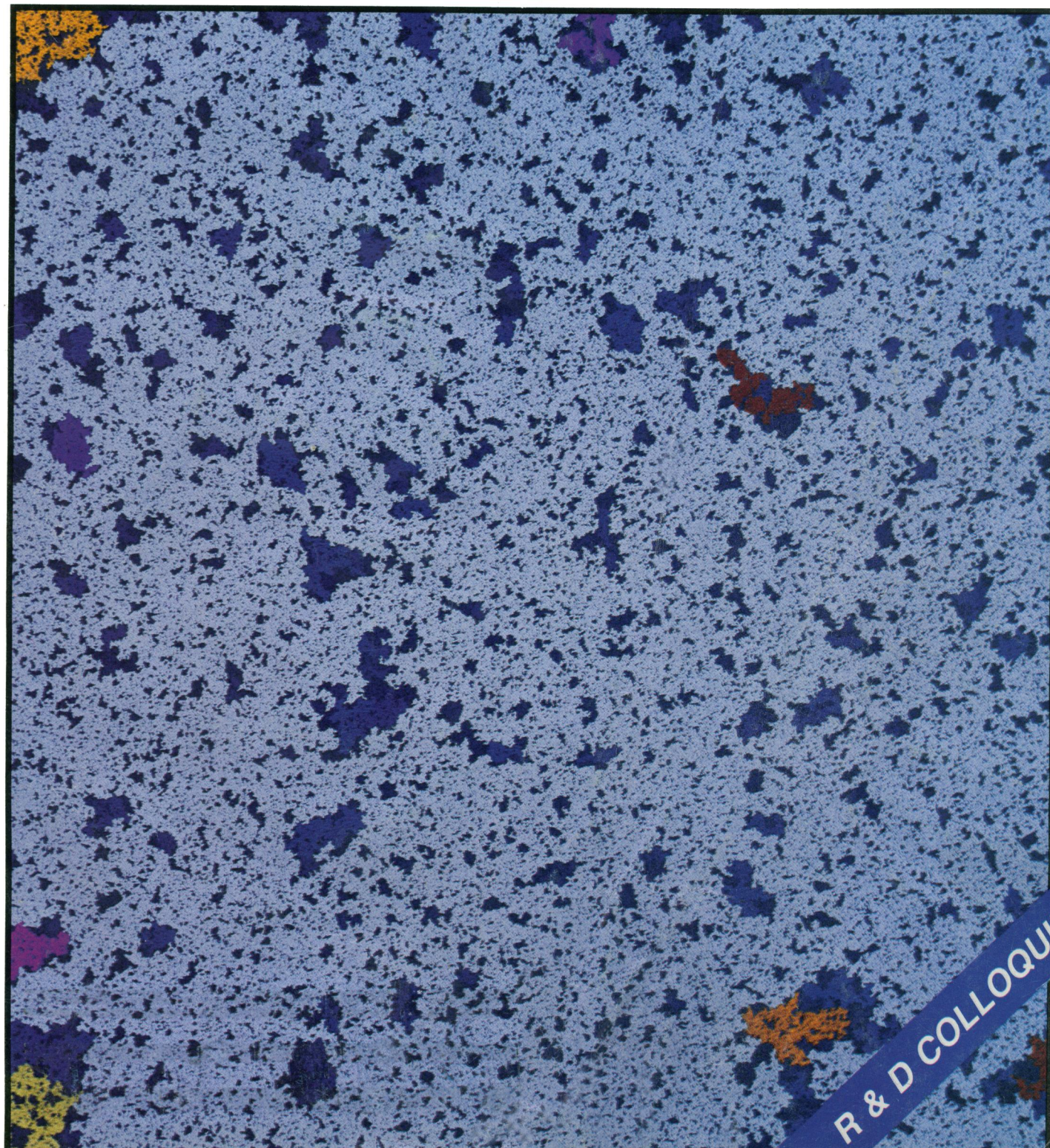


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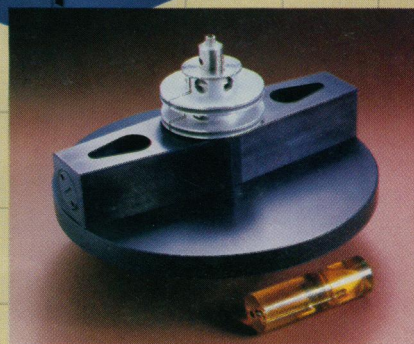
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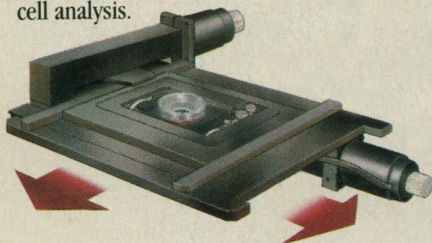
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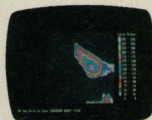


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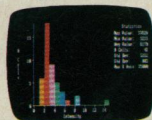
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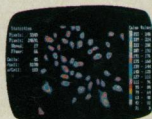
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779 This Week in *Science*

Editorial

781 Increasing Productivity and Efficiency in Agriculture: V. M. Ruttan

Letters

783 The Spaceplane: G. HARDIN; E. MARSHALL ■ Billings Ovulation Method: M. A. WILSON ■ *Titanic*—a Royal Mail Ship: A. B. HARRIS ■ "Active" and "Passive" Risks: C. PERROW

News & Comment

785 Science Escapes Brunt of Budget Ax
789 R&D Lobby Anxiously Awaits Budget Action
791 *Briefing*: Science Board Study Indicates U.S. Science Healthy ■ Superfund Is Running Out of Money ■ NASA Had Warning of Potential Shuttle Accident ■ Foods as Salty as Ever, Center Says

Research News

793 Voyager Finds Uranian Shepherds and a Well-Behaved Flock of Rings
796 Ubiquitin Moves to the Cell Surface
798 *Briefing*: A Surprising Action for the AIDS Virus ■ Where to Put the Missing Venusian Ocean

Articles

807 Infrared Astronomy After IRAS: G. H. RIEKE, M. W. WERNER, R. I. THOMPSON, E. E. BECKLIN, W. F. HOFFMANN, J. R. HOUCK, F. J. LOW, W. A. STEIN, F. C. WITTEBORN
814 Dynamics of Fractal Networks: R. ORBACH
820 The 1985 Nobel Prize in Physics: B. I. HALPERIN

Research Articles

823 Cell Surface Molecule Associated with Lymphocyte Homing Is a Ubiquitinated Branched-Chain Glycoprotein: M. SIEGELMAN, M. W. BOND, W. M. GALLATIN, T. ST. JOHN, H. T. SMITH, V. A. FRIED, I. L. WEISSMAN

Reports

830 Cation-Ratio and Accelerator Radiocarbon Dating of Rock Varnish on Mojave Artifacts and Landforms: R. L. DORN, D. B. BAMFORTH, T. A. CAHILL, J. C. DOHRENWEND, B. D. TURRIN, D. J. DONAHUE, A. J. T. JULL *et al.*

