvo.

Environmental Issues and the Social and Behavioral Sciences (24 Feb., HI): Leisure environments, energy and social issues, the city, identity development and crisis, land use.
Irwin Altman, William R. Burch, Jr., Samuel Z. Klausner, Harold M. Proshansky, Joachim F. Wohlwill.

Covert Discrimination and Women in the Sciences (25 Feb., HI): Individual and the institution, legislative and non-legislative issues, psychological barriers.
Judith A. Ramaley, Elske Smith, Doris Wooten, Carol Bonosaro, Irene Frieze, Ellen Weaver.

15. Science and Public Policy

Federal Funds for Research: Who Gets What, When, and How? (21 Feb., HI): Budget-making, research organizations, federally funded R&D.
T. Dixon Long, Herman Postma, Walter Rosenblith, Ronald Konkel, Ray Thornton.

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.
Laurence B. Heilprin, Elizabeth B. Adams, Andrew A. Aines, George K. Chacko, Joseph C. R. Licklider, Arthur J. Levine, Donald A. Dunn, Ruth M. Davis, Barbara A. Ringer, Donald G. Fink.

Scientists and Congress: Making a Difference (22 Feb., HI): Congressional agenda, ozone-fluorocarbon controversy, the political arena, swine flu, and congressional science fellowships.
Richard A. Scribner, N. Richard Werthamer, Charles A. Mosher, William Moomaw, Thomas Moss, R. Darryl Banks, Audrey Buyrn, Christopher Coccio, Barry M. Casper.

Knowledge for Policy-Making: Integrating Information, Opinion, and Values (23 Feb., HI): Intermediate knowledge, research applied to national needs, holistic technology assessments.
Richard A. Scribner, Christopher Wright, L. Vaughn Blankenship, Patrick Kelly, Don E. Kash, Jack M. Nilles, Donald Michael.

Judgment and Choice in Public Policy Decisions (23 Feb., HI): Social decision-making, human judgment, societal risk taking.
Kenneth R. Hammond, Joseph F. Coates, Ward Edwards, Paul Slovic, Kenneth E. Boulding.

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. Moles, 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.
Donald C. Pelz, Carol H. Weiss, E. W. Kelley, Nathan S. Caplan, Kiyoshi Ikeda, Robert F. Rich, F. Tomlinson Sparrow, Howard R. Davis.

Energy Analysis: A New Public Policy Tool (25 Feb., HI): Information for policy-makers, environmental work, second law efficiencies, economic costs, energy RD&D planning.
Martha W. Gilliland, H. T. Odum, Marc H. Ross, David A. Pilati, Richard H. Williamson.

16. History and Philosophy of Science

Technology and Public Policy: A Retrospective View (21 Feb., DH): The atomic bomb, Jacksonian era relations, submarine telegraphy, the telephone, wastewater systems.
Joel D. Goldhar, David Bearman, Joel A. Tarr, Harvey Brooks, Richard G. Hewlett, Merritt R. Smith, Vary T. Coates, Ithiel de Sola Pool.

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

Contemporary Religious Movements in America: Religious Minorities in a Secular Society (22 Feb., DH): Religion, secularization and modernization, typology of nontraditional movements, types of conversion, attitudinal changes, social context.
Gillian Lindt, Dick Anthony, Thomas L. Robbins, James T. Richardson, J. Stillson Judah, Benton Johnson, Eileen Barker.

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.
Lauren C. Gilman, Lora M. Shields, R. James Becker, Lynn E. Elfner, James F. Lovell, William Brumley, Robert C. Duty, Ruth W. Melvin, Richard J. Raridon, James R. Batt, M. Gabrielle Maze, Robert W. Hanson, George W. Griffith, Michael J. Carlo, Harvey A. Miller.

