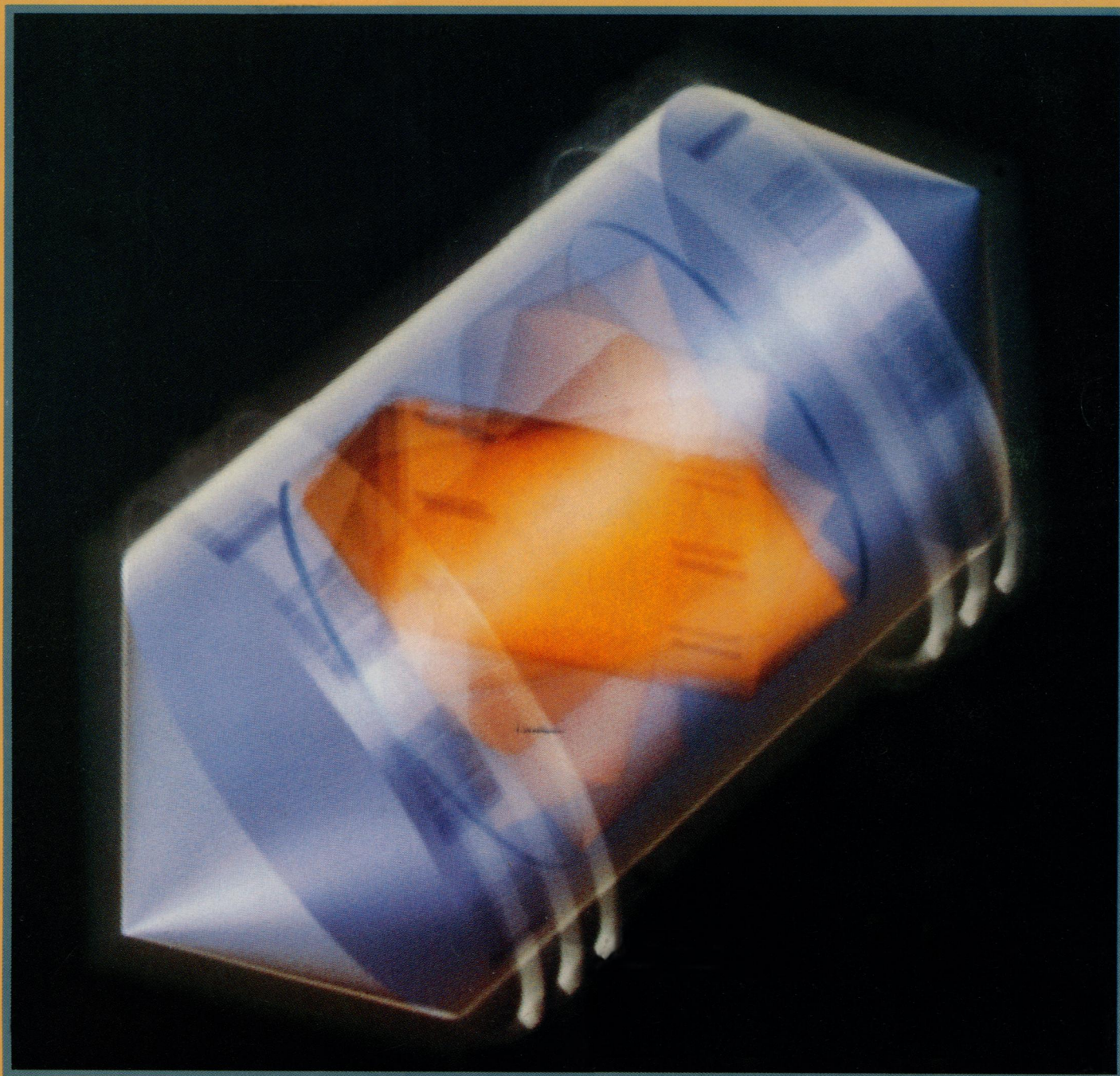


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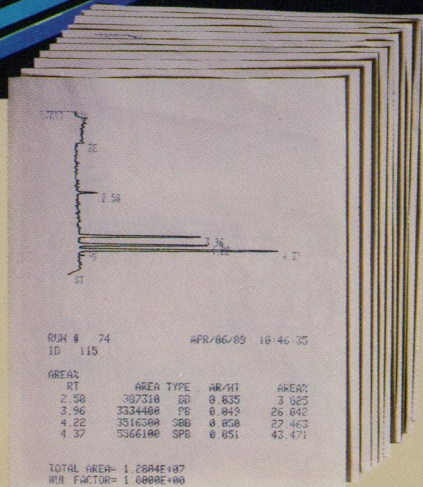
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**COVER** Motions involved in double rotation, a means to obtain sharp nuclear magnetic resonance (NMR) spectra for quadrupolar nuclei in solid materials. The sample is contained in the inner (orange) cylinder, which rotates  $\sim 7000$  times per second around an axis inclined at  $30.6^\circ$  to the axis of the outer (blue) cylinder. The outer cylinder, which has a diameter of  $\sim 1$  centimeter, rotates  $\sim 1000$  times per second around an axis inclined at  $54.7^\circ$  to the magnetic field. See page 71. [Computer-generated image courtesy of Lawrence Berkeley Laboratory]

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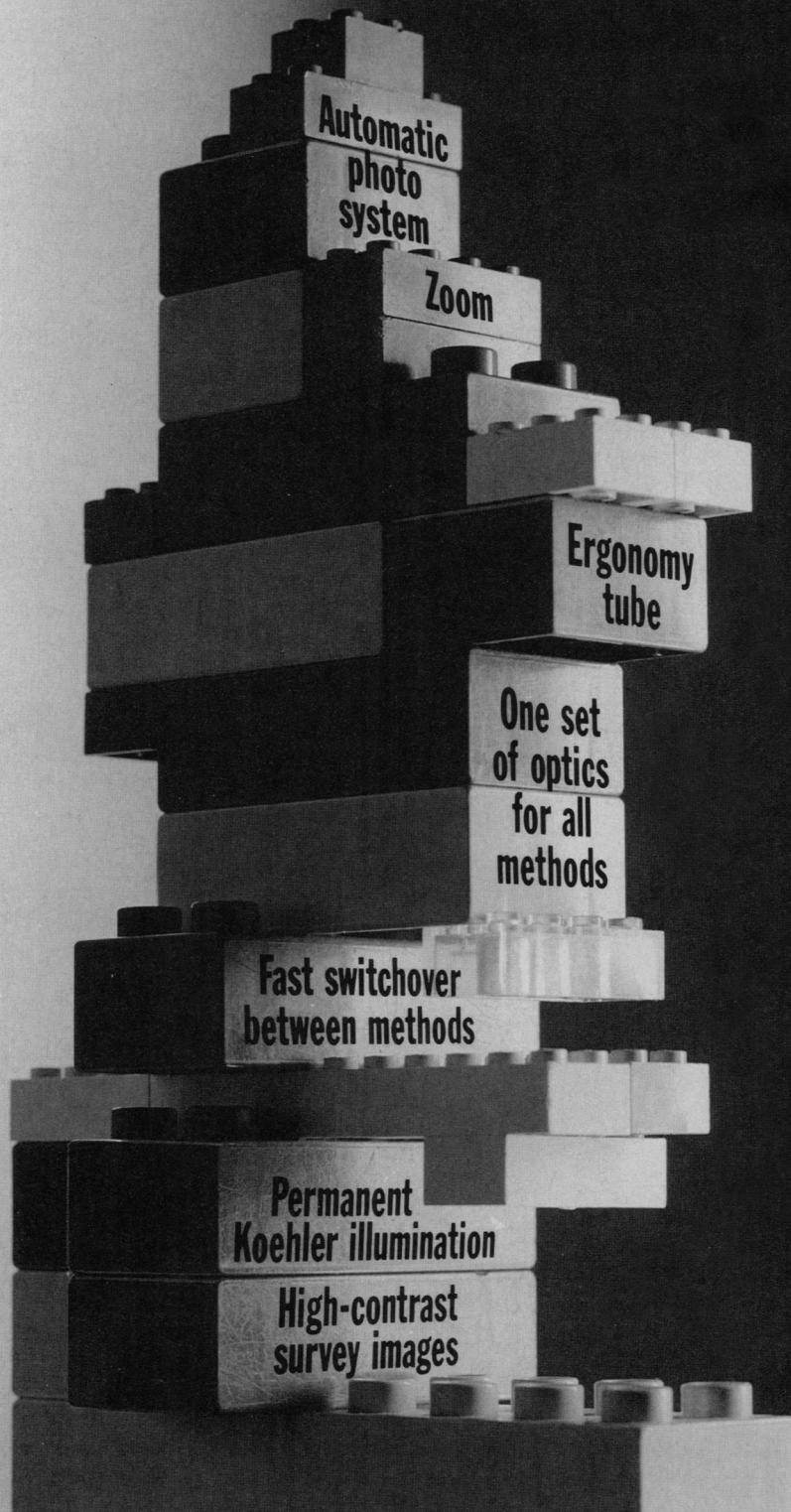
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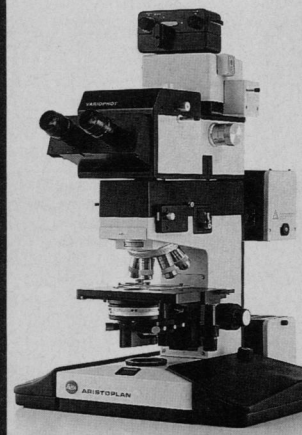
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## This Week in SCIENCE

### Instrumentation

FOR the past 40 years, *Science* has devoted one October issue to new developments in analytical instruments. The editorial and four articles this week describe some of this year's technologic advances that are making chemical and structural studies of cells, large biomolecules, and small molecular species more detailed and accurate (pages 9, 51, 57, 64, and 71).

### Nanolithography

THE sharp tip of the scanner of a scanning tunneling microscope, an instrument that is being used increasingly for explorations of surface topography at atomic scale, has been used for drawing lines and punching holes in the surface of a crystal (page 99). If lasting patterns can be drawn accurately on such surfaces, this technique may facilitate the creation of tiny (nanometer-sized) electronic devices. Garfunkel *et al.* speculate that the modifications to the surface of the conducting oxide—a single crystal of the “blue bronze”  $\text{Rb}_{0.3}\text{MoO}_3$ —are brought about by atomic scale abrasions. The early results suggest that the patterns on this oxide are stabler than those that have been etched into other materials such as metals and insulators.

### Linked volcanic events

HOT plumes of material rising from deep within the earth's mantle are thought to have a shape that consists of a large spherical head and a long narrow tail. When the head reaches the earth's lithosphere, a large mass of magma can quickly form. Eruption of this magma may result in an accumulation of basaltic lavas, called a flood basalt; continuing magmatism associated with the tail of the plume may maintain a “hot spot” from which magma erupts more slowly, perhaps for hundreds of millions of years. (As crustal plate moves over the tail, chains of volcanic islands, like Hawaii, are generated.) This is the model proposed by

Richards *et al.* to account for the association of some of the largest of the continental flood basalts with known hot spots (page 103). Model predictions of plume migration through the mantle correlate with volumes and eruption rates of large flood basalts (proxies for the size of the plume head) and related hot spots. Large volcanic plateaus under the oceans may be the marine equivalents of the continental flood basalts, which also could have formed when the hot mantle plumes first erupted.

### Foiling fungi

THE fungus *Lagenidium callinectes* is a formidable pathogen for many different crustaceans. Although its victims include the juvenile and larval forms of the shrimp *Palaemon macrodactylus*, the embryos of such shrimp are remarkably resistant to fungal infections. Symbiotic bacteria (*Alteromonas* species), which live at the surfaces of the externally brooding embryos, provide protection against fungi by secreting an antifungal substance called isatin (page 116). Gil-Turnes *et al.* show that when bacteria and isatin are stripped away, the embryos die of fungus infections; the embryos can, however, be protected if they are exposed to isatin solutions or reexposed to isatin-producing bacteria. The importance of isatin is at least twofold: not only does it preserve the host (a benefit for host and bacteria alike) but it also limits competition at the surface from other pathogens. Surface-associated bacteria such as these may provide chemical protection from dangerous pathogens in the water for a range of aquatic plants and animals.