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COVER Percolation network, for sites at concentration $p = 59.9$ percent, occupied at random on a square grid of 3000 sites on a side, using periodic boundary conditions. Sites are connected if they are adjacent along a vertical or horizontal direction, not along the diagonals. The white colored sites represent the infinite network; the next larger cluster colored bright yellow is a finite cluster. The size of the largest "hole" is the percolation correlation length, ξ_p . The network obeys fractal geometry for length scales $r < \xi_p$, and Euclidean geometry otherwise. See page 814. [Figure is courtesy of R. F. Voss, IBM Thomas J. Watson Research Center, Yorktown Heights, New York]

- 833 Periodic Extinction of Families and Genera: D. M. RAUP and J. J. SEPKOSKI, JR.
- 836 Thermal Spectrum of Uranus: Implications for Large Helium Abundance: G. S. ORTON
- 840 Maturational Changes in Cerebral Function in Infants Determined by ^{18}F FDG Positron Emission Tomography: H. T. CHUGANI and M. E. PHELPS
- 843 L-Isoleucine and L-Leucine: Tumor Promoters of Bladder Cancer in Rats: Y. NISHIO, T. KAKIZOE, M. OHTANI, S. SATO, T. SUGIMURA, S. FUKUSHIMA
- 845 Expression Cloning of a Lymphocyte Homing Receptor cDNA: Ubiquitin Is the Reactive Species: T. ST. JOHN, W. M. GALLATIN, M. SIEGELMAN, H. T. SMITH, V. A. FRIED, I. L. WEISSMAN
- 850 Long-Term Cultures of HTLV-III-Infected T Cells: A Model of Cytopathology of T-Cell Depletion in AIDS: D. ZAGURY, J. BERNARD, R. LEONARD, R. CHEYNIER, M. FELDMAN, P. S. SARIN, R. C. GALLO
- 854 Mammalian Metallothionein Is Functional in Yeast: D. J. THIELE, M. J. WALLING, D. H. HAMER
- 856 Detection of α -Transducin in Retinal Rods But Not Cones: G. B. GRUNWALD, P. GIERSCHIK, M. NIRENBERG, A. SPIEGEL

Technical Comments

- 859 Carbon Dioxide Enhancement of Tree Growth at High Elevations: C. F. COOPER, J. GALE, V. C. LAMARCHE, JR., D. A. GRAYBILL, H. C. FRITTS, M. R. ROSE

AAAS Meetings

- 869 *Annual Meeting*: Call for Symposium Proposals ■ *R&D Colloquium*: R&D and the Budget Crisis—Preliminary Program and Advance Registration Form

Book Reviews

- 873 *Learning To Heal*, reviewed by J. F. KETT ■ *Chloroplast Biogenesis*, N. W. GILLHAM ■ *Quaternary Geology and Environment of China*, H. E. WRIGHT, JR.

Products & Materials

- 875 Cell Culture Device ■ Spectrofluorometer ■ Software to Teach Measurement ■ Test-Tube Electrode ■ Motion Analyzer ■ Gas Cylinder Switch ■ Protection for Centrifugists ■ Glove Box ■ Literature

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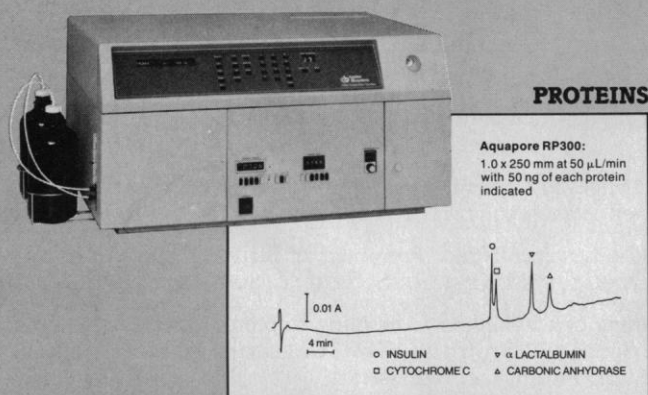
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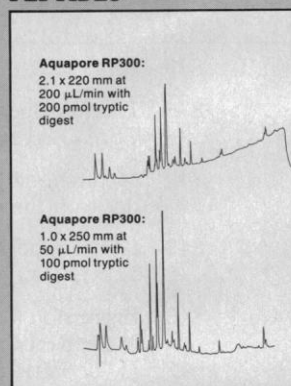
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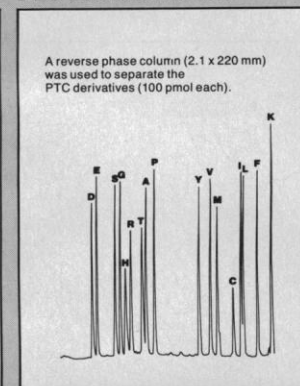
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This Week in SCIENCE

Exploration of the infrared cosmos

INFRARED emissions emanate from at least 250,000 sources in the cosmos, according to a catalog prepared after a 10-month all-sky survey made by a telescope aboard the Infrared Astronomical Satellite (IRAS) in 1983 (page 807). Among the sources are 10,000 galaxies never before seen and comets and asteroids, including the IRAS-Araki-Alcock comet that came close to Earth—within 2 million miles. Other sources are particles orbiting around stars much as the planets orbit around the sun, and gas clouds, young stars, old giant stars enshrouded in dust, and other remnants and products of star-formation processes. Astronomers are now planning for further explorations of infrared emitters with a Space Infrared Telescope Facility (SIRTF), an orbiting observatory to be positioned 700 to 900 kilometers above Earth, containing a high-resolution camera, an imaging photometer, and a spectrograph. This facility would provide yet another qualitative and quantitative gain in detection sensitivity. Rieke *et al.* discuss how SIRTF analyses are expected to yield information about some of the primordial materials of the solar system and distant galaxies, contributing to an understanding of the mysteries of cosmic energy, the creation of galaxies, planets, and stars, and the origin of life.

Ubiquitin

HIGHLY conserved in evolution and found inside all eukaryotic cells, ubiquitin, a protein of 76 amino acids, has now been found on lymphocytic cell surfaces; it may contribute to the ability of the lymphocyte to recognize, adhere to, and then migrate through high endothelial venules (HEV) to organs of the immune system (pages 823 and 845). The traffic patterns of lymphocytes are specific: those of the peripheral lymphoid system home preferentially to peripheral lymphoid organs and those of the gut-associated lymphoid system home preferentially to gut-associated organs. Sie-

gelman *et al.* and St. John *et al.* provide new details about the structure of ubiquitin and the genes from which it is produced as well as the relation of ubiquitin to cell surface molecules responsible for the lymphocyte-HEV attachment. Ubiquitination of surface molecules may not be specific to the lymphocyte surface; ubiquitin may associate with a range of surface molecules, perhaps to stabilize surface interactions or to tag surface molecules for internalization and degradation after homing or other processes have been accomplished. In a Research News article, Marx reports on these and other recent developments in ubiquitin research (page 796).

