American Association for the Advancement of Science

SCIENCE

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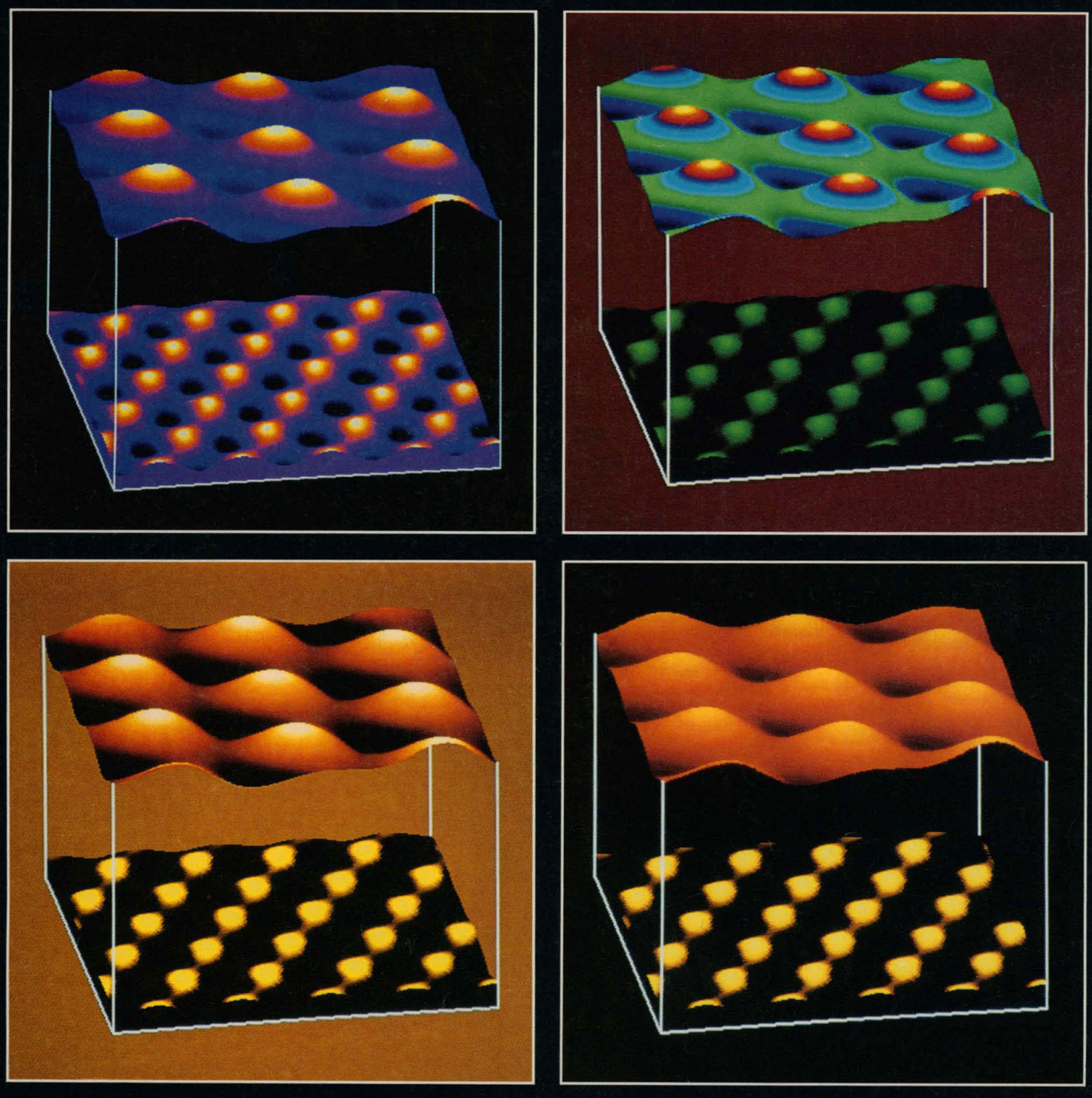

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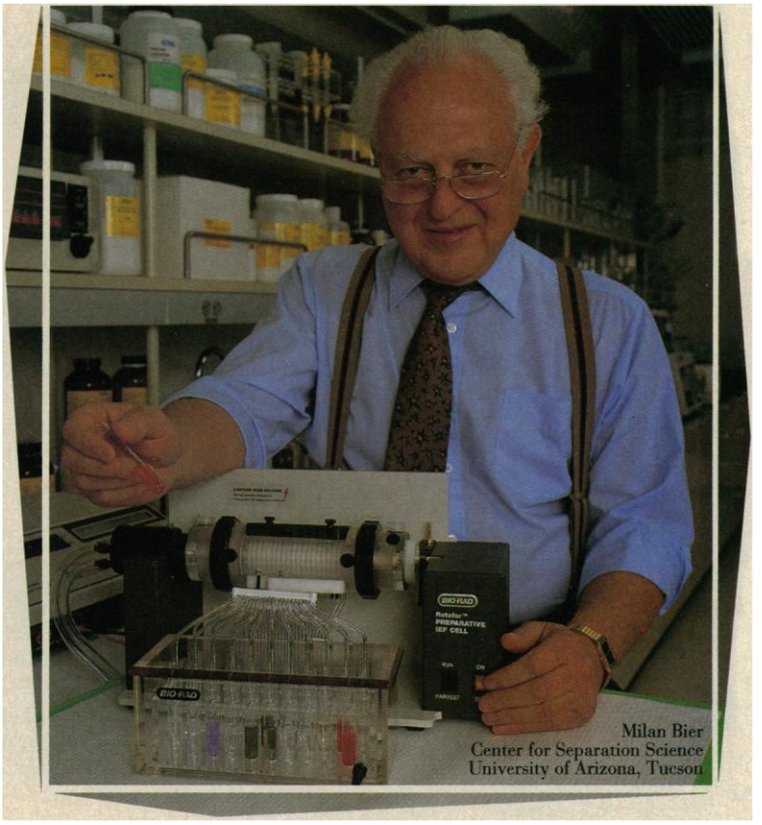