### Defining specificity

AMONG the cells of the immune system that react with viruses are cytotoxic T cells (CTLs). When CTLs encounter AIDS viruses, they react against the virus if receptors on CTLs recognize distinctive peptides of the viral envelope presented in an appropriate context. Takahashi *et al.* have

identified a single amino acid in peptides of the AIDS virus envelope protein that can determine which CTLs will react with which peptide (page 118). Two similar peptides, with sequences corresponding to residues 315 to 329 of envelope proteins, were synthesized; each had 15 amino acids, 9 of which were identical. Each peptide showed exclusive reactivity with one population of CTLs. When the amino acid at position 325—which was a valine in one peptide and a tyrosine in the other—was shifted from valine to tyrosine or vice versa, the peptides no longer reacted with their specific CTLs but reacted with those of the other peptide. Thus, although this was not the only difference between the two peptides, amino acid 325 was central to the peptide's specificity. If, through alteration of a single amino acid, a virus can, in vivo, shift its immune specificity, an explanation may be at hand for how some viruses continue for long periods to evade host immune defenses.

### Simulation software

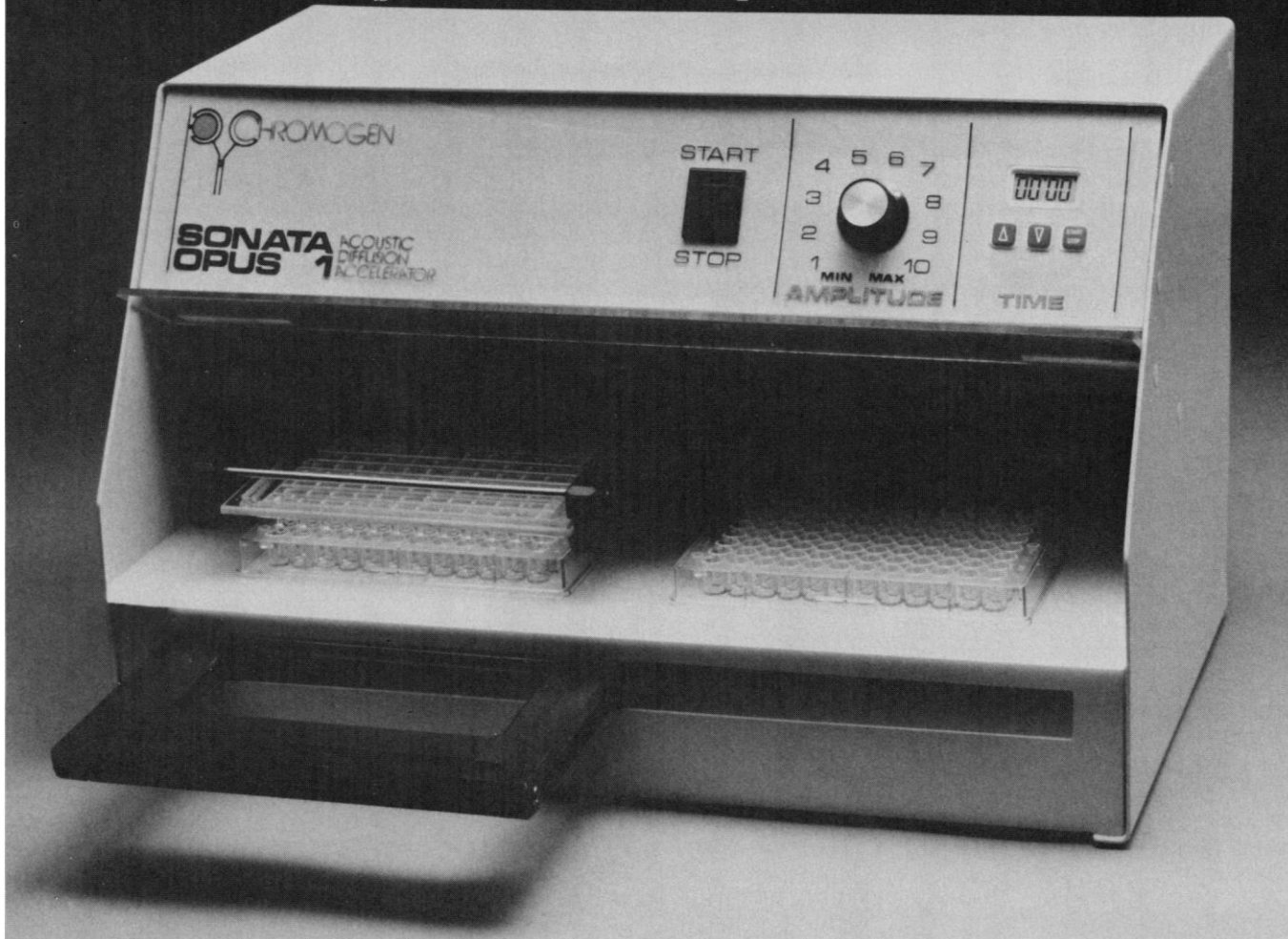
TWO software packages for simulations are available for Macintosh computers; their features, differences, strengths, and shortcomings are described by Bogen (page 138). One package, called STELLA, is most useful for processes that have steps that can be compartmentalized; the other, Extend, uses block diagrams connected with input and output arrows to conceptualize systems. These packages can be used for depicting such processes as how sexually transmitted diseases spread from infected to uninfected individuals in a population, how drugs enter the body, move through the gastrointestinal tract, the blood, and the kidneys, and later are excreted, and how biological oscillators may interact to control respiration, circadian rhythms, or the beating of the heart. Through the use of diagrams rather than hard-to-follow and hard-to-alter equations, both packages greatly simplify the procedures for developing, varying, and running models of the dynamical aspects of complex systems.

■ RUTH LEVY GUYER



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Low Pos Control	0.252	0.595	0.027	0.013
Low Pos Dil 1:5	0.055	0.193	0.003	0.004
High Pos Control	0.551	1.276	0.008	0.030
High Pos Dil 1:5	0.172	0.549	0.004	0.045

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## Analytical Instrumentation and Measurements

Improvements in analytical instruments and methods continue to expand opportunities for research in many areas of the biological and physical sciences. Some of these advances are described in four articles in the current issue of *Science*.

Gas, liquid, and supercritical fluid chromatography as a group constitute some of the most broadly applicable analytical tools available to the natural sciences. In this issue Novotny surveys recent developments that have increased their usefulness. In gas chromatography, open tubular columns have replaced packed columns, leading to shortened time of analysis and less contamination from packing. Advances have been made in treating the stationary surfaces of the columns with highly selective phases, including chiral substances. Thermal stability has been improved dramatically. Natural petroporphyrins have been separated at column temperatures as high as 420°C. Many interesting advances have been made in detection technology.

Applications of supercritical fluid chromatography continue to increase. The less dense fluids (usually CO<sub>2</sub> or N<sub>2</sub>O) permit faster solute diffusion than do liquids. They make possible improved separations of substances that are insufficiently stable or volatile for gas chromatography or are difficult to detect by liquid chromatography. Compounds in excess of 10,000 daltons can be separated and then quantified by flame detectors. Major applications include heavy constituents of fossil fuels, synthetic oligomeric mixtures, polymer additives, food products, and agricultural chemicals.

Kennedy and colleagues in Jorgenson's laboratory describe efforts aimed at exploiting the sensitivity and separative powers that can be achieved by open tubular liquid chromatography (OTLC) and by capillary electrophoresis. The theory of OTLC predicts that a column with an inside diameter of 2 micrometers would generate 1 million theoretical plates with an analysis time of less than an hour. More than 1 million theoretical plates have been achieved in the separation of proteins using capillary zone electrophoresis. Typical injection volumes are on the order of picoliters to nanoliters. The authors point out that the major challenge is quantitating the results of such separations. Detectors are required to be sensitive to femtomole and attomole amounts of analyte. They have successfully made use of electrochemical detectors and laser-induced fluorescence. The resultant capabilities have been applied to analysis of single neurons of the land snail *Helix aspersa*. They were able to obtain semiquantitative values for 17 of the free amino acids in a single cell.

Fenn and colleagues discuss means of achieving multiple ionization of large molecules without fragmenting them. They mention achieving intact ions with 20 or more charges. This permits easier analysis in mass spectrometers. For example, an ionized protein of molecular weight 30,000 could have a mass-to-charge ratio of 1,500. In practice they obtain a coherent series of peaks differing by a unit of charge. Spectra have also been obtained for oligonucleotides. In the electrospray system a sample solution 1 to 20 microliters in volume enters a chamber through a needle maintained at a few kilovolts. The emerging liquid is charged, and this causes droplet dispersion due to Coulomb repulsion. Evaporation of the solvent leads to a further explosion of droplets and ultimately to a field at the surface of the droplets sufficient to desorb ions.

Chmelka and Pines review some of the many developments in the nuclear magnetic resonance (NMR) of solids. In the past the NMR of solids lagged far behind that of liquids. In liquids, high resolution with narrow lines is attained, owing to the rapid isotropic nature of molecular motion. In solids many of the deleterious effects due to the lack of rapid isotropic motion can be minimized by magic-angle spinning of samples. A key improvement is the use of double rotation of the solid materials simultaneously about axes inclined at two magic angles. This technology, which has been demonstrated for oxygen-17 in silicates, makes it possible to obtain spectra of improved resolution from nearly all NMR-active nuclei of the periodic table. In many cases enriched rare isotopes would be used.

The authors provide numerous examples of insights that have been obtained in the study of solids. For example, recent NMR experiments have probed solids and adsorbed molecules in the millikelvin range and at 1500 K. The high-temperature studies have provided information about structure and motion in magmas.—PHILIP H. ABELSON



# ANNOUNCING THE DAWN OF A NEW ERA IN LABORATORY ANIMAL IDENTIFICATION

Simplicity itself: a programmable stand-alone system that doesn't require a computer hookup and uses *your* animal identification number.

## Background

Some two years ago Bio Medic Data Systems revolutionized laboratory animal identification by introducing an implantable micro-identification device with an encoded number. An interrogation system activates the implantable chip which then transmits its number. In effect: a truly foolproof system akin to adding a unique electronic "universal product code" to each animal.

## What are the Benefits?

This simple system obsoletes the traditional ear punching or tagging, toe clipping, and tail tattooing. As such, the age-old labor intensive techniques—in terms of the initial identification, the subsequent reading, and the inevitable re-dos—are replaced by a simple, easy, humane and remarkably efficient system. (A dramatic example: 200 animals can be identified in about 45 minutes.)

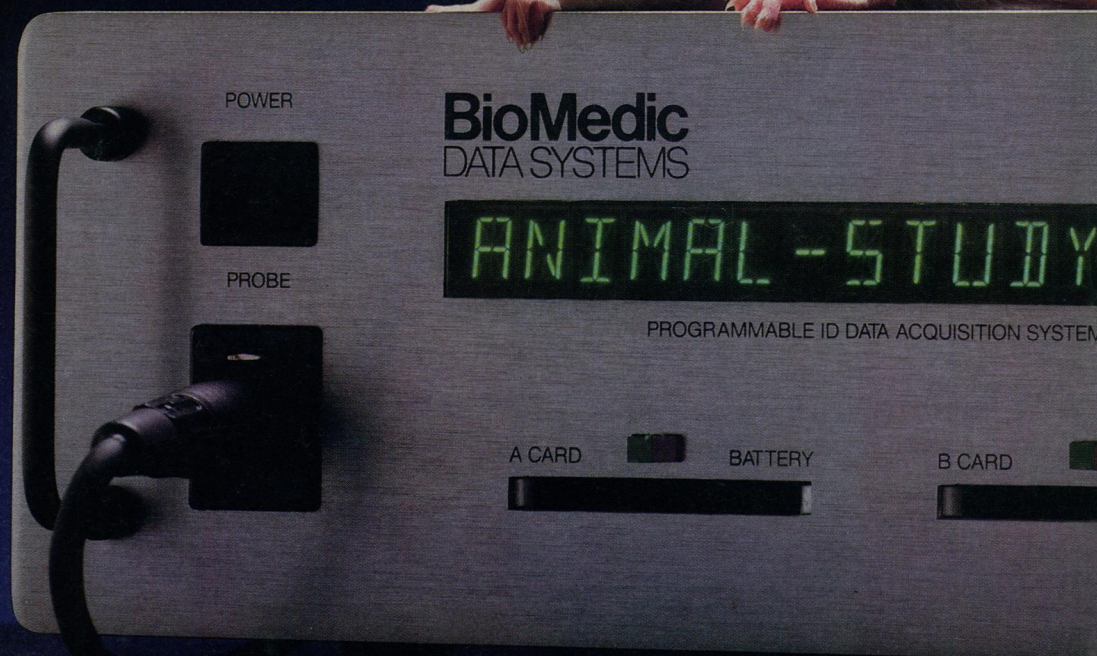
In addition: the imprecision of the conventional methods is replaced by *positive animal identification*. Animal misidentification or infection can indeed be catastrophic should they delay, impede, or destroy a crucial investigation. This simple foolproof system now converts ear punching or tagging, toe clipping, and tail tattooing into unacceptable risks... and who needs that when a positive animal identification system is now available!