Protein diets and urinary cancer

THE protein-rich diets preferred by people in western countries contain amino acids that may promote bladder cancer (page 843). Results of a short-term (4-week) culture assay developed by Nishio *et al.* proved to be predictive of the long-term (40 to 60 weeks) likelihood that bladder tumors would develop in rats fed diets supplemented with possible carcinogens. The assay measured whether, in the presence of test substances, precancerous bladder cells continued to agglutinate (as they do when exposed to known cancer-promoting agents). Of 21 amino acids tested, L-isoleucine and L-leucine sustained the clumping in culture; these amino acids subsequently promoted the development of bladder cancer or precancerous lesions in the rats. High protein consumption may, through component amino acids, be causally associated with a high incidence of bladder cancer.

AIDS pathogenesis

How long it takes for the AIDS virus to produce overt disease in an infected individual may depend on the extent of unrelated immune stimulation that is occurring coincidentally (page 850). Cells of the

immune system, including the T4 lymphocytes that harbor the AIDS virus, differentiate and divide when activated by foreign antigens and mitogens. Upon activation, cells infected with the AIDS virus secrete the immune mediator interleukin-2, produce and release viruses that can then infect other cells, and die. Zagury *et al.* found that, when activated, fresh T cells from AIDS patients, AIDS patients' T cells grown for 60 days in culture, and normal T cells infected experimentally with the virus all showed the same sequence of secretion, viral production, and death. A similar sequence of events may occur in cells in the body: individuals infected with the AIDS virus and concurrently exposed to other infectious agents or foreign materials in semen or blood would acquire a full-blown immune deficiency syndrome when hyperstimulation has ended, T-cell depletion has occurred, and other changes in immune functioning have developed.

Varnish dwells after dwellers vanish

VARNISH on rocks in California's Mojave desert suggests that people may have lived there 15,000 years ago (page 830). Rock varnish is a slowly forming layer, usually less than 100 μm thick, of clay minerals, manganese and iron oxides, and trace elements. Rocks that have been carved, quarried, or in other ways worked by humans will be coated with varnish only after such use; thus, by dating the varnish, a minimum age for the post-use period can be determined. Dorn *et al.* dated rock varnish by cation-ratio dating, in which three elements that leach at different rates from rock varnish are measured, and by radiocarbon dating using a tandem accelerator mass spectrometer. The varnish layer closest to the rock surface was analyzed at each site studied and provided a date for the earliest post-use period. The techniques hold promise for determining minimum ages of landforms and artifacts composed of materials that are not, themselves, directly suitable for dating.

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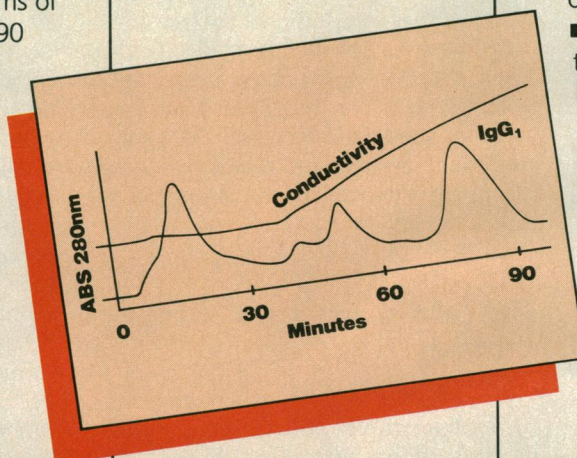
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Increasing Productivity and Efficiency in Agriculture

Efforts to enhance agricultural productivity have two major objectives. One is to generate income growth for the producers of agricultural commodities. Another is to make agricultural commodities available to consumers on increasingly more favorable terms.

These two goals have at times appeared to be inconsistent or in conflict. During periods when the growth of productivity has lagged behind the growth of demand, the commodity component of food costs has risen. During periods when demand for agricultural commodities has stagnated, commodity prices have sometimes declined more rapidly than production costs. Yet during most of the last half century both consumers and producers have shared in the economic dividends generated by productivity growth. Consumers in the United States have access to food on more favorable terms than at any time in the past. And most farm families today enjoy a level of living that was not available to earlier generations.

This is not to imply that all is well in rural America or in the nation's agricultural research system. During the last 5 years a global recession and the rising value of the dollar have dampened the demand for U.S. farm commodities abroad and high interest rates have imposed severe financial burdens on farmers and their suppliers. These have combined to force severe deflation in land values and a financial crisis for many farmers.

These difficulties have prompted some critics to suggest a moratorium on agricultural research and technology development. Such a moratorium, it is suggested, would result in slower growth in agricultural production and permit domestic and international markets to absorb surplus production capacity at no real cost to consumers or producers.

Such reasoning is seriously flawed. The capacity of American agriculture to expand its foreign markets and retain its domestic markets depends on continued declines in the real costs of production. American agriculture has achieved its preeminence in the world by substituting knowledge for resources. This knowledge, embodied in more productive biological, chemical, and mechanical technologies and in the managerial skills of farm operators, has given the United States a world-class agricultural industry at a time when many other sectors of our economy are losing their preeminent position. A necessary condition for U.S. agriculture to retain its status is enhancement of both public and private sector capacity for scientific research and technology development. The costs, to both consumers and producers, of failure to maintain and enhance our efficiency in production would greatly exceed the adjustment costs resulting from abundance.

It is important for both producers and consumers that the agricultural research mission not be too narrowly defined. Research should provide farmers and policy-makers with the knowledge needed to adjust to the changes driven by national and international economic forces. Research should also be directed to the design of more efficient institutions to protect both our production capacity and the income of farm people from the costs resulting from the integration of U.S. agriculture into world markets. Society should also insist that agricultural research be concerned with the effects of agricultural technology on the health and safety of agricultural producers, with the nutrition and health of consumers, with the impact of agricultural practices on the esthetic qualities of natural and modified environments, and with the quality of life in rural communities.