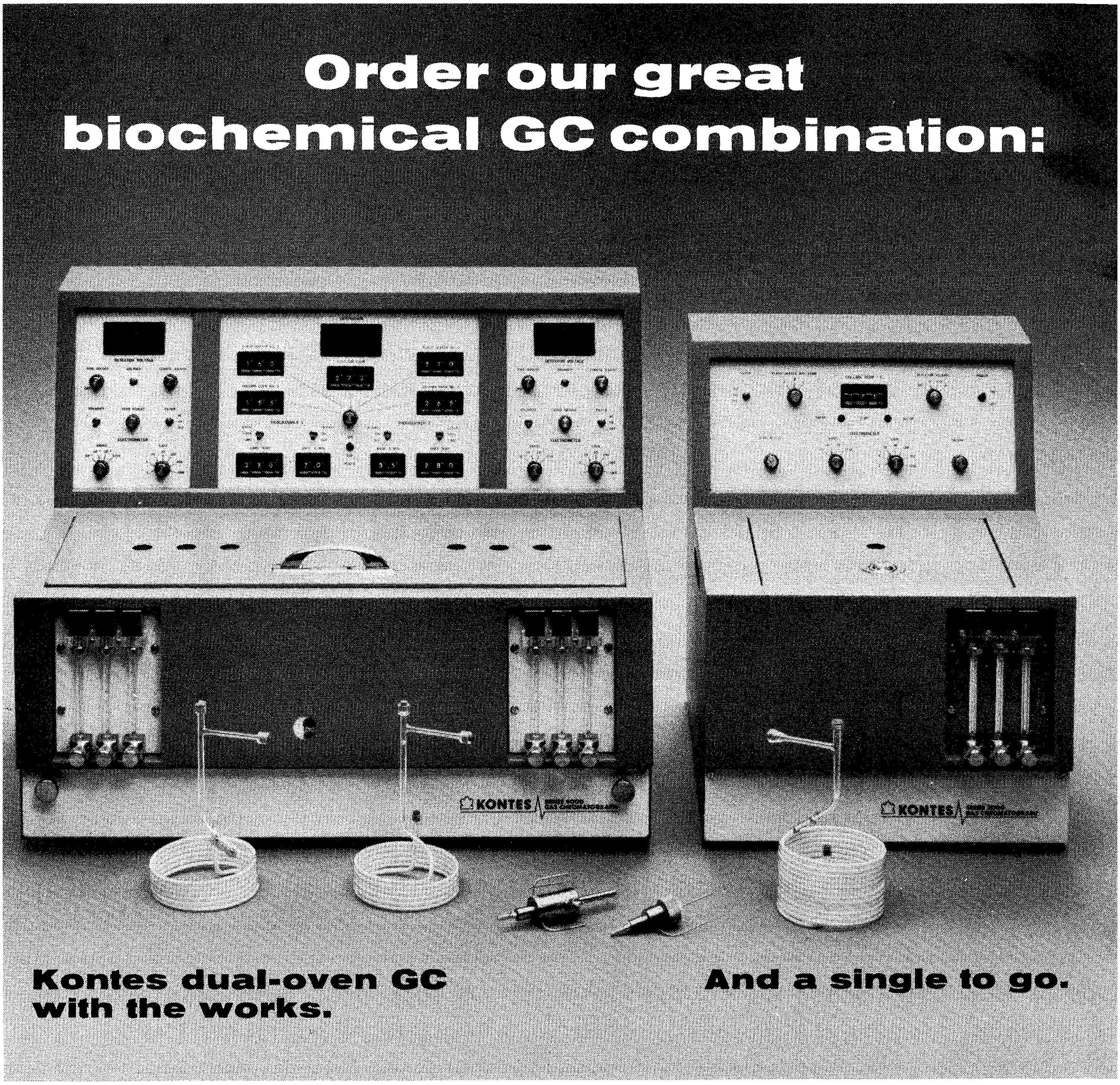
New Light on Newton: To Honor the 250th Anniversary of His Death (23 Feb., DH): Newton's years of discovery, Newton's dynamics, absolute space, optical lectures, algebraic versus geometric techniques.
Ernan McMullin, Richard S. Westfall, James E. McGuire, Alan Shapiro, Michael Mahoney.