## What about Tissue Response?

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Microchip implant  
shown at 8X  
magnification



ing "C" in the published report is underlined. (ii) A second error occurred in the description of the position of the primers used for amplification of envelope sequences. The text should have read, "These primers would be expected to amplify the region between nucleotides 5662 to 6129 instead of 5684 to 6151." This confusion in numbering arose because the Los Alamos computer database on human retroviruses used a different numbering system, which we inadvertently used in describing the position of the primers and probes. (iii) In describing the reaction conditions, we inadvertently described the enzyme assay conditions provided by the manufacturer instead of the reaction conditions used for amplifications. The following restatement of reference 16 is correct.

16. The primers were derived from the *gag* and *env* regions of HTLV-I. The two *gag* primers were 5'-CGACCGCCCCGGGGCTGGCCGCT-3' and 5'-GGTACTGCAGGAGGTCTTGGAGG-3'. These primers would be expected to amplify the region between nucleotides 842 and 1375 of the sequence described by Seiki *et al.* [M. Seiki, V. Hattori, M. Yoshida, *Proc. Natl. Acad. Sci. U.S.A.* **80**, 3618 (1983)]. This region corresponds to the region between nucleotides 863 and 1397 of the same sequence reported in the Los Alamos computer data

base for human retroviruses (accession numbers J02029, K02722, J02028, J02030, J02031, and J02032). The oligonucleotide probe was 5'-GATCCCGTCCCGTCCGCGCCA-3', which spans the region between nucleotides 1080 and 1101 of the published HTLV-I sequence (corresponding to 1102 and 1123 of the data base). The two *env* primers were 5'-CTCCCTTCTAGTCGACGCTC-CAGG-3' and 5'-GCCACCGGTACCGCTCGGC-GGGAG-3'. These primers would be expected to amplify the region between nucleotides 5662 and 6129 of Seiki *et al.* (corresponding to nucleotides 5684 and 6151 of the database). The oligonucleotide probe was 5'-GCCTCTCCACITGGCACGT-CC-3', from nucleotides 5877 and 5897 (corresponding to nucleotides 5899 to 5919 of the data base). In some instances a nick-translated probe derived from the HTLV-I proviral genome that spanned the amplified region was used instead of the oligonucleotide probe. Amplification of the DNA was performed with the Geneamp kit provided by Perkin-Elmer Cetus Corp. (Norwalk, CT). The reactions were carried out with 2  $\mu$ g of DNA and 1.0  $\mu$ mol of the primers under conditions modified from those specified by the manufacturer. The reaction mixtures contained 10 mM tris-HCl, pH 8.3; 50 mM KCl, 1.5 mM MgCl<sub>2</sub>, 0.01% gelatin, 200  $\mu$ M each of dATP, dGTP, TTP, and dCTP in a final volume of 100  $\mu$ l. 2.5 units of *Taq* polymerase were used for each assay. Typically, for each cycle of amplification, the mixture was denatured at 94°C for 2 min, annealed at 55°C for 1 min, and then extended at 70°C for 2 min. From 36 to 40 cycles of amplification were performed and fresh enzyme (2 to 5 units) was added to each tube at the end of every tenth cycle."

In the text of the same paper, the fourth sentence of the fourth paragraph should

have read, "These were 23–24 bases long and rich in G–C content to allow stable hybridization."

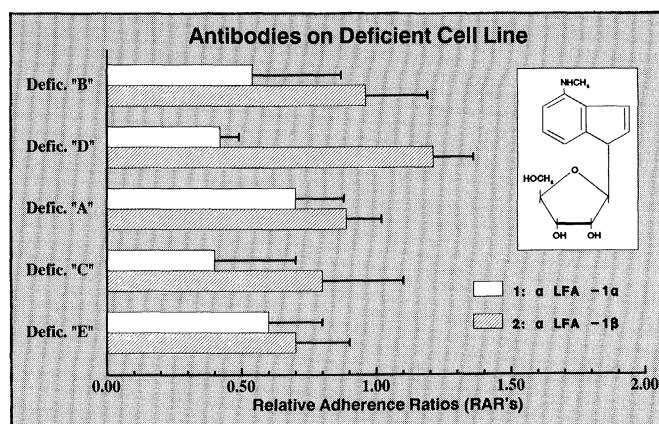
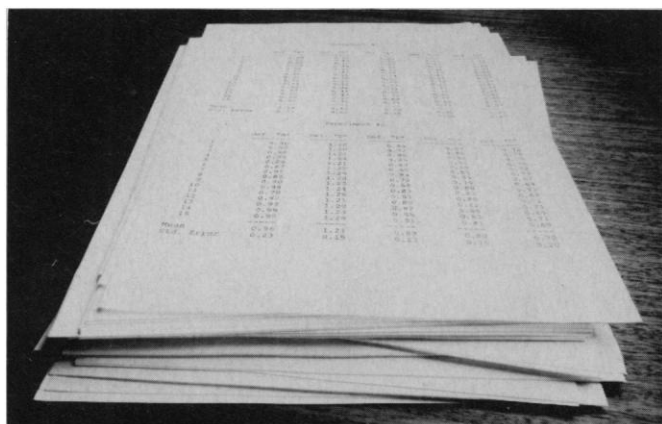
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**Erratum:** In the News & Comment "Ethics and science" feature "Science advisers need advice" by Eliot Marshall (7 July, p. 20), Dinoseb is described as "a fungicide made by Uniroyal." Dinoseb is registered as both a fungicide and a herbicide. It was primarily used as a herbicide. It was manufactured by Uniroyal and by several other companies, but Uniroyal was not involved in the litigation mentioned in the article.

**Erratum:** In Mark Crawford's News & Comment article "Lab report puts SSC magnets in limbo" (25 Aug., p. 809), it was said that the Bush Administration could request \$900 million in funding in for the Superconducting Super Collider for fiscal year 1991. That number is wrong. The correct estimate for project funding is \$593 million.

**Erratum:** The photograph accompanying the News & Comment article "Jet Propulsion Lab looks to life after Voyager" by M. Mitchell Waldrop (8 Sept., p. 1037) was generated on a VAX with a photoclinoimetry program developed by Randy Kirk of the U.S. Geological Survey in Flagstaff, Arizona. The Jet Propulsion Laboratory's hypercube computer was not used to generate the panorama shown, as stated in the caption.

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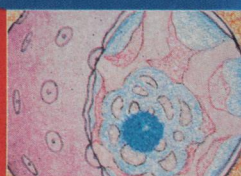


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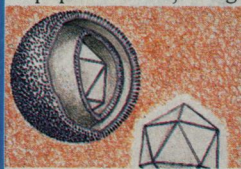
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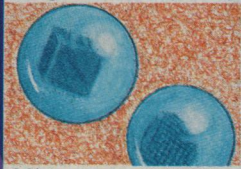
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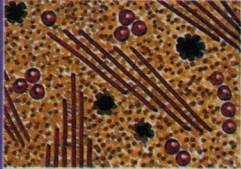
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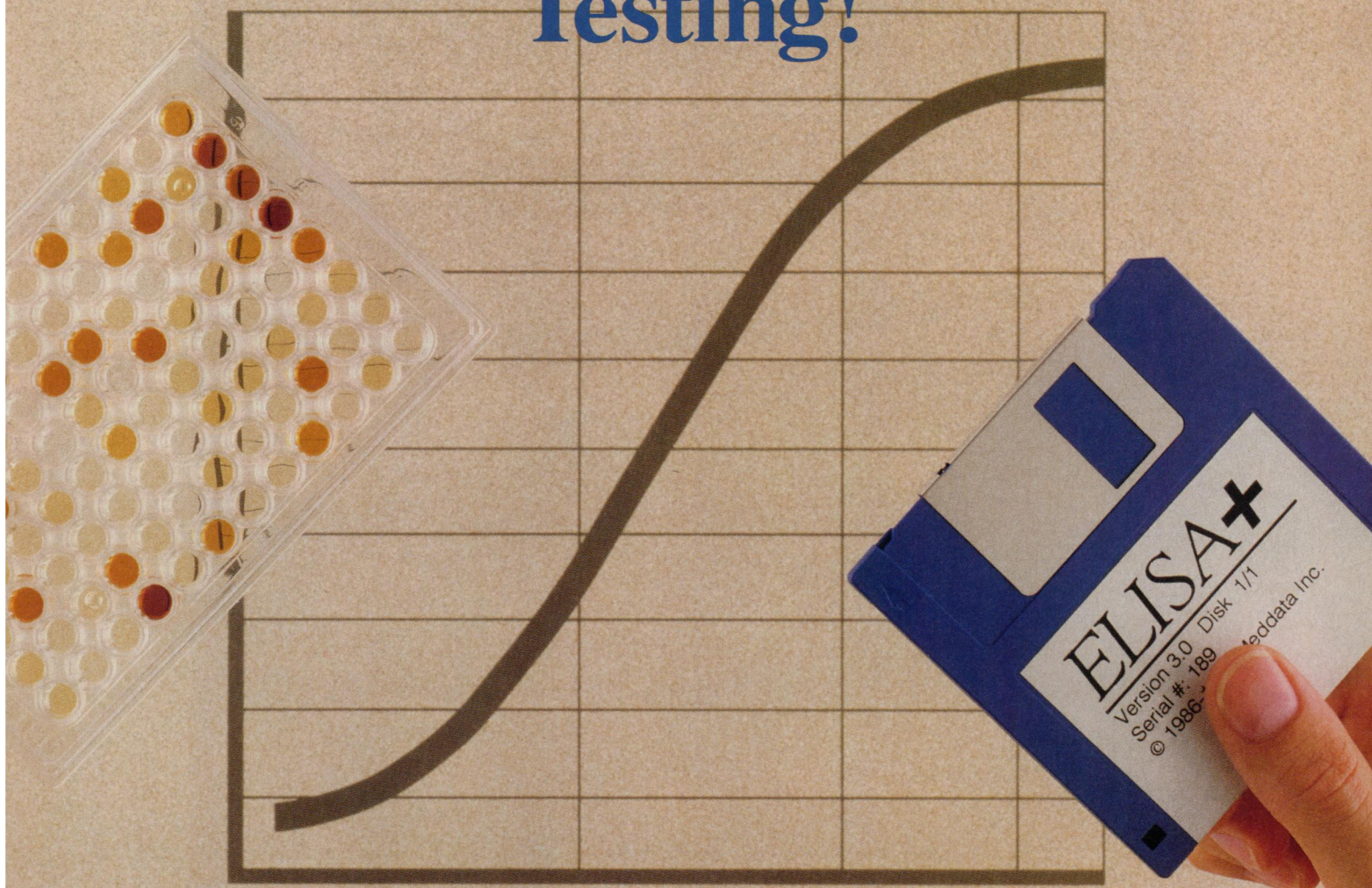
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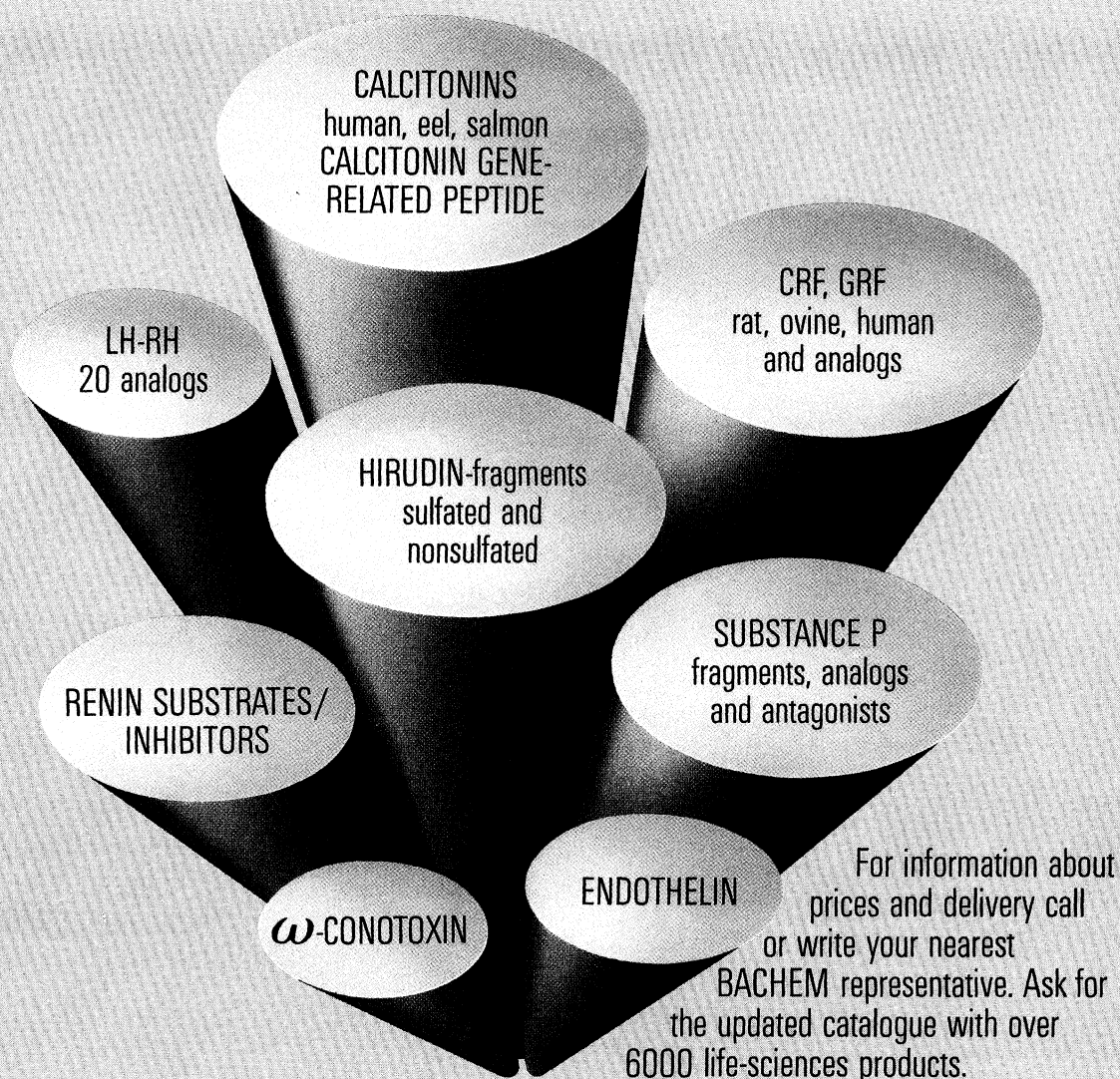