New sources of productivity will be needed if U.S. agriculture is to maintain its preeminence. From 1955 to 1965, increased levels of fertilizer accounted for a yield gain of two bushels of corn per year. By the early 1980's, higher levels of fertilizer use were accounting for less than half a bushel per year yield increase. The gains in productivity growth that can be expected from traditional sources will be inadequate to meet even the relatively slow growth in demand for U.S. agricultural commodities that is now anticipated over the next several decades. During the last half century U.S. agriculture has experienced rapid gains in both output per worker and output per hectare. New sources of productivity growth consistent with changing resource endowments and the dramatic growth of scientific opportunity must be sought.—VERNON W. RUTTAN, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul 55108

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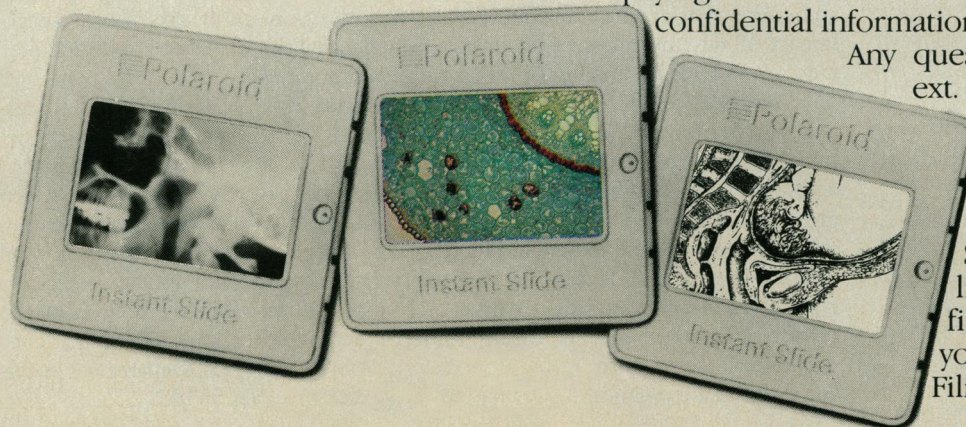
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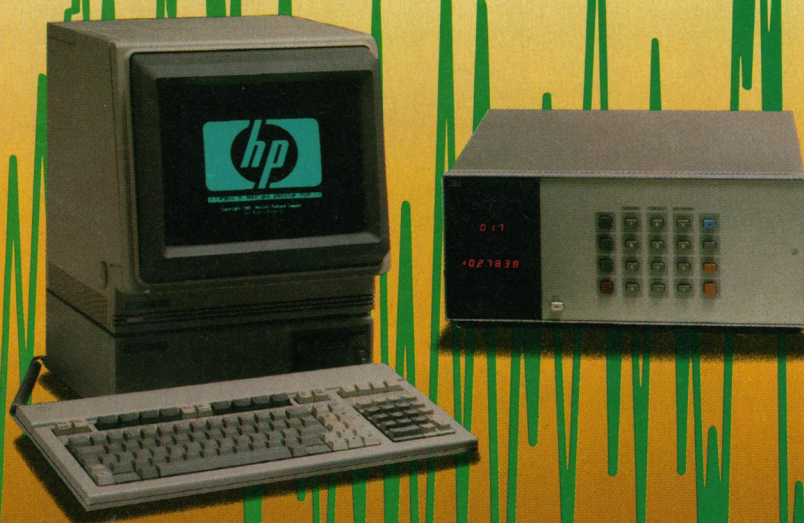
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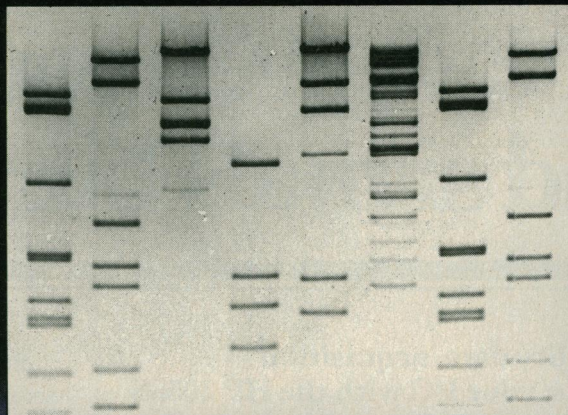
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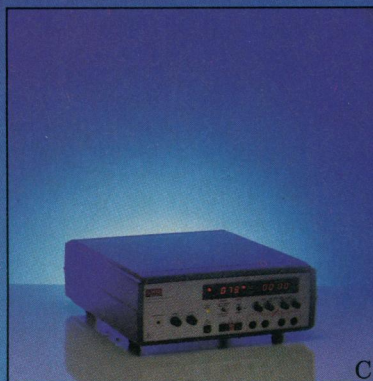


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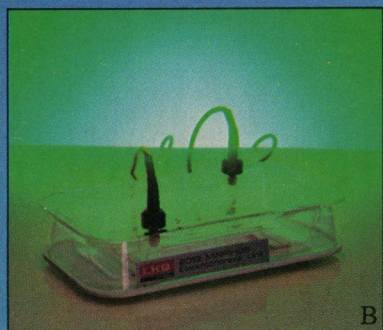
Wedge-shaped



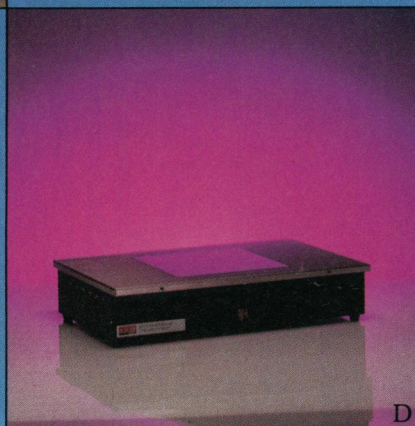
A



C



B

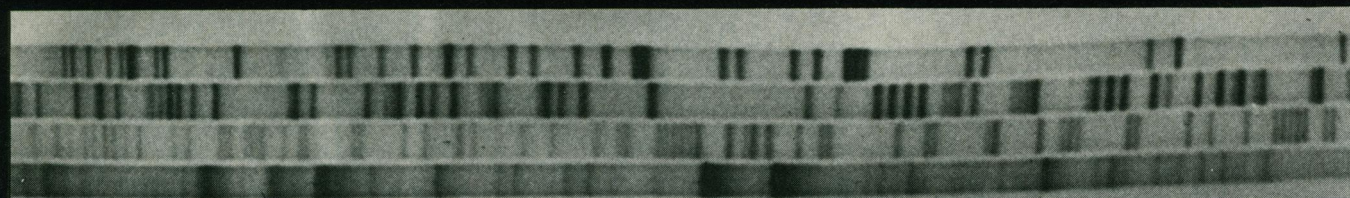


D

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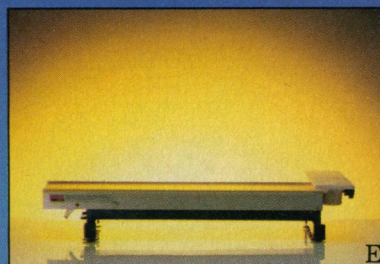