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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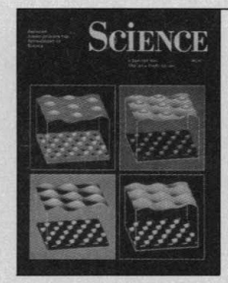
■ The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.



COVER Atomic force microscope images reveal the atomic arrangement of the first monolayer of copper atoms (top layer) electrodeposited on a gold crystal (bottom layer). The atomic spacing of this first copper layer differs from that of the bulk when the reaction is carried out in sulfate electrolyte. See page 183. [Images by S. A. C. Gould and S. Manne *et al.*]

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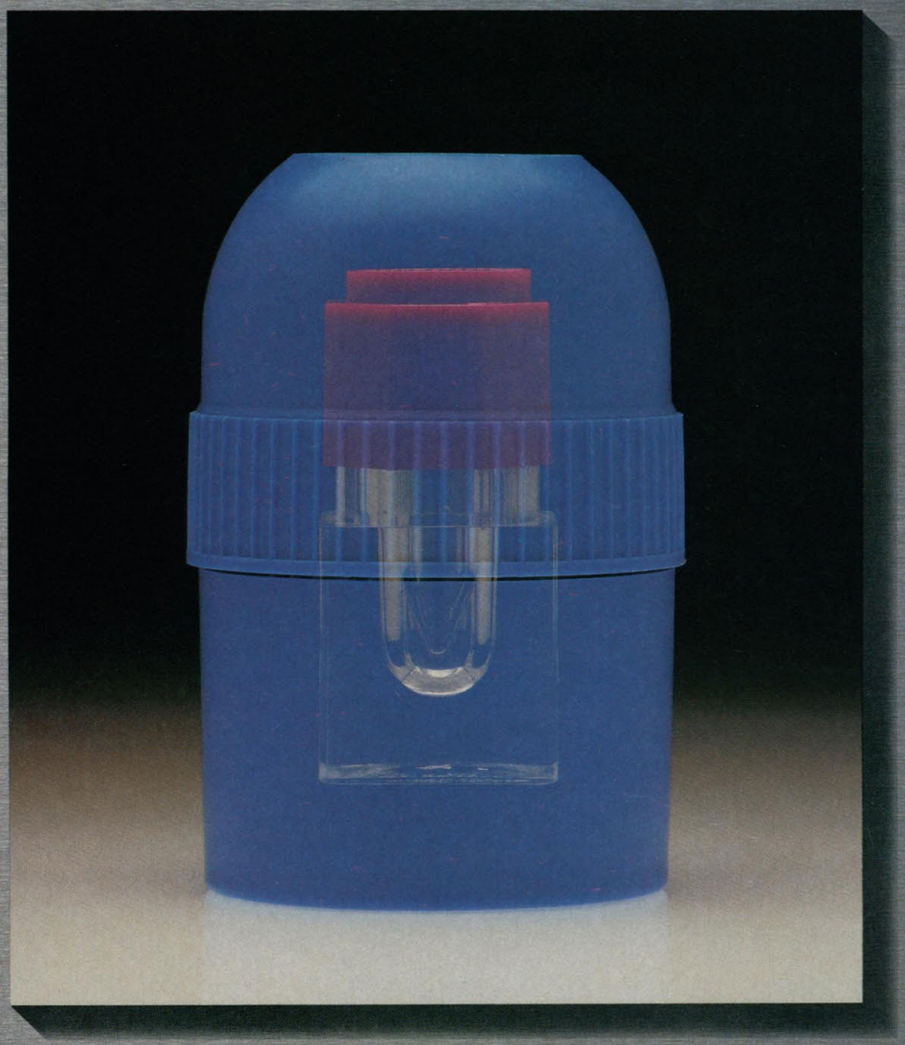

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Preparing for earthquakes

THREE recent major earthquakes—in Mexico (1985), Armenia (1988), and California (1989)—along with 1990's hype over a predicted earthquake in New Madrid, Missouri, that never materialized have heightened public awareness of earthquake hazards and have led to intensified efforts to reduce damage and loss of life from future earthquakes. Realistically, how much can be done? Bolt argues that it should be possible to reduce risks from earthquakes to levels comparable to those posed by other natural hazards (page 169). State and federal governments are considering new building and engineering codes, new ways to provide earthquake insurance, and new disaster relief measures that should soften the impacts of future earthquakes. Seismologists have a growing database from which to map more accurately vulnerable areas, although the diverse responses of different types of soil to strong ground motion and uncertainties regarding earthquake sources make such maps incomplete. Efforts are being made to find a balance between saving the maximum number of lives and spending reasonable sums of money. These efforts include difficult priority decisions, such as which are the key institutions (besides hospitals and disaster relief centers) whose survival beyond the next earthquake must be ensured.