The Epistemic Status of Human Emotions (24 Feb., DH): Animal emotions, children, emotions in human knowing, pictorial communication, emotions and mythology.
Anthony Leeds, John P. Scott, Mathilda S. Holzman, John M. Kennedy, Robert C. Solomon, Wallace L. Chafe, Noretta Koertge.

The Many Faces of Information Science (25 Feb., DH): Information transfer, theoretics of information, information structures, knowledge transfer, signs and symbols.
Edward C. Weiss, William Goffman, Marshall C. Yovits, Naomi Sager, Donald J. Hillman, Vladimir Slamecka.

The General Systems Paradigm: Model for a Changing Science (25 Feb., CO): Reductionism and incrementalism, complementary epistemology, holistic and interdisciplinary approaches.
Heinz Von Foerster, Kenneth E. Boulding, Richard F. Ericson, Joseph Goguen, Hazel Henderson, Margaret Mead, James G. Miller, Anatol Rapoport, Francisco Varela, Ernst Von Glasersfeld.

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.



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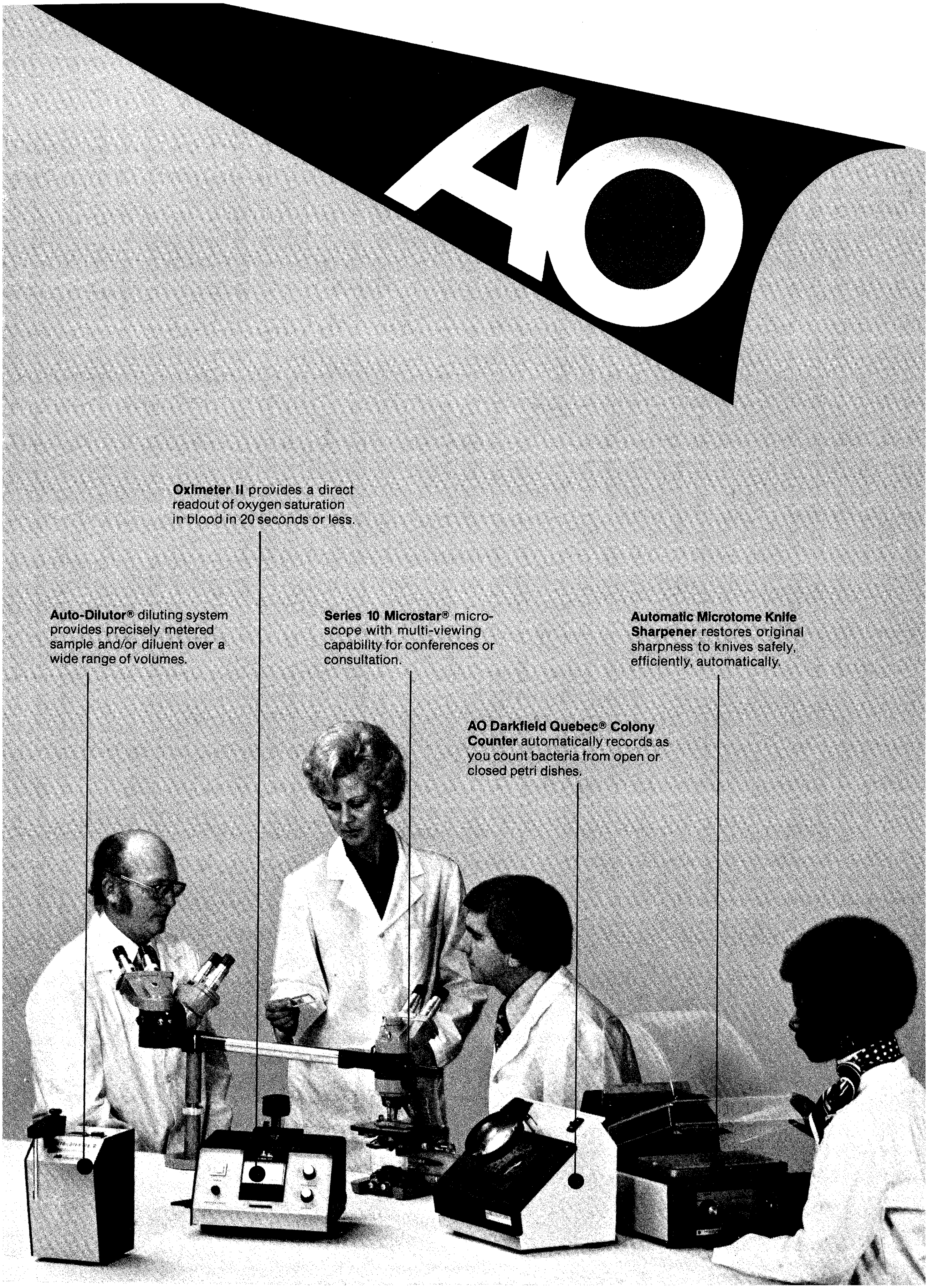
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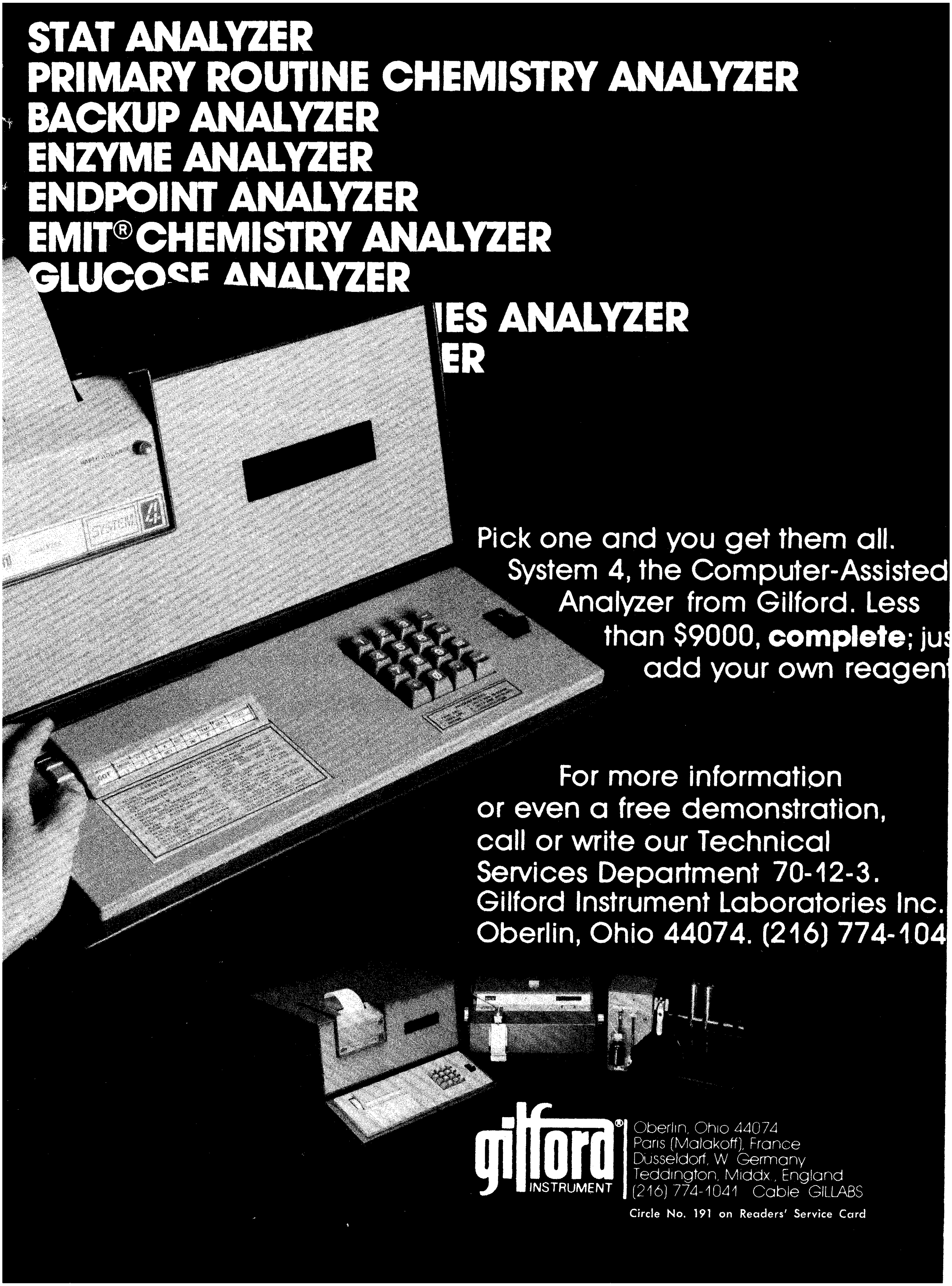
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much stronger winds (8). We plan to obtain data for the winter period during the Viking extended mission.