Working in DNA/RNA electrophoresis with gradient gels

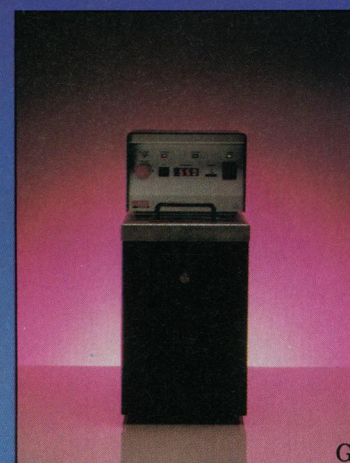
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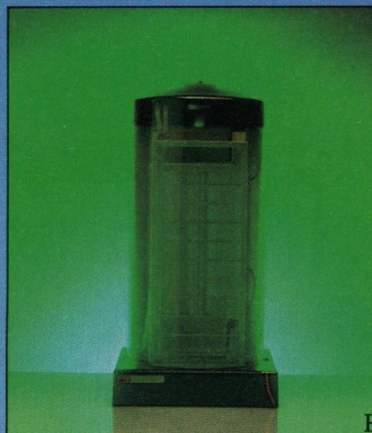
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E



G



F



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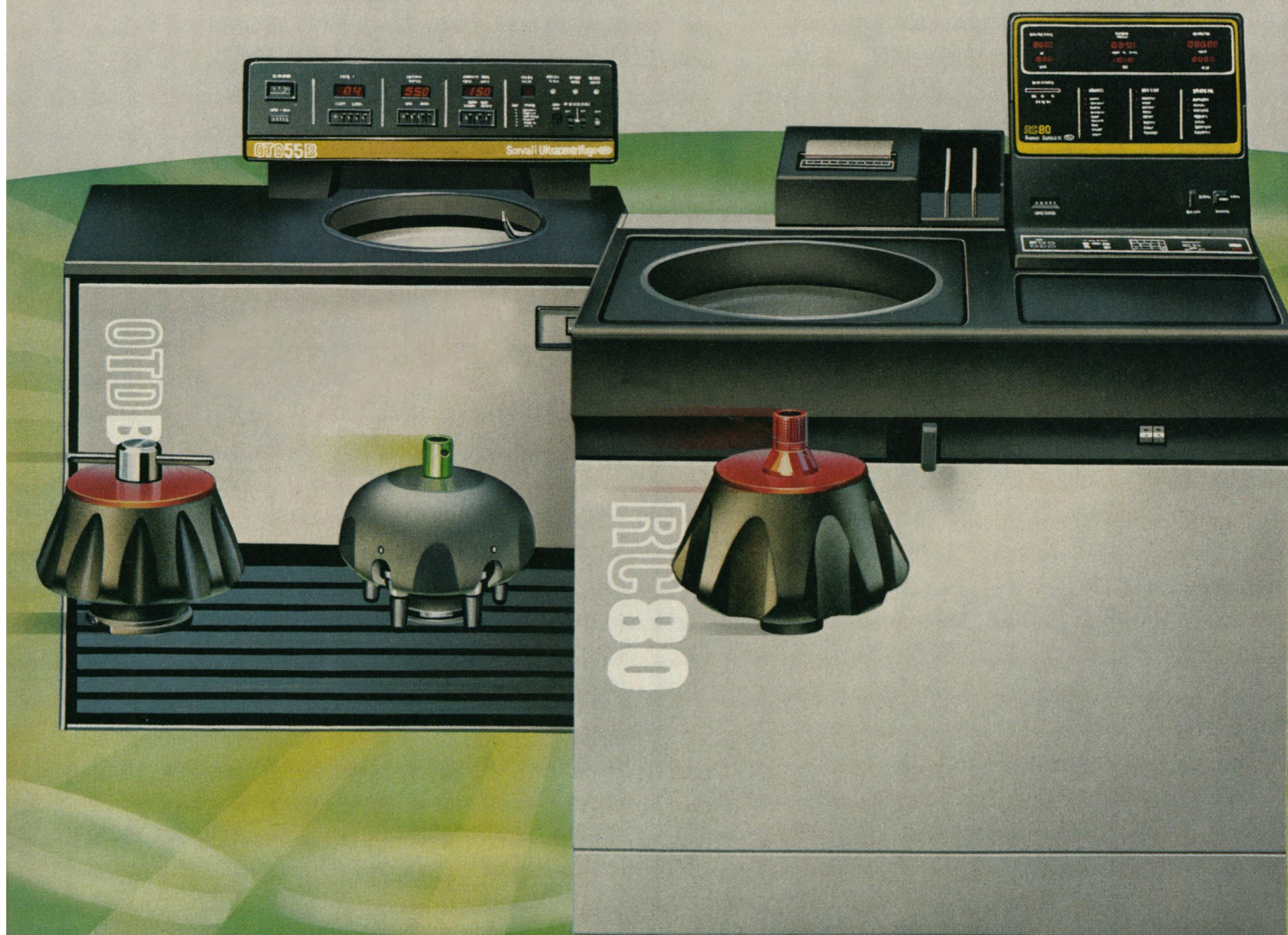
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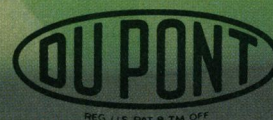
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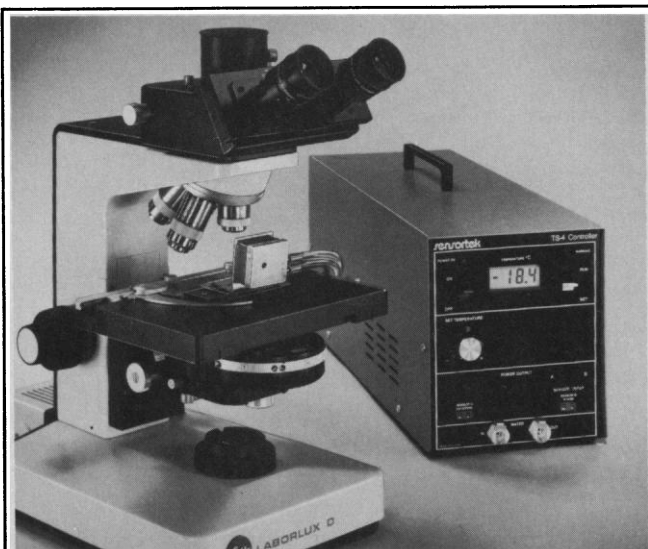
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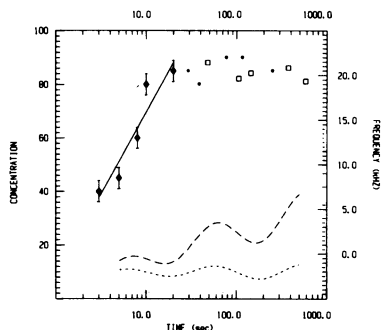
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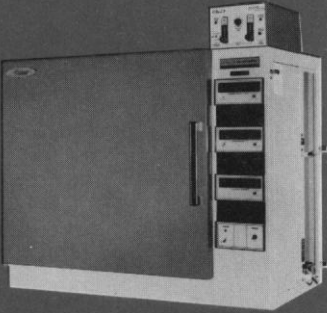