Atomic images of electroplated surfaces

THE electrochemical process called underpotential deposition has been used for laying down atomic monolayers onto noble metal substrates (cover). Such surfaces are of interest for applications in fuel cells and sensors because they retain their activity better than untreated electrodes. One of the most extensively studied systems, deposition of copper onto gold surfaces, has been examined by Manne *et al.* by atomic force microscopy (page 183). Images were made of the copper and gold constituents throughout complete electrochemical cycles as copper was deposited from two electrolyte solutions—perchloric acid and sulfuric acid. The monolayers deposited from perchlorate were more closely packed than those deposited from sulfate. Electroplating was completely reversible and both types of copper monolayers could be removed from the gold surfaces, leaving the gold substrate in its original configuration.

Dangerous vaccines

SOMETIMES vaccination can have a highly undesirable effect: instead of preventing disease, it may exacerbate it. Because high-tech recombinant vaccines that contain only one or a few defined immunogenic determinants may be especially likely to have this effect, caution must be exercised in their testing and use. Oehen *et al.* show that a recombinant vaccine designed to protect mice against lymphocytic choriomeningitis (LCM) virus can heighten the vulnerability of mice to disease (page 195); the outcome of vaccination depends on the genetic background of the mice, the injection protocol, and the strain of virus used for challenge. LCM is a disease in which host T cells kill virus-infected cells and contribute significantly to pathology. Recombinant vaccines were found to protect some strains of mice from subsequent challenge but to enhance the vulnerability of others. In the newly vulnerable mice, the vaccine apparently shifted the balance between viral spread and the speed and extent of immune responses such that immunopathologic T lymphoid cells were induced, causing disease and death.

Bacterial cell wall synthesis

BACTERIAL cell walls are made of peptidoglycans. In *Escherichia coli* this exoskeletal material has over 40 components. The various parts are synthesized inside the cell, but the wall is assembled extracellularly. The process is complex, involving many building blocks and enzymes. Through study of mutant bacteria in which induction of the enzyme β-lactamase is aberrant, a role has been identified for the *ampD* gene in cell wall metabolism: specifically, overexpression of the *ampD* gene causes an increase in pentapeptides in the cell wall (page 201). Tuomanen *et al.* propose that the *ampD* gene product represses the expression of both β-lactamase and a carboxypeptidase that normally hydrolyzes the cell wall pentapeptide. A better understanding of how *ampD* and related genes affect cell wall metabolism is of considerable clinical interest, because penicillin and other β-lactam antibiotics are structurally related to peptidoglycan components and work by interfering with peptidoglycan synthesis.

Interferon signals

INTERFERON-α is thought to be a tumor suppressor: it is one of a number of substances that inhibit cell growth, and genes that encode interferon-α are commonly deleted in at least one type of leukemia. As is the case with many other substances that affect growth and differentiation, a large gray area bridges cause (in this case, the binding of interferon-α to cell-surface receptors) to effect (growth inhibition). Hannigan and Williams have now identified some of the molecular events in this gray area that contribute to the transduction of interferon-α signals (page 204); they also show the sorts of inhibitors that can block signaling. Interferon-α was found to induce the enzyme phospholipase A_2, which hydrolyzes arachidonic acid; arachidonic acid metabolites appear to be important second messengers in signal transduction. Interferon-α also induced expression of certain genes and the formation of a complex of nuclear factors and an interferon-stimulated response element. These findings may account for recent clinical reports that interferon-α and some enzyme inhibitors work synergistically to combat tumors in patients.

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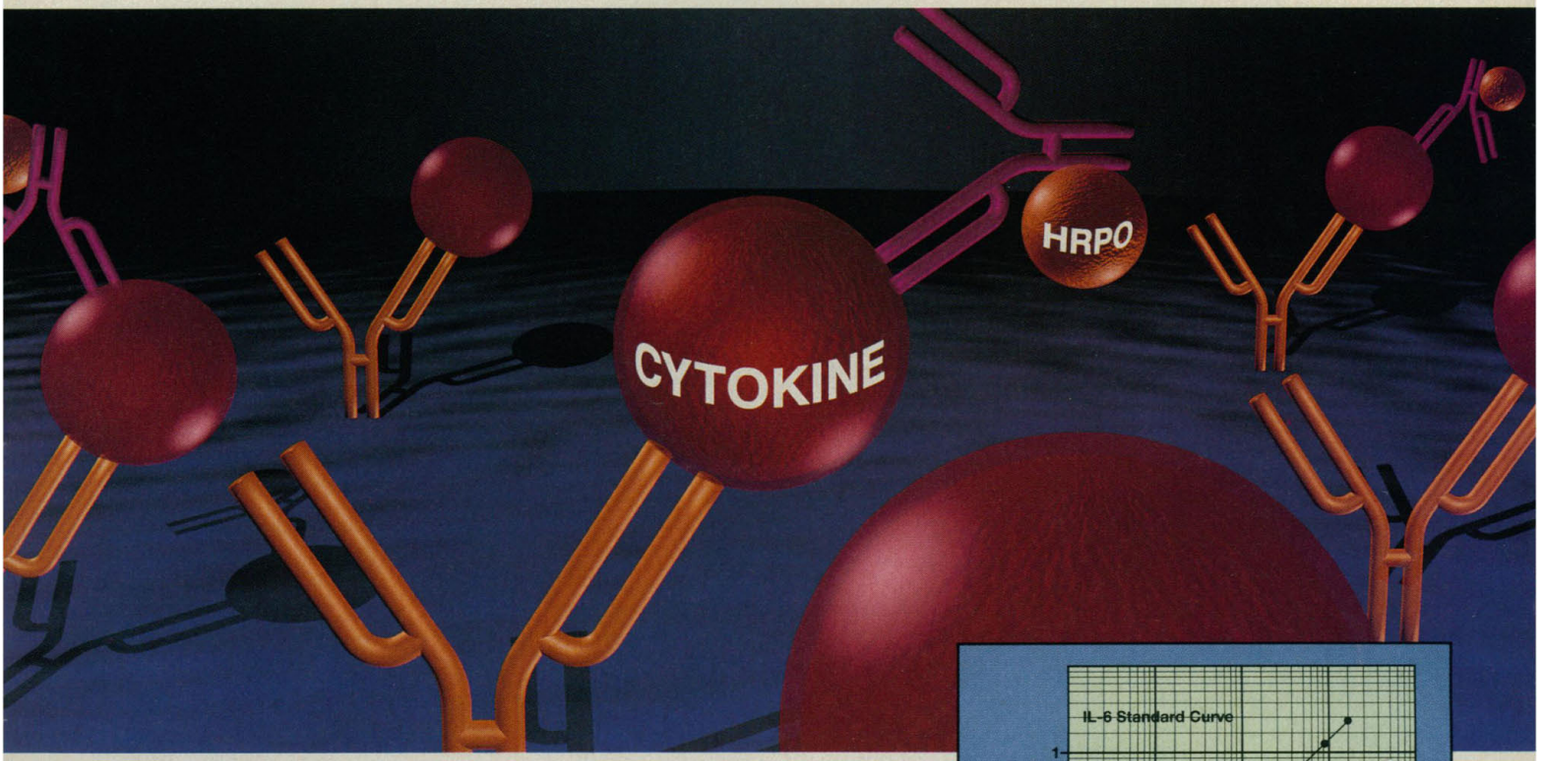