Pressure measurements at the VL2 site exhibited a downward trend similar to that observed at the VL1 site. Thus, they supported our earlier interpretation of the pressure decrease in terms of atmospheric mass loss due to CO_2 condensation at the southern winter polar cap. We have also observed diurnal and semidiurnal pressure variations at the Viking 2 site, although with much reduced amplitude compared with those observed at the Viking 1 site (Fig. 2 and Table 1). The reduction in amplitude between the two sites is consistent with the behavior of the most important planetary scale atmospheric tidal modes. For example, the amplitude of the semidiurnal mode of largest planetary scale, the $S_2^{2,2}$ mode, would be expected to be about one-fourth as large as at the VL1 site (9). Although the observed ratio is somewhat larger than this, we believe that this $S_2^{2,2}$ mode is the dominant contributer to the semidiurnal pressure variation.

The repetition of diurnal patterns from one sol to another is to be expected in summer on Mars because the regular radiation regime dominates, and because horizontal temperature gradients and winds are too small to support various forms of meteorological instability. We have already seen evidence that this regularity is breaking down at the VL2 site. Departures from the wind pattern of Fig. 1 have become increasingly evident since sol 37. This behavior is under intensive study.

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1. S. L. Hess, R. M. Henry, C. B. Leovy, J. A. Ryan, J. E. Tillman, T. E. Chamberlain, H. L. Cole, R. G. Dutton, G. C. Greene, W. E. Simon, J. L. Mitchell, *Science* **193**, 788 (1976); *ibid.* **194**, 78 (1976).
2. H. H. Kieffer, S. C. Chase, Jr., E. D. Miner, F. D. Palluconi, G. Münch, G. Neugebauer, T. Z. Martin, *ibid.* **193**, 780 (1976).
3. C. B. Leovy and Y. H. Mintz, *J. Atmos. Sci.* **26**, 1167 (1969); J. B. Pollack, C. B. Leovy, Y. H. Mintz, W. Van Camp, *Geophys. Res. Lett.* **3**, 479 (1976).
4. The term "sol" refers to the martian day of 24.660 hours and is used to avoid confusion with the terrestrial day. Sol 0 refers to the date of landing of the designated lander.
5. As on VL1, the primary temperature sensor is a thermocouple array; however, on VL2 the measurements from this sensor showed indications of noise and bias arising from the electronics. We have, therefore, used the wind reference temperature sensor to provide the VL2 temperature information reported here. Readings from this instrument are subject to radiation and conduction errors which have been corrected on the basis of experience gained with the same sensor on VL1. However, the corrected temperature readings on VL2 with an estimated error of ± 2°K are less accurate than those on VL1.
6. According to the 1/25,000,000 scale topographic map of Mars, M 25M 3RMC, prepared by the U.S. Geological Survey under NASA contracts L55232, WO-8122, and W-13709 for the Viking project.
7. J. R. Holton, *Tellus* **19**, 199 (1967).
8. G. A. Briggs and C. B. Leovy, *Bull. Am. Meteorol. Soc.* **55**, 278 (1974).
9. S. Chapman and R. S. Lindzen, *Atmospheric Tides* (Gordon and Breach, New York, 1970).
10. Supported by NASA contract NAS 1-9693.