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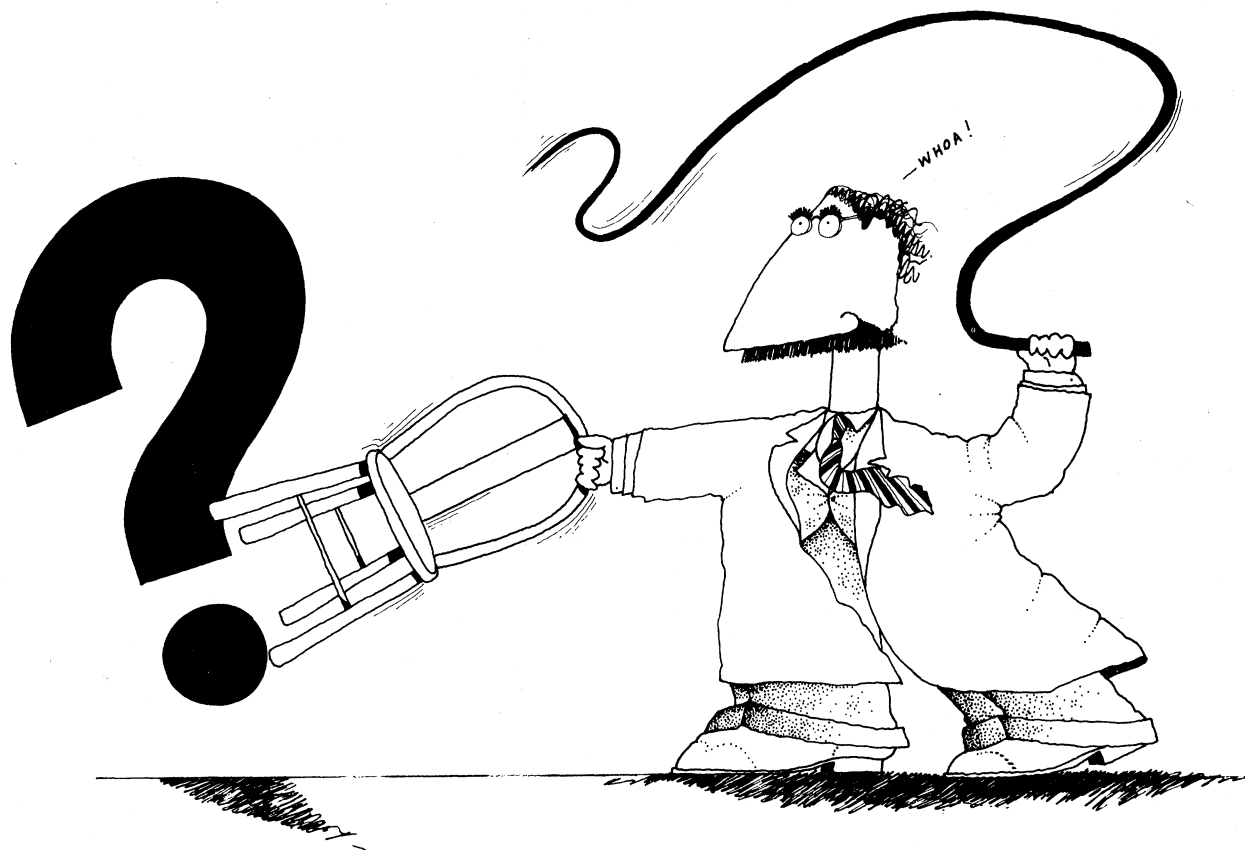
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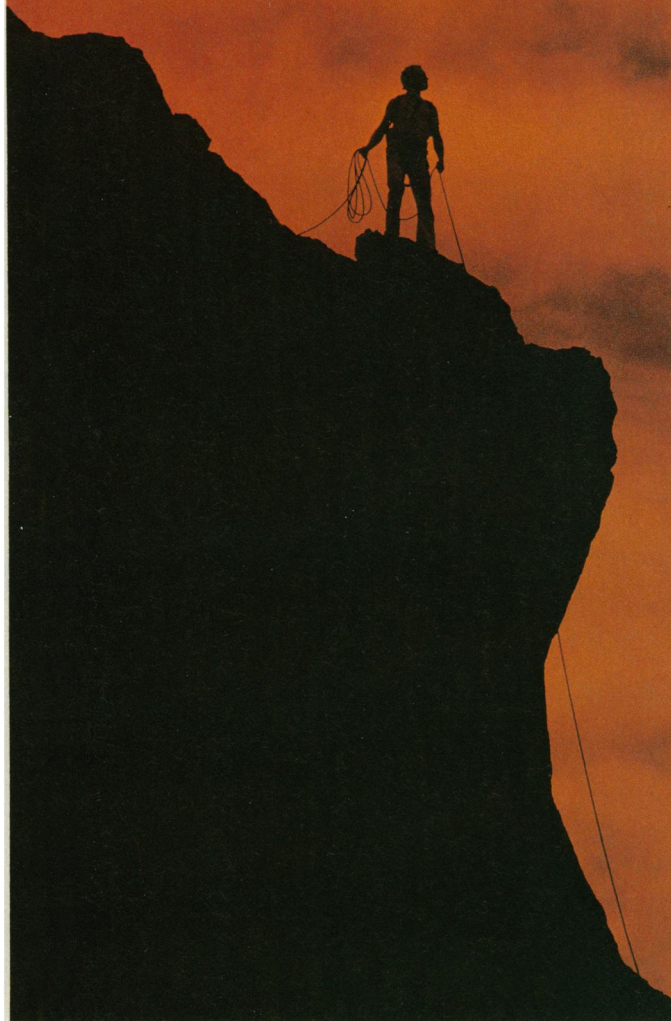
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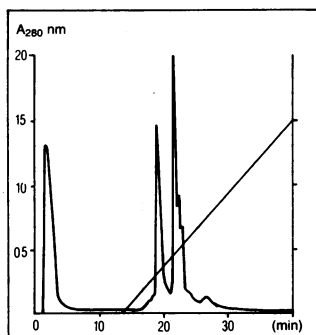
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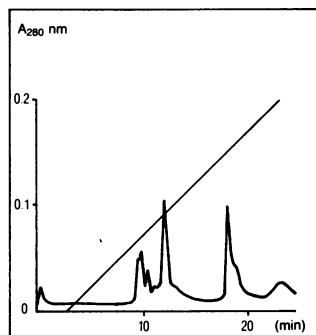
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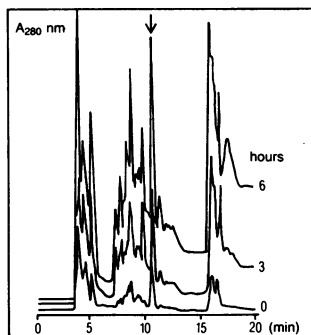
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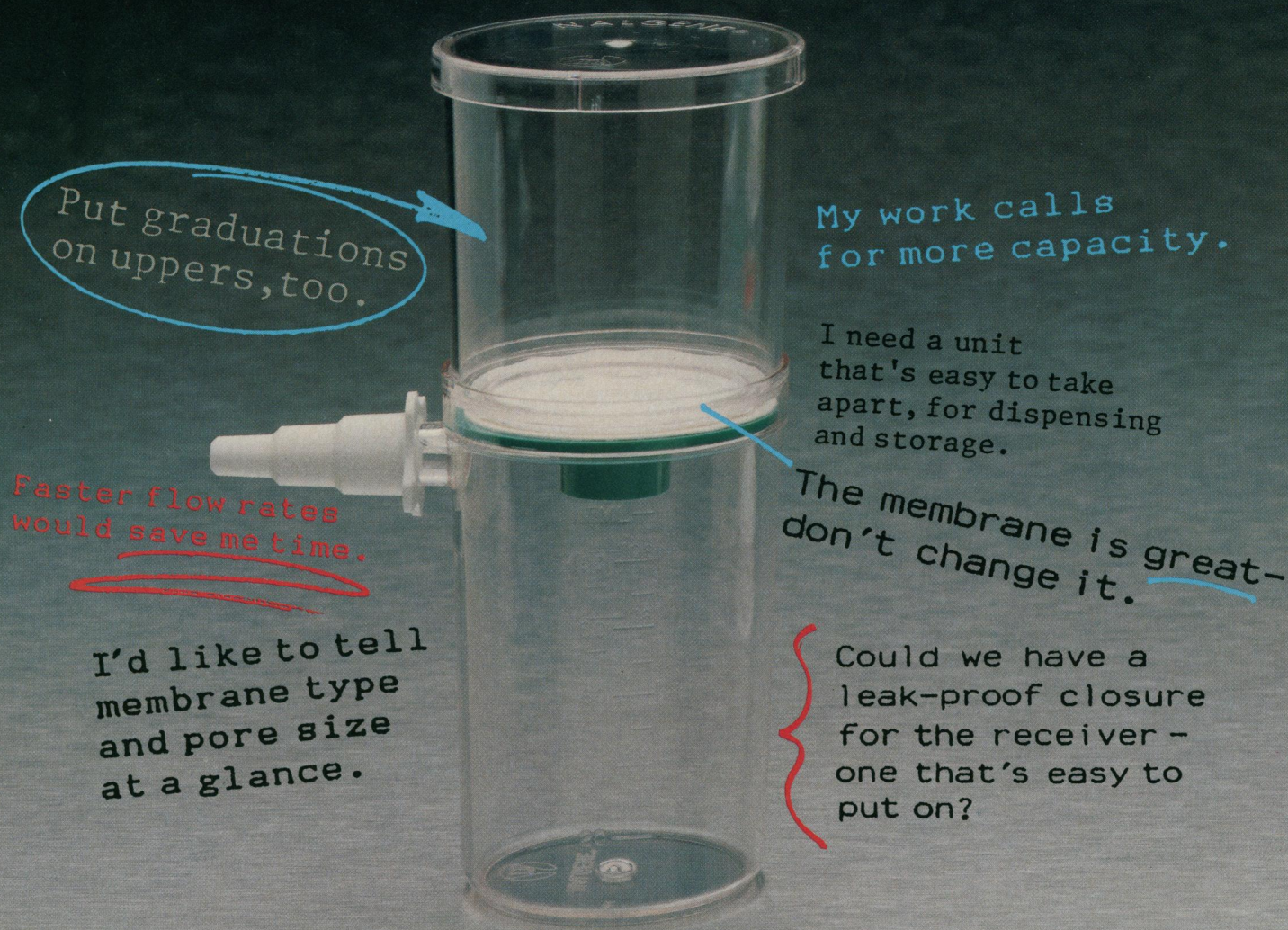
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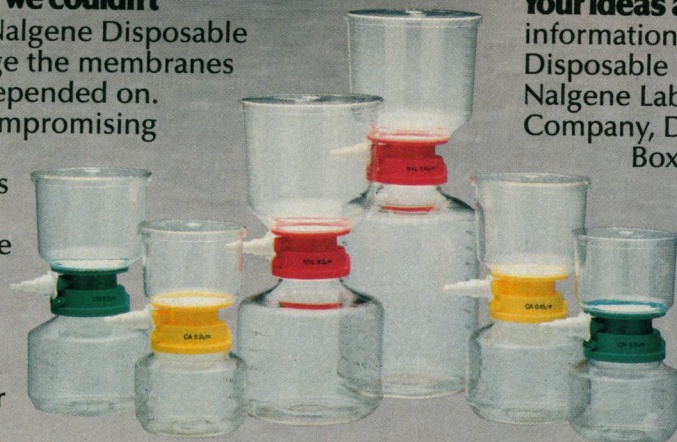
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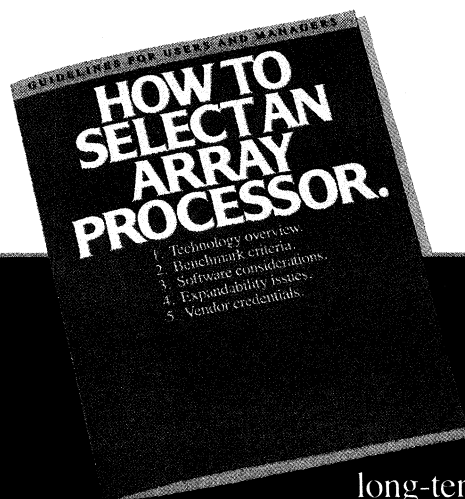