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Immunoassay vs. Bioassay

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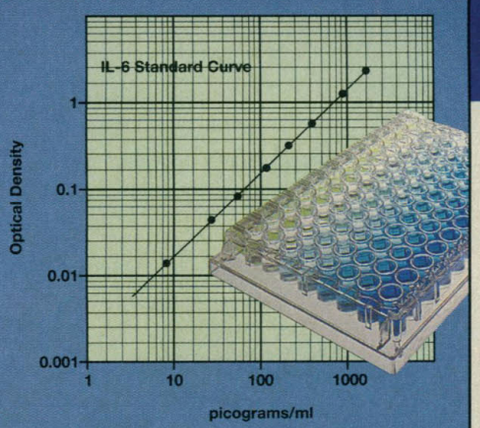

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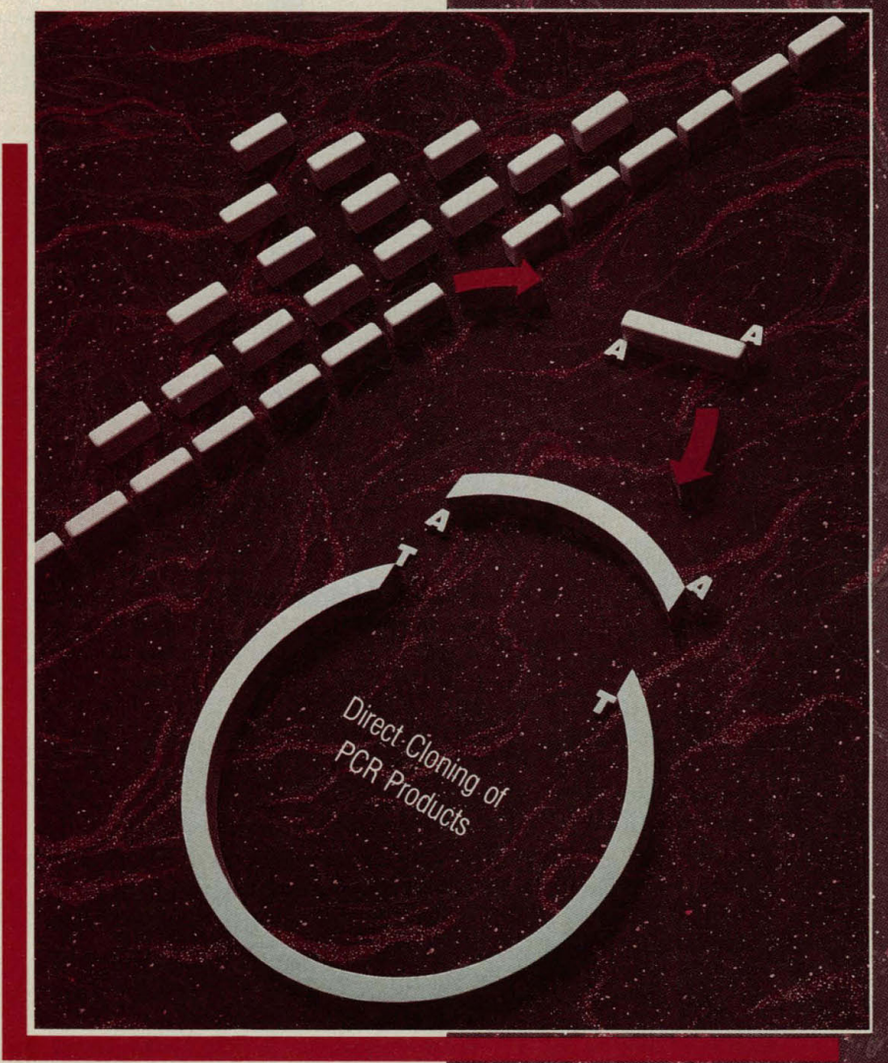

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Applicants must be U.S. citizens and have doctoral degrees or their equivalent six months prior to the requested beginning date of their visit in physics; chemistry; mathematics and computer sciences; earth, atmospheric, and oceanographic sciences; agricultural, forestry, fishery, and plant sciences; biological sciences; environmental sciences; engineering; archaeology and anthropology; geography; psychology; science and technology policy; or the history and philosophy of science. Projects in the economic and social sciences that involve development of new analytical methodologies will be considered on a case-by-case basis. Necessary expenses will be met by the NAS and the foreign academy, including reimbursement for long-term visitors for salary lost up to a predetermined maximum and expenses for spouses who accompany the scientist for six months or longer.