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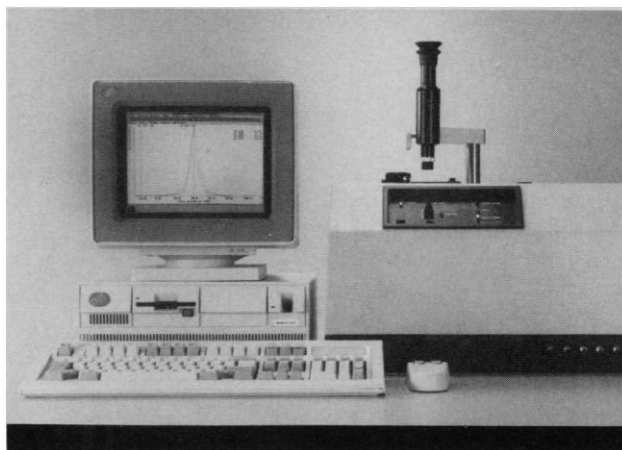
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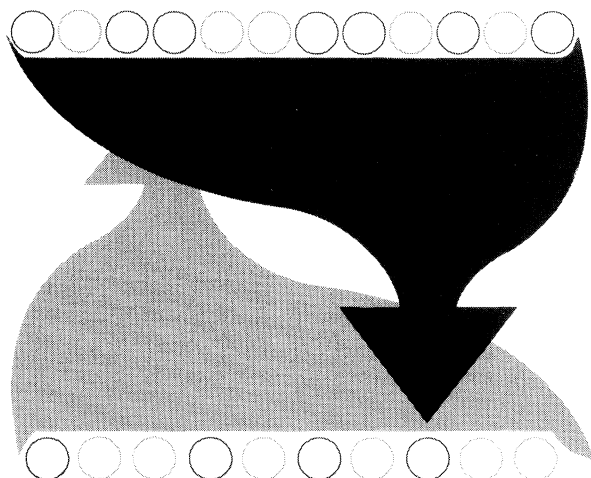
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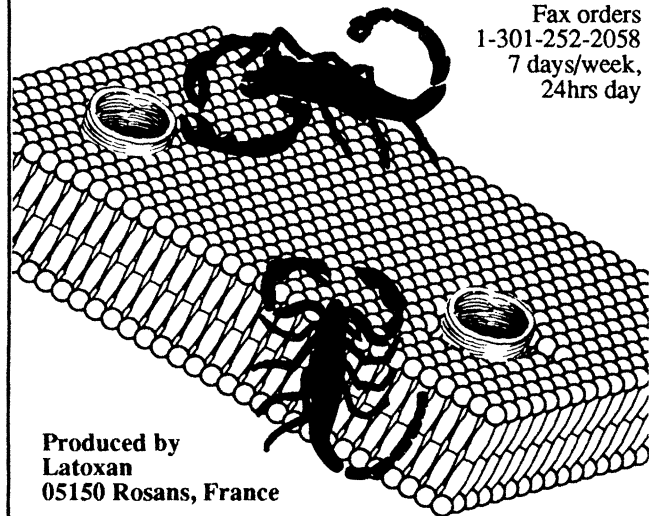
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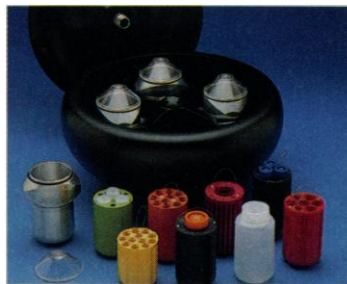
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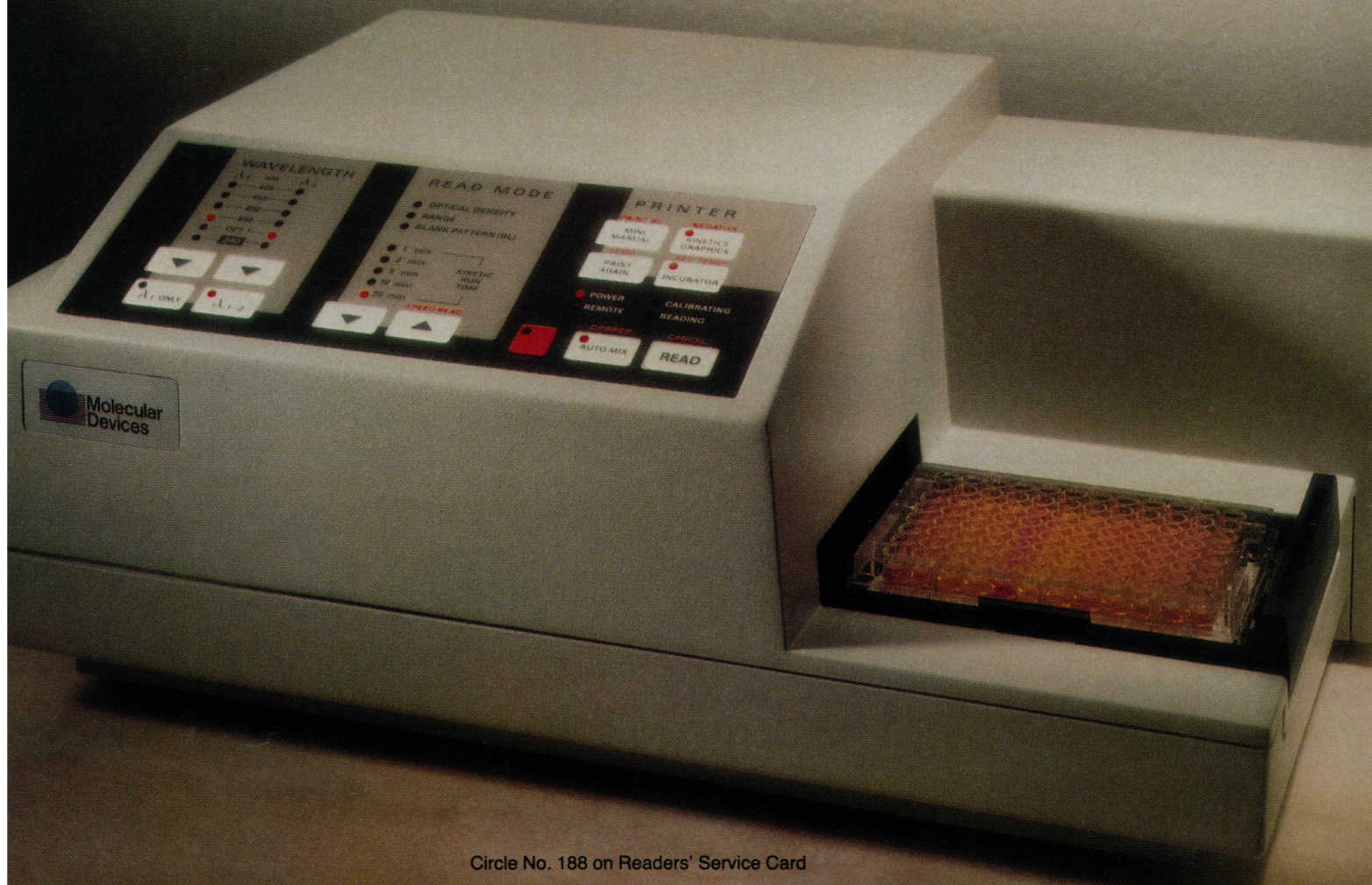
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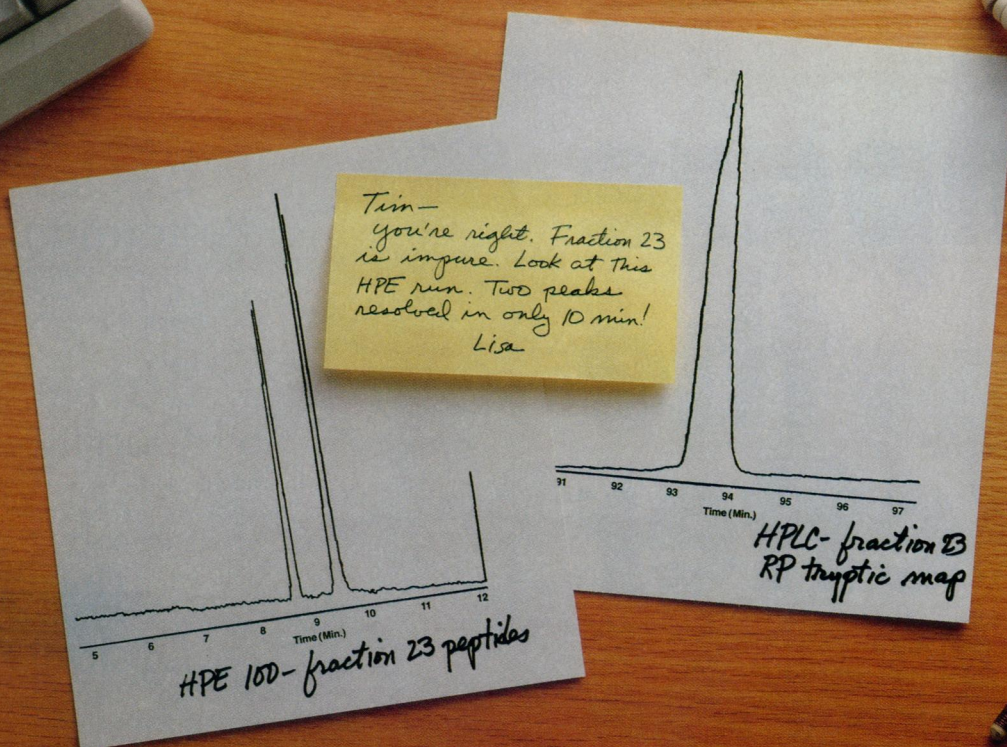
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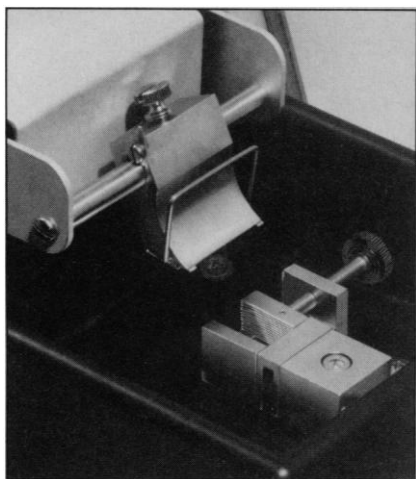
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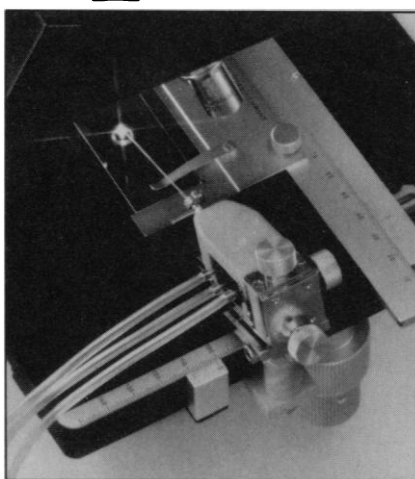
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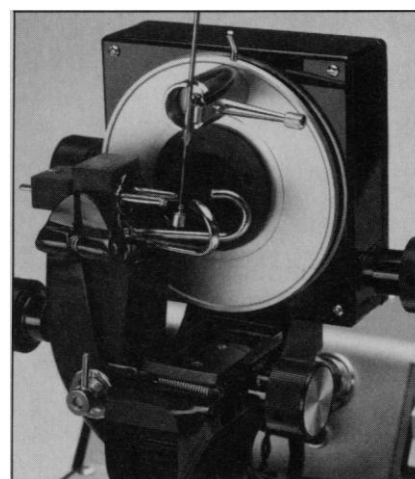
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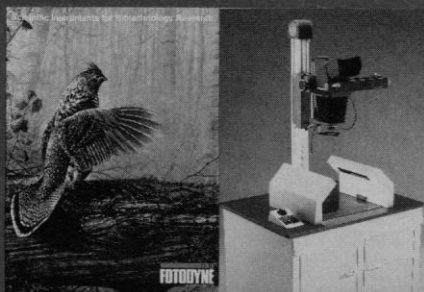
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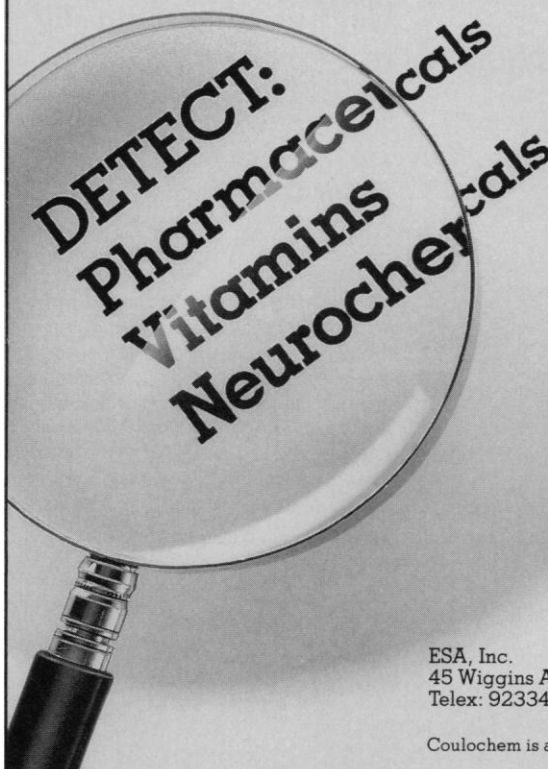
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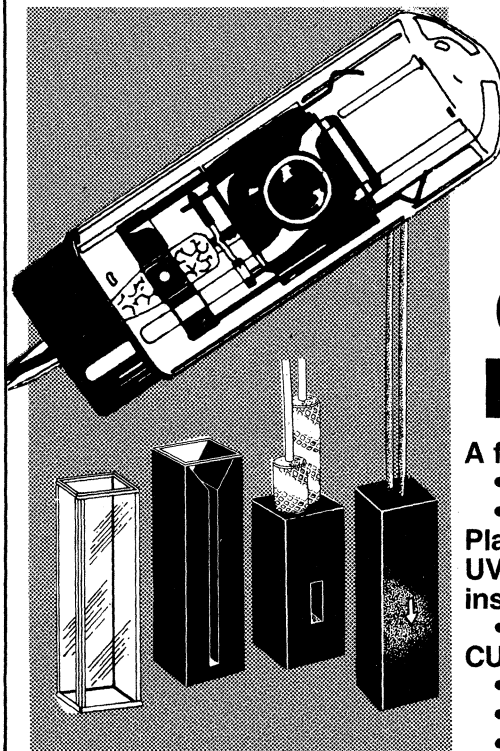