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	FPS 5430	11.48 sec	32.6	Three coprocessors

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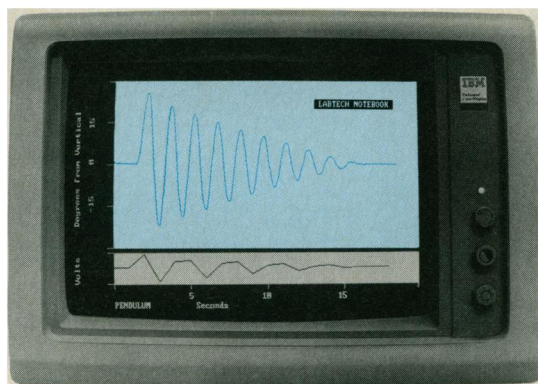
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Call for Symposium Proposals

Chicago Meeting • 14–19 February 1987

AAAS members are invited to submit symposium proposals for the next Annual Meeting in Chicago, 14–19 February 1987. Please complete the form below, attach a "Synopsis of Objectives" (about 200 words), and send it to us **not later than 15 April 1986**.

We are particularly interested in symposia dealing with the latest developments in science and technology, and the implications of these developments for society. Coordinated contributed paper sessions are also welcome; inquire for details with this submission.

All symposium proposals are subject to review. If the information submitted is inadequate for reviewing, the proposal will be returned. Endorsement (sponsorship) by a AAAS Section Committee expedites the review process. It is therefore in the interest of the proposer to send a *copy* of the proposal to the appropriate Section Secretary (see "AAAS News" section in *Science* for names) for endorsement at the

same time the original is sent to the AAAS Meetings Office.