Requests for applications for the first round of the project development visits should reach the National Academy of Sciences no later than November 15, 1990. **Applications for this program must be postmarked no later than November 30, 1990.** Requests for applications for the individual exchange program should reach the National Academy of Sciences no later than February 15, 1991. **Applications for this program must be postmarked by February 28, 1991.** Requests for applications for the second round of the project development visits should reach the National Academy of Sciences no later than February 15, 1991. **Applications for this program must be postmarked by February 28, 1991.** Address application requests to:

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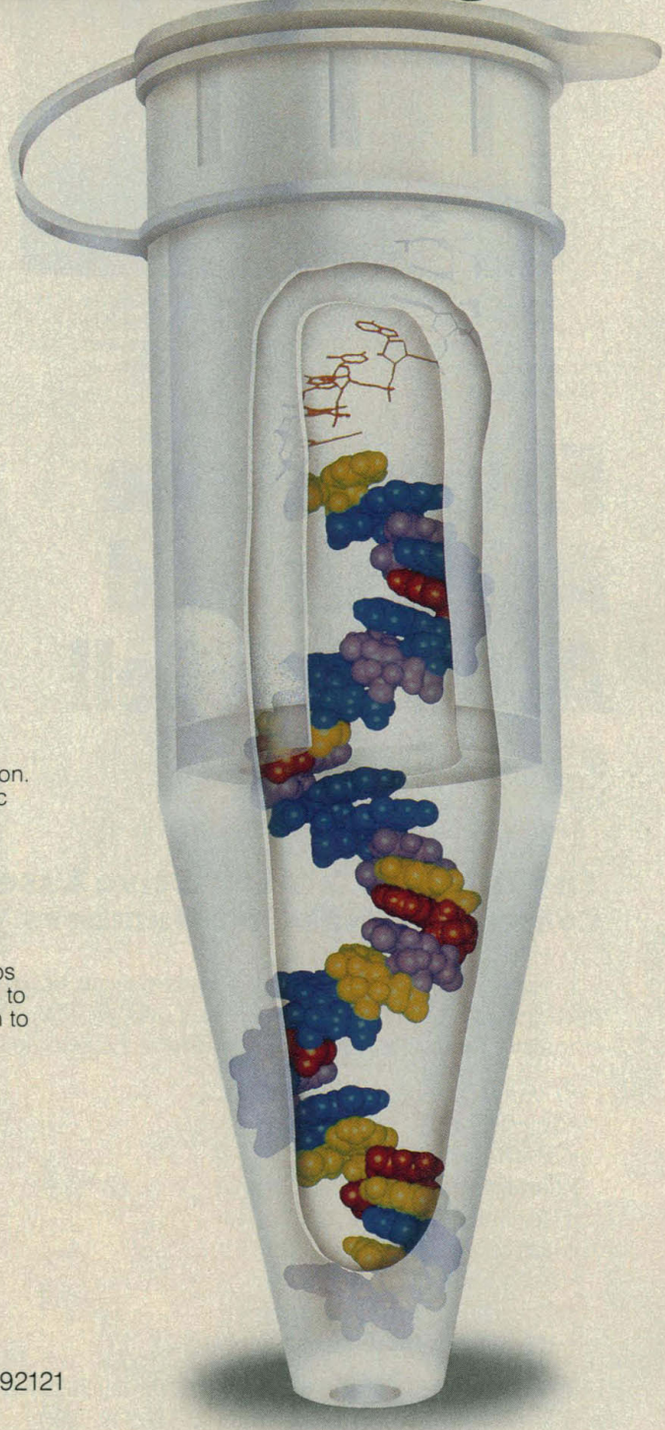

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**patent pending.* *mRNA model courtesy of* BIOSYM