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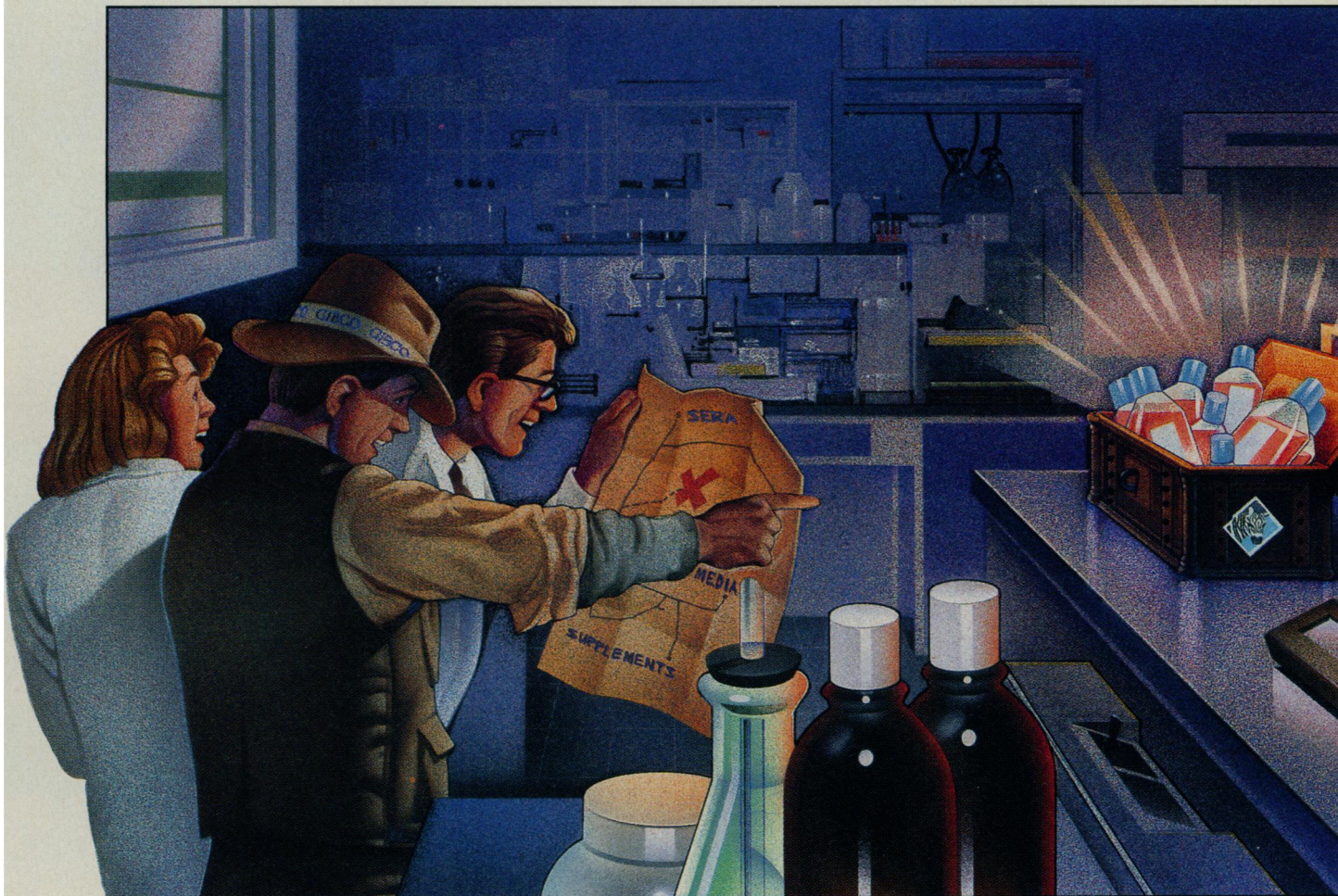
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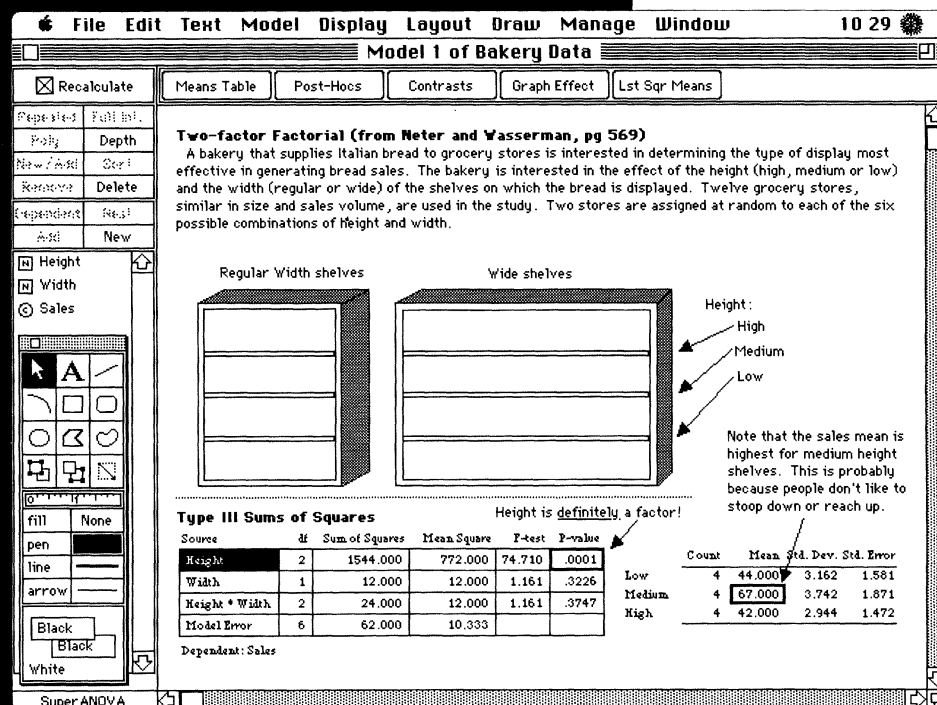
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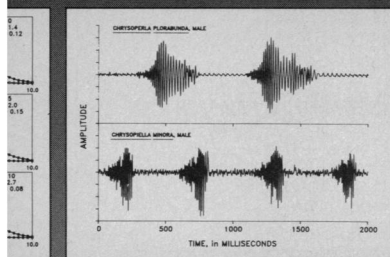
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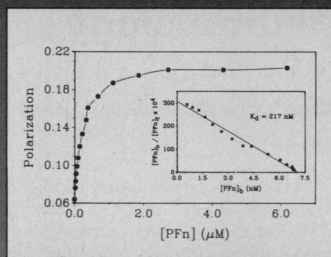
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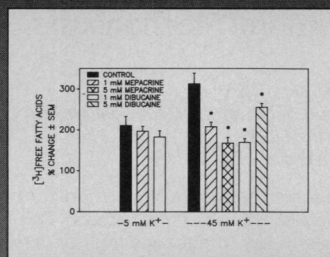
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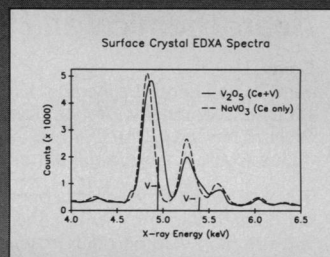
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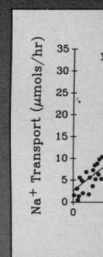
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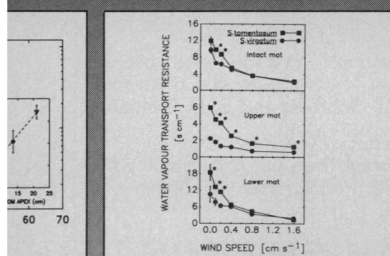
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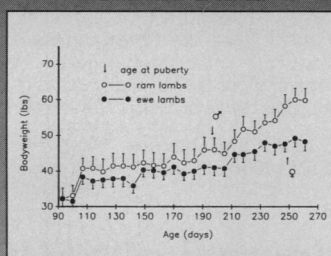
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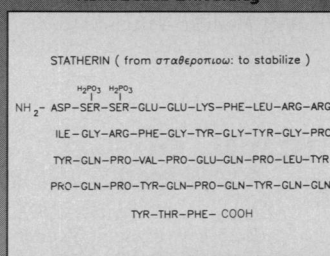
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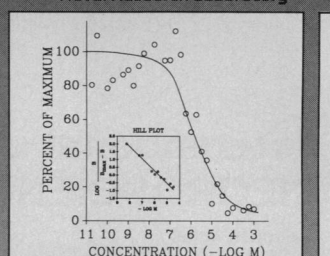
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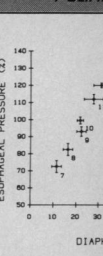
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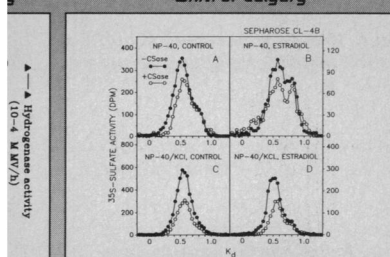
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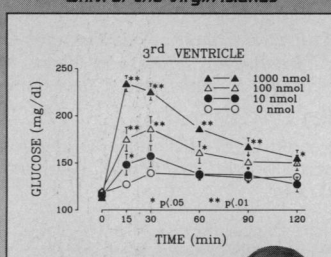
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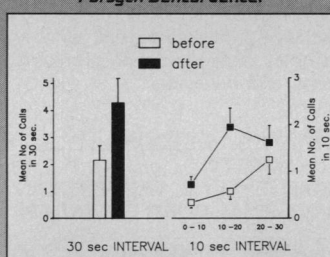
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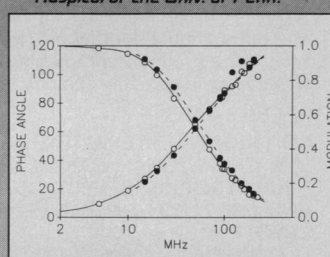
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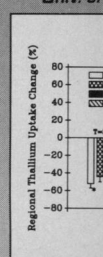
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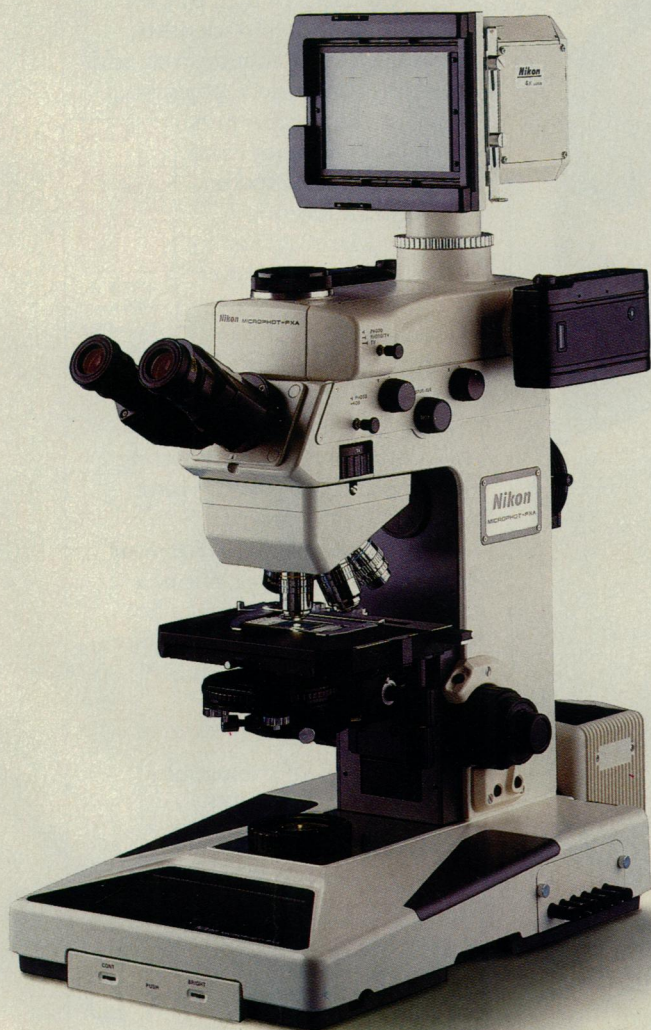
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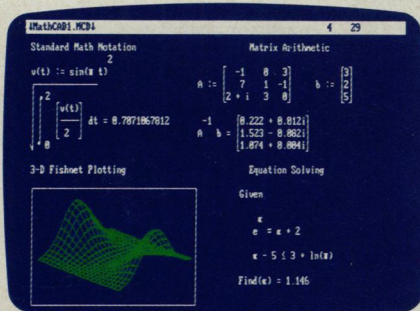