Speakers should *not* be confirmed at this time; however, sufficient information about probable speakers and their topics should be provided to allow for evaluation of the proposal. Please note that AAAS does not pay honoraria to speakers.

Some Deadlines

June: You will be notified about acceptance, conditional acceptance, or nonacceptance of your proposal. Further information will be provided at that time.

July: Preliminary programs with confirmed speakers are due.

October: Final program copy, suitable for publication, is due.

AAAS ANNUAL MEETING Chicago 14–19 February 1987	PROPOSED SYMPOSIUM Submit not later than 15 April 1986	Return this form to: AAAS Meetings Office 1333 H Street, NW Washington, DC 20005 Telephone: (202) 326-6450
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PRINCIPAL ORGANIZER (who will receive correspondence):

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NAME _____ AFFILIATION _____

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TITLE OF SYMPOSIUM _____

SPONSORSHIP (AAAS Section, Office, or Affiliate **only**) _____ No. of 3-hr. Sessions _____

Presider _____ Affiliation _____ 1. Speaker _____ Affiliation _____ Topic _____ 2. Speaker _____ Affiliation _____ Topic _____	3. Speaker _____ Affiliation _____ Topic _____ 4. Speaker _____ Affiliation _____ Topic _____ 5. Speaker _____ Affiliation _____ Topic _____
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**PLEASE ATTACH SYNOPSIS OF OBJECTIVES OF
PROPOSED SYMPOSIUM (APPROXIMATELY 200 WORDS).**

R&D and the Budget Crisis

Eleventh Annual AAAS Colloquium on R&D Policy

26 & 27 March 1986

Capital Hilton ♦ Washington, DC

- ♦ Discussion will be based on *AAAS Report XI: Research and Development, FY 1987*, a timely and comprehensive analysis of the proposals for R&D in the FY 1987 budget, prepared by AAAS and a group of its affiliated scientific, engineering, and higher education associations. Registrants will also receive *Proceedings* following the Colloquium and *Congressional Action on R&D in the FY 1987 Budget* in the fall.
- ♦ Trends and prospects for R&D in defense, energy, health, space, and other areas will be explored by leaders from industry, universities, agencies of the federal government, Congress, the White House, and the scientific and engineering communities.
- ♦ Perspectives will be provided on topics such as impacts of deficit-cutting legislation on R&D, responses by the scientific-technical community, public and private roles in research, and strategies for government-industry cooperation.

**For further details, write: AAAS R&D Colloquium, Public Sector Programs,
1333 H Street, NW, Washington, DC 20005**

**Sponsored by the AAAS Committee on Science,
Engineering, and Public Policy**

American Association for the Advancement of Science

Eleventh Annual AAAS Colloquium on R&D Policy ♦ 26-27 March

R&D and the Budget Crisis

Preliminary Program

Wednesday, 26 March

8:00 am Registration

8:45 am Welcome

David A. Hamburg, *Chairman, Board of Directors, AAAS, and President, Carnegie Corporation of New York*

Overview of R&D in the FY 1987 Budget

Willis H. Shapley, *Consultant, AAAS R&D Budget Project*; Stephen D. Nelson, *Manager, Science Policy Studies, AAAS*

9:30 am Budgetary and Policy Context for R&D in FY 1987

Administration proposals for R&D, Gramm-Rudman-Hollings Act, overall budget and economic context, R&D community perspectives

Moderator: J. Thomas Ratchford, *Associate Executive Officer, AAAS*

Speakers: Edwin L. Dale, Jr., *Assistant Director, Public Affairs, Office of Management and Budget*; John P. McTague, *Acting Director, Office of Science and Technology Policy, Executive Office of the President*; Frank Press, *President, National Academy of Sciences*

12:30 pm Lunch (speaker to be announced)

2:15 pm Impacts of Federal Budgetary Cutbacks

Universities, industrial R&D, federal R&D laboratories

Speakers: Alan Schriesheim, *Director, Argonne National Laboratory*; Charles F. Cook, *Vice President of R&D, Phillips Petroleum*

4:30 pm Agency Perspectives on R&D in the FY 1987 Budget

Simultaneous small group sessions, highlights of major agency R&D budgets, congressional reactions, questions and discussion

Department of Defense: Leo Young, *Director, Research and Laboratory Management, Office of the Deputy Undersecretary of Defense for Research and Engineering*

Department of Energy: Joel A. Snow, *Director, Science and Technology Affairs, Office of Energy Research, DOE*

National Aeronautics and Space Administration: Frank B. McDonald, *Chief Scientist, NASA*

National Institutes of Health: Norman Mansfield, *Director, Division of Financial Management, NIH*

National Science Foundation: Sandra D. Toye, *Controller, NSF*

Environmental Protection Agency: Speaker to be announced

6:00 pm Reception

Thursday, 27 March

7:45 am Breakfast (speaker to be announced)

9:00 am R&D Community Responses to the Budgetary Situation: Charting a Course for the Stormy Future

Universities, engineering, private sector, overview

Panel: Robert Rosenzweig, *President, Association of American Universities*; Lewis Branscomb, *Vice President and Chief Scientist, IBM Corporation*; Don I. Phillips, *Executive Director, Government-University-Industry Research Roundtable, National Academy of Sciences*; Alvin W. Trivelpiece, *Director, Office of Energy Research, DOE*; John A. White, *Chairman, American Association of Engineering Societies*

12:45 pm Lunch

Presiding: Lawrence Bogorad, *President-Elect, AAAS*; Maria Moores Cabot, *Professor of Biology, Harvard University*

Speaker: Pat Choate, *Director, Office of Policy Analysis*

Concluding Remarks: William D. Carey, *Executive Officer, AAAS*

2:30 pm Adjournment

See reverse for registration form

**11th AAAS R&D Colloquium
Washington, D.C.
26-27 March 1986**

**ADVANCE
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FORM**

S3

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\$125 Partial (publications only) _____

\$ 60 Student (publications only) _____

SEPARATE MEAL TICKETS

\$ 20 Lunch, Wednesday (26 Mar.) _____

\$ 7 Breakfast, Thursday (27 Mar.) _____

\$ 20 Lunch, Thursday (27 Mar.) _____

TOTAL AMOUNT: \$ _____

Packets will be mailed to preregistrants on about 12 March; registrations received after 12 March will be held at the AAAS Registration Desk in the Capital Hilton. **Refund Policy:** Advance registration fees and meal tickets will be refunded for cancellations received by 24 March; no refunds will be made on cancellations received after this date.

Registration fees include all sessions and publications; meals are included only with payment of full registration fee. All registrants receive *AAAS Report XI: Research and Development, FY 1987* before or at the Colloquium, published *Proceedings* after the meeting, and a supplementary report, *Congressional Action on R&D in the FY 1987 Budget*, in the fall.

Mail registration form to: AAAS Meetings, R&D Forum Registration, 1333 H Street, N.W., Washington, D.C. 20005

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