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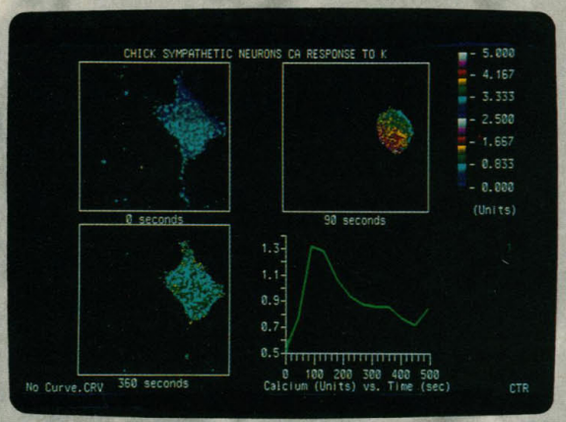
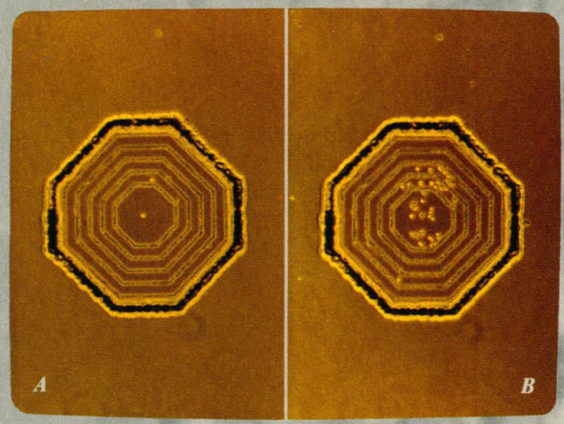
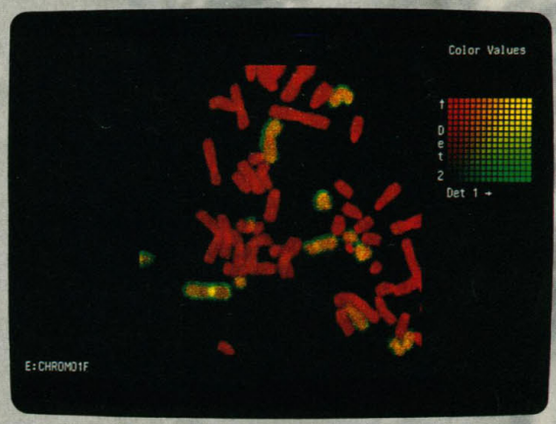


Confocal quantitation and localization of Ca^{2+} using the ACAS 570. *Ca^{2+} response to potassium is shown as a function of time in a 1μ confocal optical slice of an Indo-1 labeled chick sympathetic neuron. (Courtesy of Dr. Arun R. Wakade, Dept. of Pharmacology, Wayne State Univ.)*



Attached cell sorting using the ACAS "Cookie-Cutter"™ technique. *A) CHO cell isolated in culture. B) Cell out-growth after two days. (Courtesy of Dr. Margaret Wade, Meridian Instruments, Inc.)*



Detection of human chromosomes by* in situ *hybridization using the ACAS 570. *Mouse/human hybrid cell culture labeled with fluorescein-human DNA and propidium iodide. Displayed as a dual-label overlay image. (Courtesy of Dr. Roger A. Schultz, Molecular Genetics Laboratory, Univ. of Maryland.)*

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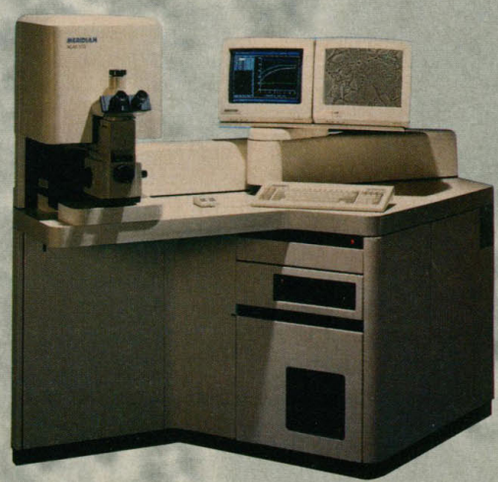

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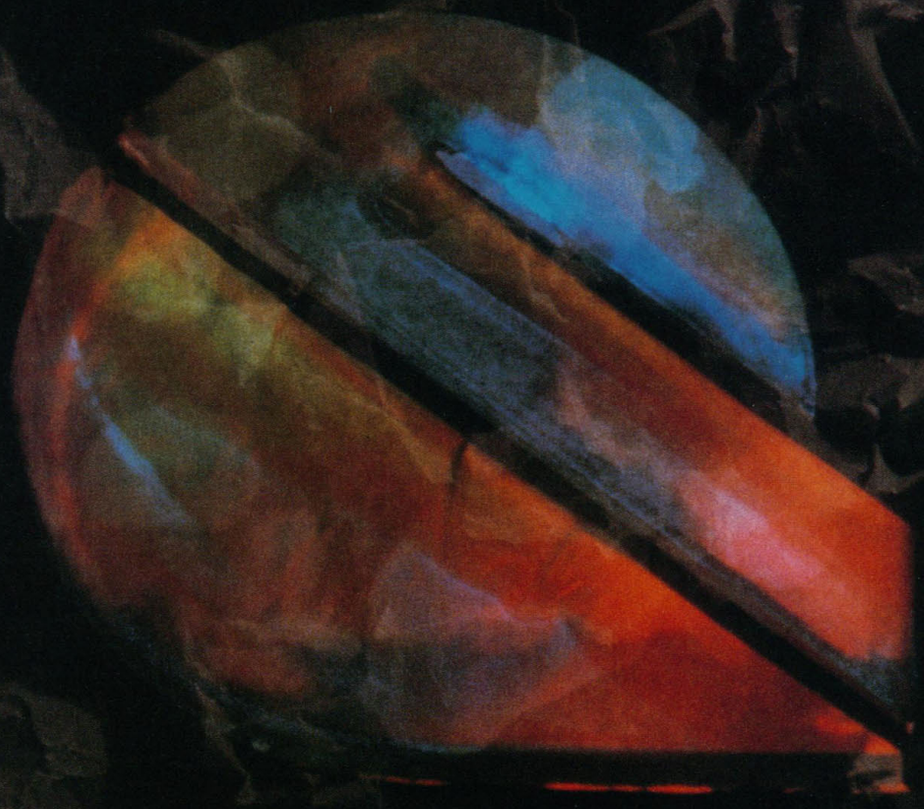