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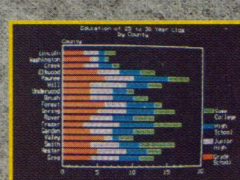
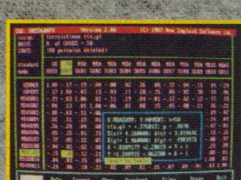
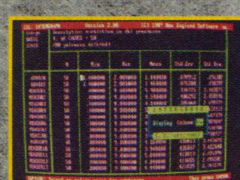
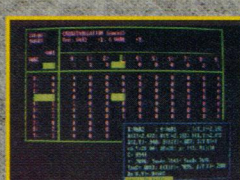
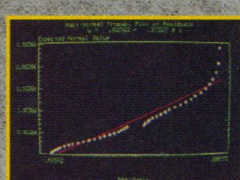
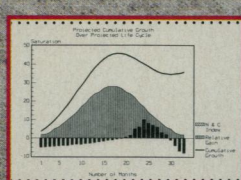
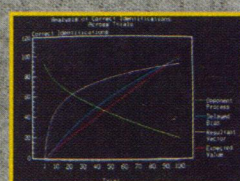
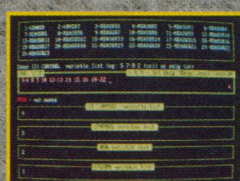
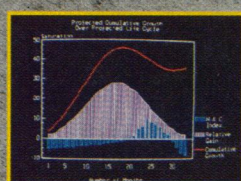
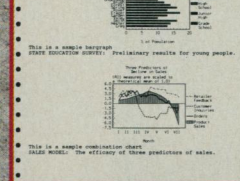
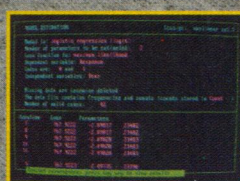
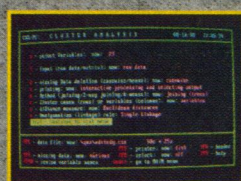
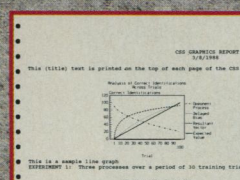
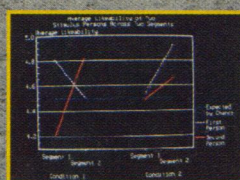
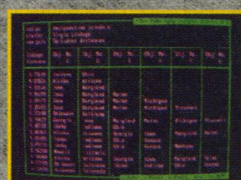
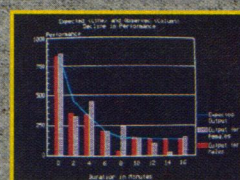
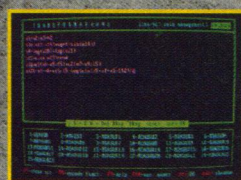
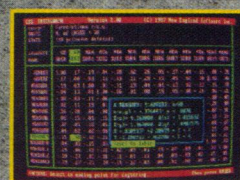
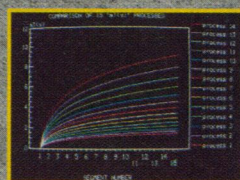
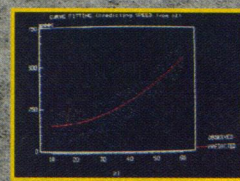
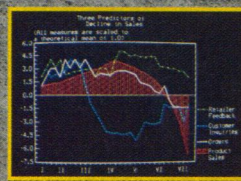


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# AIDS

Books from AAAS

## **AIDS 1988: AAAS Symposia Papers**

*Edited by Ruth Kulstad*  
*Foreword by C. Everett Koop*

This volume contains many of the groundbreaking papers on AIDS presented at the 1988 AAAS Annual Meeting.

The wide variety of the papers presented here reflects the current thinking about AIDS research today—that control over the AIDS epidemic must be achieved through a collaborative, multi-disciplinary effort that includes not only the medical and biological sciences, but the social and behavioral sciences as well.

This fully indexed volume is organized into five major sections: The first explores the epidemiology and natural history of AIDS and the HIV infection both in the United States and internationally. It also looks at the difficulty of predicting the course of the virus—statistical issues;

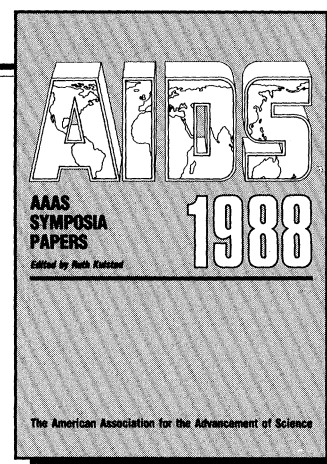
patterns of HIV-1 incubation, infectiousness, and transmission; and approaches to demographic impact modeling.

Section two discusses the social consequences of AIDS as they relate to gender, intravenous drug users, and public policy, and it examines the dilemmas that AIDS presents to the medical community.

The third section focuses on the AIDS prevention strategies currently employed around the world.

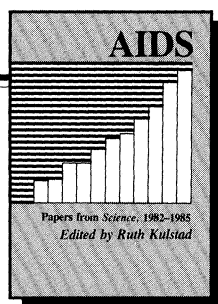
Section four considers the economic, political, ethical and legal issues surrounding the epidemic.

The final section presents several recent medical and biological studies on AIDS and HIV.



*AIDS 1988* is a timely, authoritative source of information on the growing body of AIDS research being conducted around the world. It is essential for medical, biological, social, and behavioral scientists, and for everyone who is professionally or personally concerned about the AIDS epidemic.

1988; 478 pp.; softcover  
index; 12 appendices  
#88-19S – \$29.95 (members \$23.95)



## **AIDS: Papers from Science, 1982-1985**

*Edited by Ruth Kulstad*

This collection includes frequently cited research papers and news reports on AIDS that were published in *Science* between August 1982 and September 1985.

Many of the papers relate directly to AIDS research, while others touch on relevant aspects of the immune system. The news stories help to explain the ongoing research, while focusing on some of the sociological questions raised by the disease. The book is arranged chronologically, enabling the reader to trace the his-

tory of the AIDS epidemic through September 1985—a history that is of great sociological interest.

This fully indexed collection is valuable not only for the experimental data and conclusions, but also as an excellent bibliographic reference of AIDS work in major journals worldwide.

1986; 654 pp.; softcover  
detailed indexes and illustrations  
#85-23S – \$19.95 (members \$15.95)

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How do animals represent space, time, number and rate? From insects to humans, Gallistel explores the sophisticated computations performed in these ubiquitous yet neglected domains of animal learning. A Bradford Book. 550 pp. \$45.00 (January)

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# Science & Society

Books from AAAS

## **Science, Technology, and Society** *Emerging Relationships*

*Edited by Rosemary Chalk*

This volume provides a thorough introduction to the issues concerning the unique relationships among science, technology, and society (STS). It offers 85 articles, editorials, and letters published over the past 40 years in *Science*, the weekly journal of the AAAS.