16 November 1976

PRODUCTS and MATERIALS

Blood Gas Quality Control

The Dynex system comprises a three-channel instrument which allows simultaneous equilibration of three solutions, each with a different *p*H, partial pressure of oxygen, and partial pressure of carbon dioxide. This enables one to prepare quality control solutions for blood gas analysis rapidly as equilibration is accomplished within 15 minutes. Analytical Products. Circle 720.

Neonatal Patient Monitors

The 414UA displays electrocardiogram, blood pressure or peripheral pulse, and respiration. A digital readout shows heart rate, systolic/diastolic or mean blood pressures, two temperatures, differential temperature or respiration rate. The 414UB does all of the above except monitor blood pressure. Recorders are available for either of these monitors. In addition to the ECG, pulse, or pressure waveform, alphanumeric information, including elapsed time, heart rate, respiration rate, two temperatures, systolic/diastolic, and mean blood pressures, is printed in the margin. Tektronix. Circle 718.

Digoxin Test Kit

A new test kit for radioimmunoassay of digoxin is based on a solid state test system. SPAC features a plastic section that becomes the closed end of the reaction tube. The antibody is coated on and covalently bonded to the surface of this plastic section. The coated section is sealed to a polypropylene cylinder to form the tube used for the test. The patient's digoxin concentration is determined by comparing the percent of iodine-125-labeled digoxin bound to the antibody in the patient's reaction tube to the standard curve. The tubes may be placed in any gamma well counter for this determination. Mallinckrodt/Nuclear. Circle 721.

Thyroid Reagents

Liothyronine and thyroxine solutions with high specific activity (iodine-125) are now available. Liothyronine will be supplied at a specific activity of greater than 1200 microcuries per microgram in 20-microcurie and 100-microcurie packages. Thyroxine will be supplied at greater than 200 microcuries per microgram in 50-microcurie and 250-microcurie packages. These high-specific-activity thyroid hormones will be supplied in multidose vials in a solution of ethanol and water (3:1, volume-to-volume). Amersham/Searle. Circle 722.

Blood Bank Dry Bath

Model DB-12215E offers the advantages of dry test tubes reducing the chance of cross-contamination plus portability. The device has 40 wells for 12-millimeter test tubes. Temperature is controlled to within ±0.25°C at 37°C. Operating range is 30° to 56° and the bath heats up to 37°C in 20 minutes. Thermolyne. Circle 717.

Respiratory Intensive Care

RICS II is a system for monitoring critically ill patients. It provides long-term trend monitoring of up to 16 patients and simultaneous short-term monitoring of any one patient. Up to 24 hours of data may be stored, displayed, or plotted for five respiratory parameters: fractional percent inspired oxygen, partial pressure of alveolar oxygen, partial pressure of alveolar carbon dioxide, inspiration to expiration ratio, and the respiratory rate. High and low alarms for the first two of these are individually set for each patient. The system consists of the Medspect gas analyzer, a control unit based on a fixed-program microprocessor, and a CRT display with a hard copier and a keyboard. Scientific Research Instruments. Circle 716.