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2nd Int. Conference on Research Policies and Quality Assurance
May 6-7 / Rome (I)
Scientific Organization:
A.E. Shamoo (USA)

Nutritional Aspects of Osteoporosis
May 16-18 / Lausanne (CH)
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Stress and Reproduction
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Molecular and Cellular Biology of Reproduction
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A Molecular View of Steroid Biosynthesis and Metabolism
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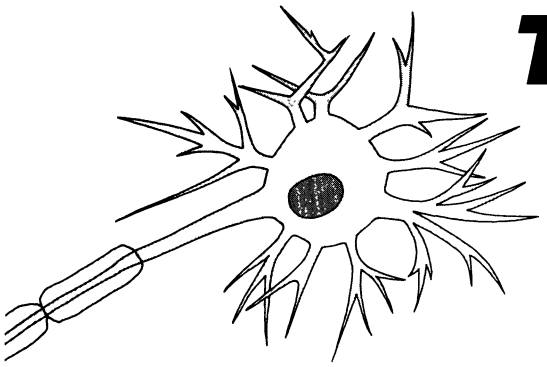

The Neurosciences

Challenges for the '90s

A Three-day Seminar at the AAAS Annual Meeting
Sheraton Washington Hotel, Washington, DC
Seminar Dates: ***16-18 February 1991***

Program

Organized by Katrina L. Kelner *(*Science *magazine)*

StimulusTranscription Coupling in Neuronal Cells

(Saturday, 16 February, 8:30 am)

Inducible Proto-Oncogenes in the Nervous System —James I. Morgan *(Roche Institute);* Regulation of Neuronal Gene Expression by Depolarization —Michael Greenberg *(Harvard);* Pleasure, Pain, and Proto-oncogenes —Michael J. Iadarola *(NIDR, NIH);* NGF Induces Transcription of Genes Encoding Zinc-Finger Proteins —Jeffrey Milbrandt *(Washington Univ., St. Louis)*

Plenary Lecture

(Saturday, 16 February, 1:00 pm)

Molecular Insights into the Function of Neurotransmitter Receptors and Ionic Channels —Shosaku Numa *(Kyoto Univ., Japan)*

Structure and Function of Potassium Channels

(Saturday, 16 February, 2:30 pm)

A Minimalist Potassium Channel —Arthur M. Brown *(Baylor College);* Molecular Studies of Voltage-gated Potassium Channels —Lily Y. Jan *(UC-San Francisco);* Structure-Function Correlations in a Family of Rat Brain Potassium Channels —Walter Stuhmer *(Max Planck Inst.);* Biophysical and Molecular Mechanisms of Potassium Channel Gating —Richard W. Aldrich *(Stanford)*

Olfaction and Taste

(Sunday, 17 February, 8:30 am)

From Ions and Molecules to Perception and Cognition —Gordon M. Shepherd *(Yale);* Molecular Mechanisms of Transduction in Olfaction: A Model for Receptor-Ligand Signaling Systems —Stuart Firestein *(Yale);* Long-term Potentiation and Serial Memory Processing in the Olfactory Hippocampal Circuit —Gary S. Lynch *(UC-Irvine);* The Initial Events in Taste Transduction —Stephen D. Roper *(Colorado State);* Sensory Coding of Gustatory Information —David V. Smith *(Univ. of Cincinnati)*

Activity-dependent Plasticity in Development and Learning

(Sunday, 17 February, 2:30 pm)

Long-term Potentiation: A Cellular Model for Learning —Roger A. Nicoll *(UC-San Francisco);* Mechanisms for Use-dependent Synaptic Plasticity in the Developing and Mature Visual Cortex —Wolf Singer *(Max Planck Inst.);* Regulation of Synapse Stabilization by Regulation of a Receptor System —Martha Constantine-Paton *(Yale);* Spontaneous Activity and the Patterning of Connections in Fetal Development —Carla J. Shatz *(Stanford)*

Cognitive Processes

(Monday, 18 February, 8:30 am)

Memory: Brain Systems and Cognition —Larry Squire *(Veterans Admin. Med. Ctr., San Diego);* Attentional Control of Visual Perception: Cortical and Subcortical Mechanisms —Robert Desimone *(NIMH, NIH);* Components of High-level Vision: A Cognitive Neuroscience Analysis —Stephen Kosslyn *(Harvard);* Neural Circuits That Mediate Perceptual Judgments of Motion Direction —William T. Newsome III *(Stanford)*

Molecular Basis of Neurological Disease

(Monday, 18 February, 2:30 pm)

Molecular Genetic Approaches to Identification of Mutant Genes in Neurological Disorders —Joseph B. Martin *(UC-San Francisco);* Molecular Genetics of Hereditary Retinal Disease: Retinoblastoma —Thaddeus P. Dryja *(Mass. Eye and Ear Infirmary);* Neuronal Polarity and Microtubule System: A Target of Alzheimer's Pathology —Kenneth Kosik *(Brigham and Women's Hosp.);* Molecular Biology and Genetics of Prions Causing Neurodegeneration —Stanley B. Prusiner *(UC-San Francisco)*

Poster Session

(Date and time to be announced)

Adjournment

(Monday, 18 February, 5:30pm)

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For complete details and a registration form, see the 19 October 1990 issue of *Science* magazine, or write to the AAAS Meeting Promotion Dept., 1333 H Street, NW, Room 815, Washington, DC 20005 (Phone: 202-326-6462; FAX: 202-289-4021).