The material provides a broad overview of the emerging relationships of science, technology, and society in the period after World War II. Contributors include Bertrand Russell, C.P. Snow, Pope John Paul II, and many scholars well known in the scientific literature. The collection reflects a variety of perspectives on science, tech-

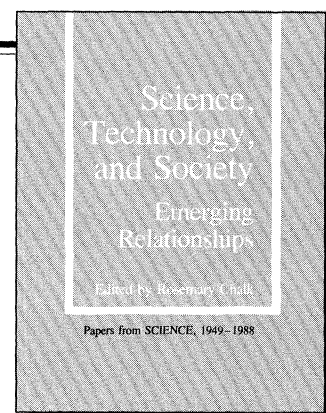
nology, and society. Provocative essays capture the concerns of leaders in the scientific community who sought to articulate the pressing problems of their times.

The book is a valuable resource for those with a professional interest in STS studies. It is also designed for use as a supplemental text for college or high school courses examining the social context of STS. And it is of interest to lay readers who want to gain an insight into the purposes and values that shape the directions of science.

**Topics include:** Scientific responsibility; science and freedom; science and eth-

ics; the human side of science; scientists and citizens; science and the modern world; fraud and misconduct in science; professional rights and duties in the health sciences; science and risk; and science and national security.

1989; 262 pp.; softcover; index  
#88-12S - \$19.95 (members \$15.95)



## **Renewing a Scientific Society** *The American Association for the Advancement of Science from World War II to 1970*

*Dael Wolfle*

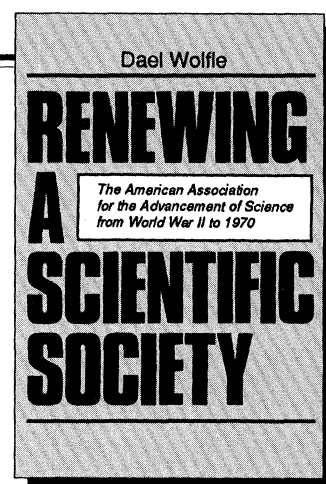
Dael Wolfle was executive officer of AAAS during the post-war period that saw an unprecedented growth in American science. In this clear and engaging narrative, he describes the Association's role in that growth as well as its internal changes as it sought to serve its four key constituencies: scientists working in all fields of science and technology, students seeking careers in those fields, a public that increasingly needed to understand new technological advances, and opinion leaders whose decisions could influence scientific and technological activities.

Dr. Wolfle also describes the AAAS's work on a wide range of national issues, including development of the National Science Foundation; Cold War concerns about the loyalty and freedom of scientists; questions about the ownership and control of research; efforts to develop an effective science curriculum for all Americans; and issues regarding air conservation, the use of arid lands, the effects of herbicides in Vietnam, and much more.

This book is essential for historians of science, members of scholarly organiza-

tions, and everyone who wants to understand the inner workings of a major scientific society.

346 pp.; softcover; index  
#89-14S - \$24.95 (members \$19.95)



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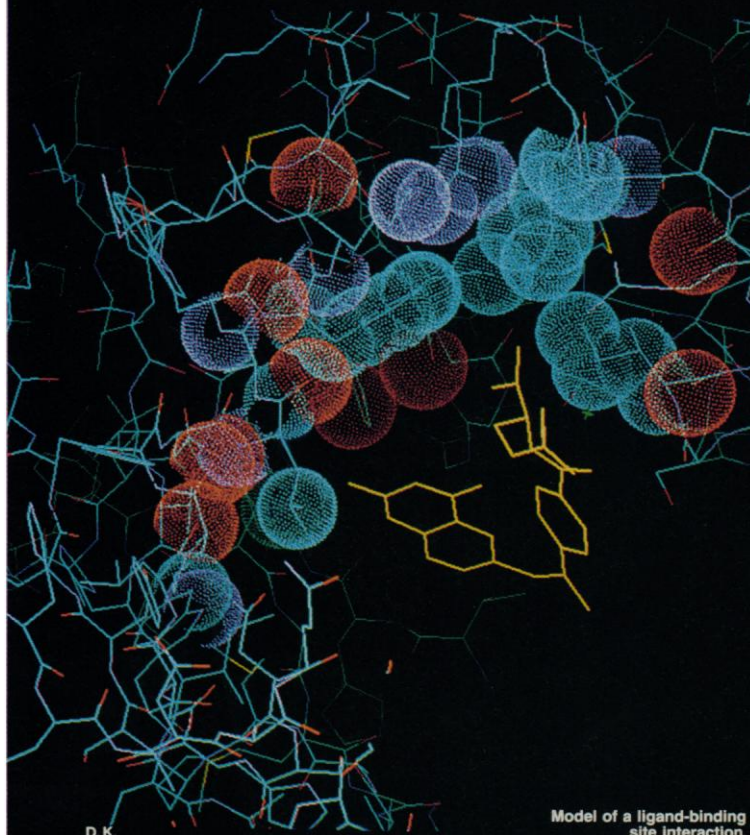
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In 1976, The McKnight Foundation initiated a program to stimulate research in neuroscience in order to promote a clearer understanding of diseases affecting memory. Over the years, this mandate has been interpreted broadly to permit support of work in many relevant areas of neuroscience. Today, The McKnight Endowment Fund for Neuroscience supports a total of up to eighteen investigators annually through the Scholars Awards. Up to six awardees may be selected each year for awards of three years' duration. The Endowment Fund is now soliciting applications in preparation for the awarding of McKnight Scholars Awards in 1990.

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Potential applicants should write or call The McKnight Endowment Fund for Neuroscience office to request application materials. **The McKnight Endowment Fund for Neuroscience, 410 Peavey Building, Minneapolis, Minnesota 55402, (612) 333-4220.**

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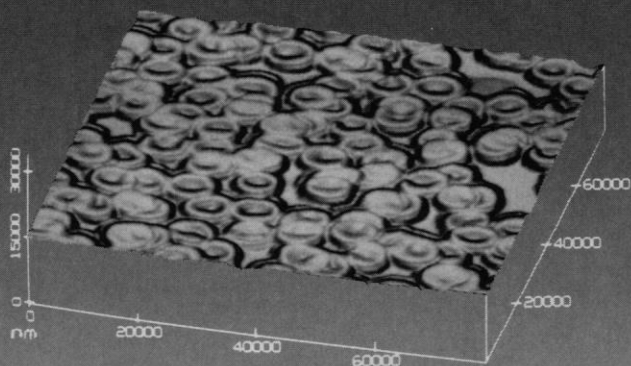
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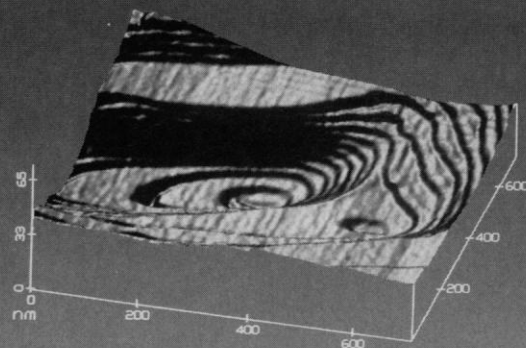
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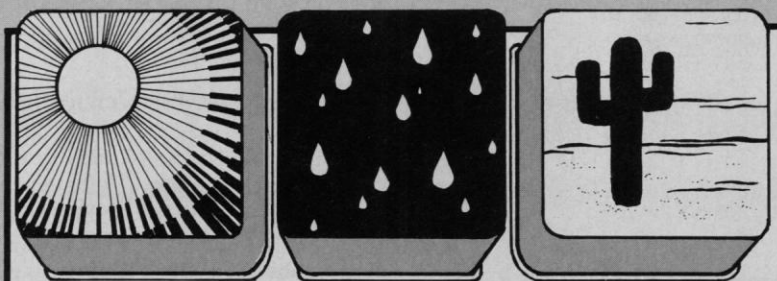
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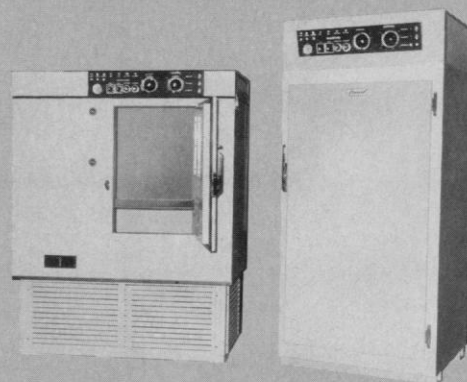
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**Contact:** Coordinator for Research  
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## Epidemiology Resources

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The TVER is able to adjust its collection to facilitate the development of new collaborative studies. In addition, some samples are available for reagents and independent research. The most extensive collections are serum samples from patients with Burkitt's lymphoma (sera from more than 1,000 patients).

**Contact:** Dr. Paul H. Levine  
Environmental Epidemiology  
Branch, DCE, NCI, NIH  
Executive Plaza North, Room 434  
Bethesda, MD 20892  
(301) 496-8115

**Cost:** Free to Collaborating Investigators;  
Others: Dependent on Processing  
Time

The National Cancer Institute has available the Animal Morbidity/Mortality Survey of Colleges of Veterinary Medicine in North America (also known as the Veterinary Medical Data Program). This unique registry of veterinary medical information represents patient data on animals seen at collaborating veterinary teaching facilities; 3 million hospital episodes have been abstracted and computerized in a standardized record format. Disease information is coded using the scheme of the Standard Nomenclature of Veterinary Disease and Operations. The computer tapes will be made available upon request.

**Contact:** Dr. Howard M. Hayes  
Environmental Epidemiology  
Branch  
Epidemiology and Biostatistics  
Program  
Division of Cancer Etiology  
Executive Plaza North, Room 443  
Bethesda, MD 20892  
(301) 496-1691

**Cost:** Inquire

The National Institute of Allergy and Infectious Diseases and the National Cancer Institute have developed a repository of biological specimens from homosexual men. The specimens were collected through contracts with five major U.S. universities for studies of the natural history of acquired immune deficiency syndrome (AIDS).

Information about applying for collaborative use of these specimens is available from the NIAID Project Officer or the NCI Co-Project Officer.

**Contact:** Chief, Epidemiology Branch,  
AIDS Program  
National Institute of Allergy and  
Infectious Diseases  
CDC Bldg., Room 240  
National Institutes of Health  
Bethesda, MD 20892

or to Dr. G. Iris Orams  
Extramural Programs Branch, EBP,  
Division of Cancer Etiology, NCI  
Executive Plaza North, Room 535  
Bethesda, MD 20892

The Epidemiology and Biostatistics Program of the National Cancer Institute has developed the Observed versus Expected (O/E) software system which calculates: (1) the number of observed events (e.g. cancer cases or deaths) in a study group at risk; (2) the number of expected events in a study group based on the rate of occurrence in some standard or referent population; (3) the ratio of observed to expected events; and (4) the significance of this ratio. The system is user friendly and capable of executing a series of calculations by different variables such as age, time group, date of exposure, age at date of exposure, duration of exposure, year relative to entry and cause of event. The O/E System provides tables by race, sex and user defined variables, allows user defined latency intervals and accepts standard or user prepared rates. O/E is written in COBOL and is exportable to most mainframes.

Human fibroblast cultures from individuals at high risk of cancer, members of cancer-prone families, and normal family members are available. Collection is historical with unknown viability. Catalogue unavailable. Information requests should include potential use of cultures.

**Contact:** Chief, Family Studies Section,  
EEB, DCE, NCI, NIH  
Executive Plaza North, Room 439  
Bethesda, MD 20892  
(301) 496-4375

**Cost:** Free to collaborating investigators  
Others: \$70/cell line.

**Contact:** Ruth Wolfson  
Epidemiology and Biostatistics  
Program  
Division of Cancer Etiology, NCI  
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(301) 496-1606

**Cost:** Free to investigators interested in  
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## Environmental Cancer

NCI's Chemical Carcinogenesis Research Information System (CCRIS) is available online through the National Library of Medicine's Toxicology Data Network (TOXNET) system. Through an interagency agreement between NCI and NLM, the CCRIS database has been built and will be maintained and updated as one of TOXNET's sponsored databases in the broad areas of chemistry, toxicology, and hazardous waste information. The CCRIS database contains evaluated data and information on carcinogens, mutagens, tumor promoters, co-carcinogens, metabolites of carcinogens and carcinogen inhibitors derived from published review articles, on-going current awareness survey of primary literature, NCI/NTP's short- and long-term bioassay studies, the IARC

Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, and special studies and reports.