Ion-Free Serum

Chemvarion is an ion-free serum which has numerous quality control applications for clinical practice and research. Chemvarion is a protein solution for the preparation of precise self-variable biochemical standards. It is free of all inorganic ions, most organic constituents, and enzymes whose analyses are commonly carried out. These constituents may be added in known amounts to provide high, low, and normal standards for research or for clinical diagnosis. Analyses are provided with each lot of Chemvarion. Clinton Laboratories. Circle 719.

Sample Divider

The Rotary Micro Riffler consists of a circular vibrating bowl and a sample collector. The collector is a rotating disk that holds eight test tubes. Rates of delivery and rotation are controlled. The bowl accommodates up to 75 milliliters for division into representative samples. Quantachrome. Circle 729.

Literature

Health Sciences Products Directory consists of 64 pages. Eastman Kodak. Circle 723.

pH in Plain Language describes fundamentals in basic terms with illustrations. Chemtrix. Circle 724.

Laboratory, Cryogenic Systems lists refrigerators, helium transfer systems, instruments and accessories. Air Products and Chemicals. Circle 725.

Condenser Lenses are available in a variety of focal lengths, diameters, and magnification ratios. Melles Griot. Circle 726.

Atomic Absorption Methods Manual is a guide book that includes special sections on individual elements. Fisher Scientific. Circle 727.

Accessories for Mass Spectrometers is a complete catalog. Vacumetrics. Circle 728.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Readers' Service Card (on pages 1226A and 1354A) and placing it in the mailbox. Postage is free.
—RICHARD G. SOMMER

BOOKS RECEIVED

(Continued from page 1273)

Ann Arbor, Mich., 1976. xx, 684 pp., illus. $29.50.

Environmental Knowing. Theories, Research, and Methods. Gary T. Moore and Reginald G. Golledge, Eds. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1976. xxii, 442 pp., illus. $25.

Enzyme Patterns in Fetal, Adult and Neoplastic Rat Tissues. W. E. Knox. Karger, Basel, ed. 2, 1976. xxiv, 360 pp., illus. Paper, $20.

Ethics and Health Policy. Robert M. Veatch and Roy Branson, Eds. Ballinger (Lippincott), Cambridge, Mass., 1976. xx, 332 pp. $15.

The Evolution and Chemistry of Aggression. D. D. Thiessen. Thomas, Springfield, Ill., 1976. xviii, 212 pp., illus. $18.50. American Lecture Series, Publication No. 989. A Monograph in the Bannerstone Division of American Lectures in Living Chemistry.

Extra-Terrestrial Intelligence. The First Encounter. James L. Christian, Ed. Prometheus Books, Buffalo, N.Y., 1976. xiv, 304 pp., illus. Cloth, $13.95; paper, $4.95.

Feeling Safe. Making Space for the Self. Stephen Shapiro and Hilary Ryglewicz. Prentice-Hall, Englewood Cliffs, N.J., 1976. x, 148 pp. Cloth, $8.95; paper, $2.95. A Spectrum Book.

Festkörper Probleme XVI. Advances in Solid State Physics. Papers from a meeting, Freudenstadt, Germany, Apr. 1976. J. Treusch, Ed. Vieweg, Braunschweig, 1976. viii, 346 pp., illus. DM 83.

A Field Guide to Pacific States Wildflowers. Field Marks of Species Found in Washington, Oregon, California and Adjacent Areas. A Visual Approach Arranged by Color, Form, and Detail. Theodore F. Niehaus. Illustrations by Charles L. Ripper. Houghton Mifflin, Boston, 1976. xxxii, 432 pp. $10.95. The Peterson Field Guide Series, 22.

Flora Europaea. Vol. 4, Plantaginaceae to Compositae (and Rubiaceae). T. G. Tutin and 9 others, Eds. Cambridge University Press, New York, 1976. xxxii, 506 pp. + maps. $65.

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