**Contact:** Dr. Thomas P. Cameron  
Office of the Director  
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**Cost:** Inquire

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**Contact:** Ms. I.C. Blackwood  
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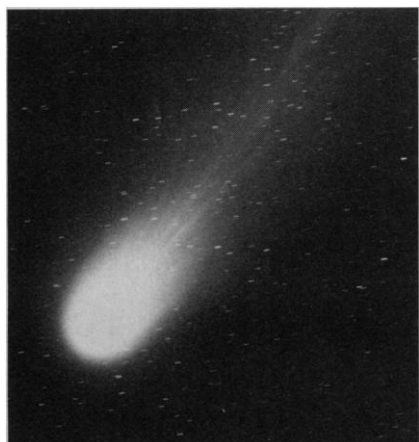
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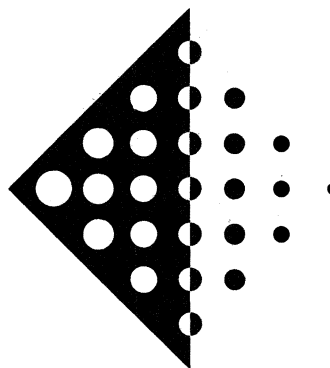
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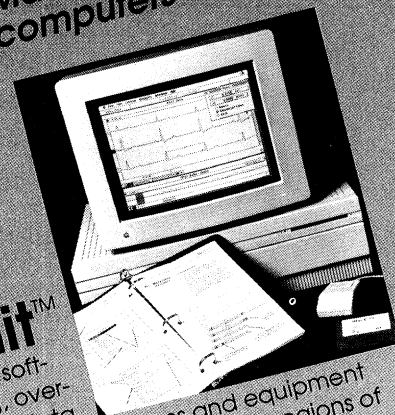


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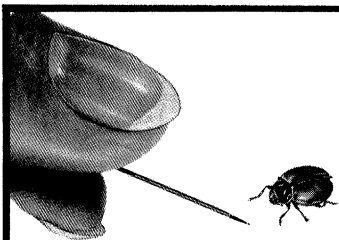
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## Brain Structure, Learning, and Memory

Edited by Joel L. Davis and Robert W. Newburgh, *Office of Naval Research*, and Edward J. Wegman, *George Mason University*

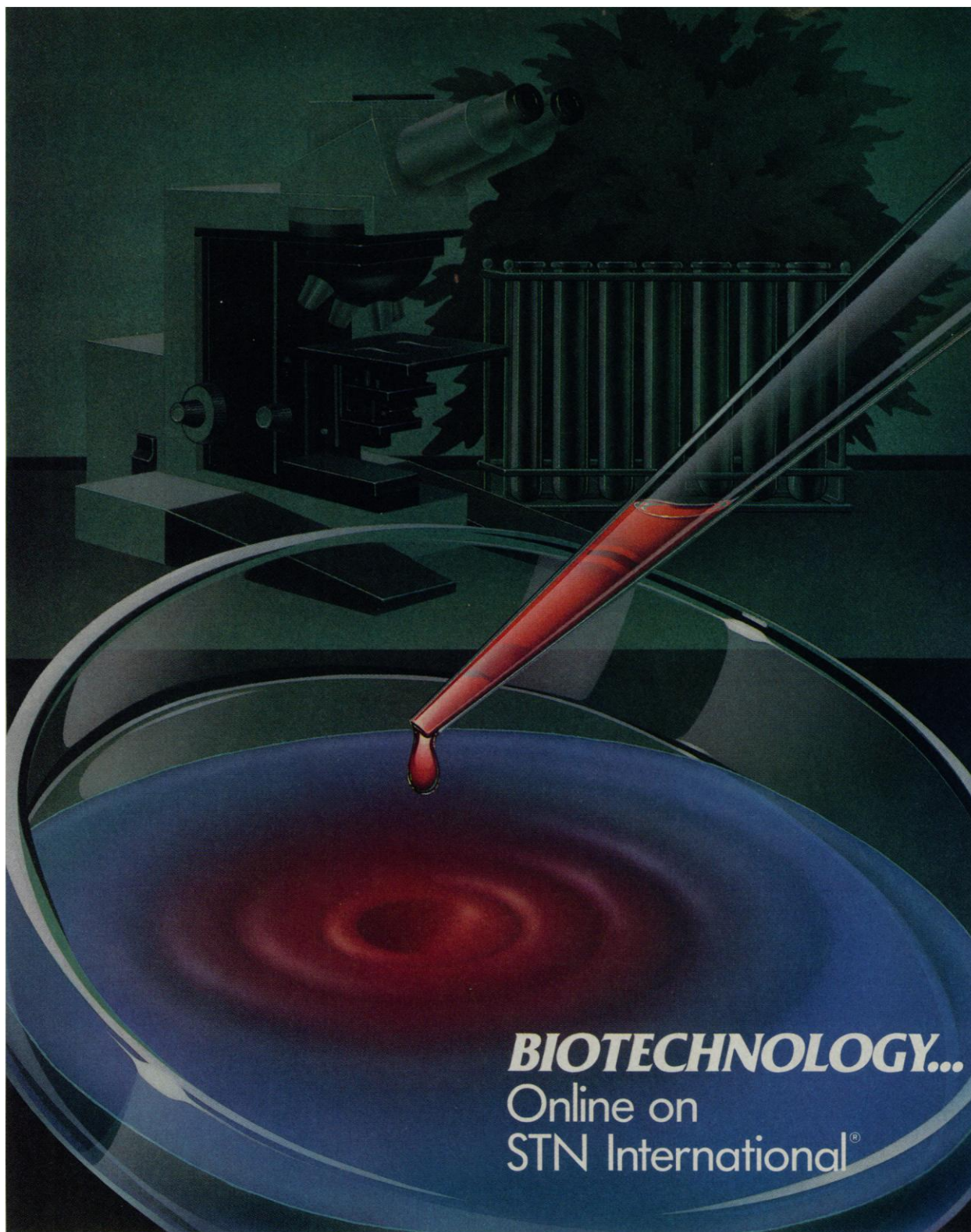
This new book, based on a AAAS Annual Meeting symposium, explores the connections between cellular and computational approaches to understanding the neural basis of learning and memory. Incorporating such diverse ideas as invertebrate and computer-based models, cerebellar involvement in motor engrams, learning, and the sensory sciences; nonstationary point processes; and models closely tied to vertebrate neural nets, the contributors not only shed new light on important brain functions but also provide an example of how neuroscience research should be structured.

\$35.00; AAAS members \$28.00 (include membership number from *Science*). 301 pp., 1988. AAAS Selected Symposium 105.

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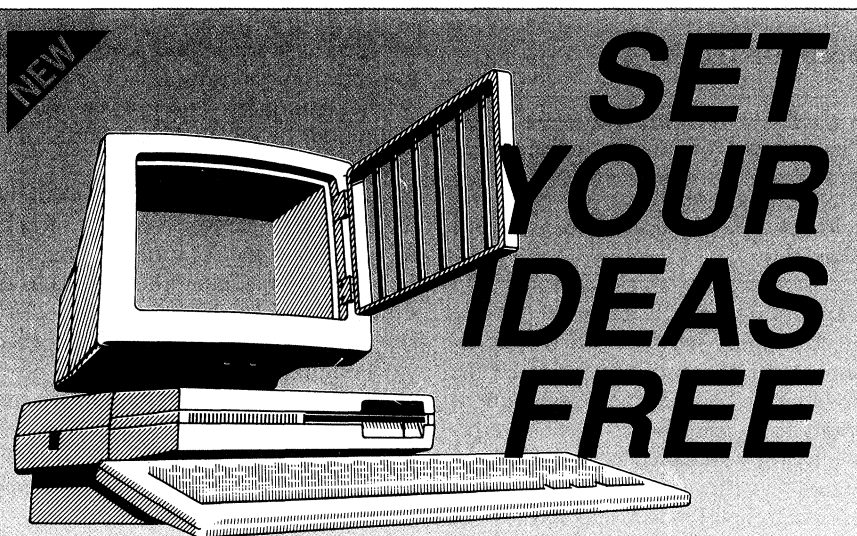


Goldman's book is divided about equally between the governing principles set forth in the U.N.-sponsored space law treaties and U.S. domestic legislation and administrative regulations, respectively. Goldman has little enough use for the former, especially the largely unratified Moon Treaty (1979), whose deference to the views of non-space-using states draws his ire and fire repeatedly and comes to symbolize, for him, the end of the era when space law was largely international law. He is on more congenial terms with U.S. law and administrative practice. Consequently, the half of his primer that deals with these subjects is less spicy but at the same time probably a surer guide for the otherwise uninitiated.

If Vereshchetin *et alii* represent the old and Goldman the new guard of space lawyers, Reynolds and Merges, two young lawyers recently turned law professors, are among the discerning few who actively seek to span the generations. *Outer Space* is designed for students, principally but by no means exclusively law students. It is in the nature of what the academic community insists upon calling a "casebook," though there are scarcely any cases in it and nothing but an anachronistic tradition is lost by calling it a "coursebook" instead. It consists chiefly of excerpts from articles, books, and miscellaneous reports, organized economically into sections on the development of space law, non-industry-specific problems (such as space-related trade issues), and industry-specific problems (such as those associated with remote sensing). Unlike Goldman, who also sees his book as suitable for use in the classroom but who stints on viewpoints other than his own, Reynolds and Merges afford students a range of informed thinking on just about every issue. Clearly by design, and again unlike Goldman's, their book sacrifices something in the way of details in the interest of getting students to focus instead upon issues of transcendent importance.

One wonders if their work will fulfill the authors' hopes that it will be used as an introductory text by busy practitioners. There is little reason to doubt, however, that it will shortly become the standard introduction in law school courses (or mini-courses) on space law, if not in its present edition then in subsequent ones. That one can speak so casually about subsequent editions of an introductory text dealing with space law is evidence enough that interest in the subject is no longer confined to a small circle of avid devotees.

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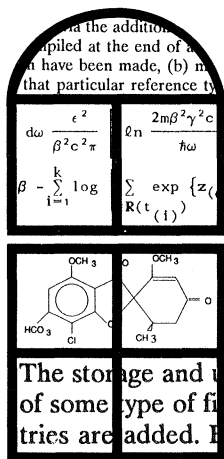
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Jean Grove's book by this name doesn't offer exact temporal or spatial definitions, but it does synthesize much of what is known about the cold "neoglacial" periods of the past 10,000 years. Grove concentrates on the most recent, and perhaps most pronounced, period of apparent climatic cooling and describes in detail the chronologies of glacial advance and retreat that are available from around the world. She sets an inspiring precedent for studies of past global changes by weaving her perspective as a historian with that of glaciologists, geologists, and climatologists. She presents a number of engrossing historical accounts, clearly illustrating how useful these records can be. She hints at the wealth of long historical accounts that may someday be available from East Asia.

Grove's book adopts the classic Little-Ice-Age view of past climatic change, focusing on glacial activity and records of temperature change. This view must be extended, however, to tap the large number of continuous non-glaciological paleoclimate records that exist from around the world. Global reconstructions of climate change need to be built from as many climatic variables as can be mapped. Many workers have jumped to claim that periods of glacial advance were



Mary Vaux at the foot of the Illecillewaet glacier in Canada, 17 August 1899. In 1887, "George Vaux, a leading Quaker businessman from Philadelphia who was also a dedicated mineralogist and supporter of the Philadelphia Academy of Sciences, visited the Rockies with his three children, William, George and Mary. . . . When the Vaux returned in 1894 and noticed that the glacier front had retreated they realized the value of their 1887 photographs and became so interested in the study of glaciers that they initiated the first measurement of glacier front positions in Canada." [Courtesy of the Whyte Museum of the Canadian Rockies. From *The Little Ice Age*]

globally synchronous during the past 10,000 years. Grove correctly urges caution, but seems to support the idea of synchronicity. Cold (or warm) events need not be global to be of concern and interest.

Grove provides a solid summary of the most likely causes of decade- to century-scale environmental change, but in doing so makes it all too apparent that we lack the insight to predict such changes. The time

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