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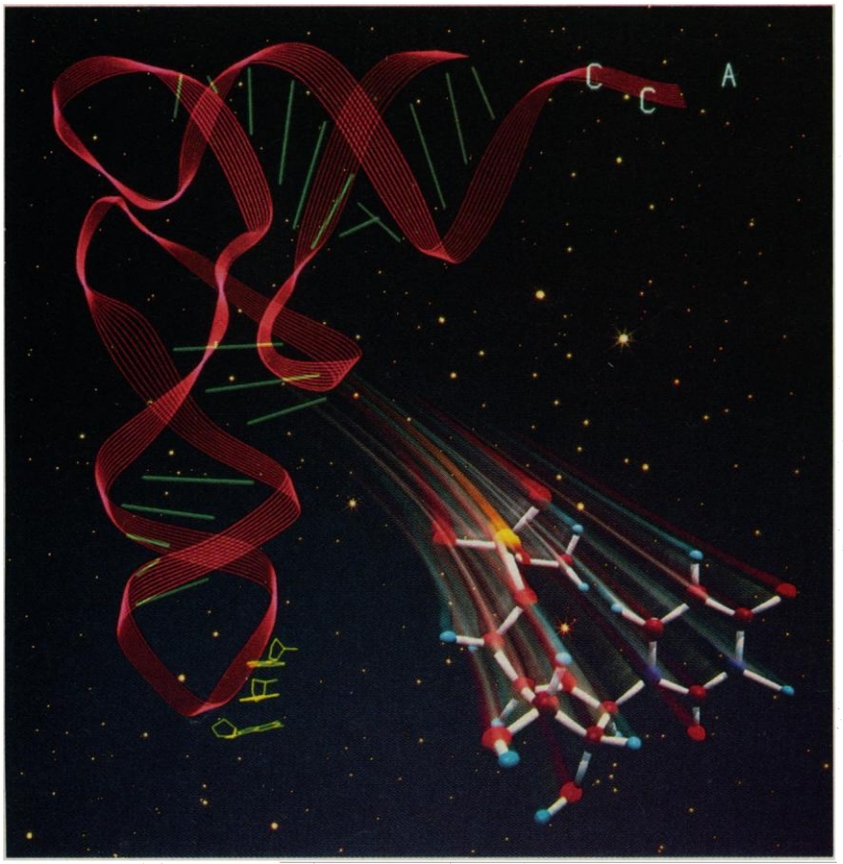

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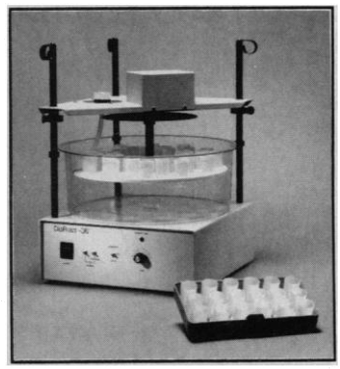

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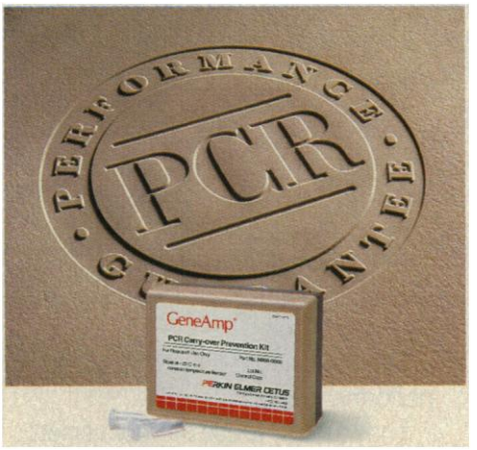

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Paperback: $34.95/ISBN: 0-12-520021-8
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February 1991, 635 pp.

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Tip Growth in Plant and Fungal Cells

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I.B. Heath

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Theodore T. Kozlowski, Paul J. Kramer, and Stephen G. Pallardy

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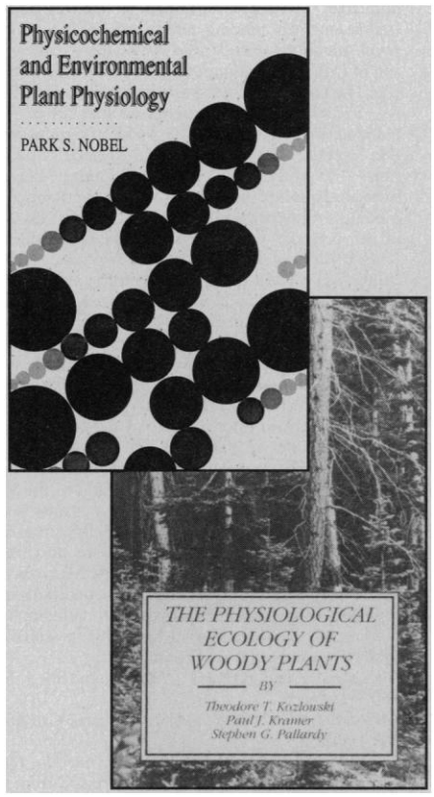

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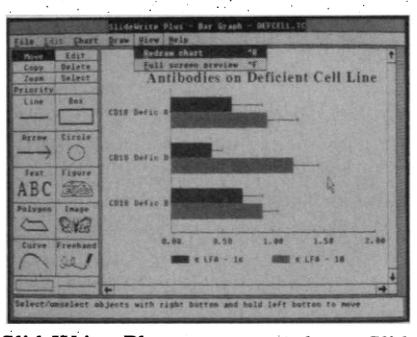

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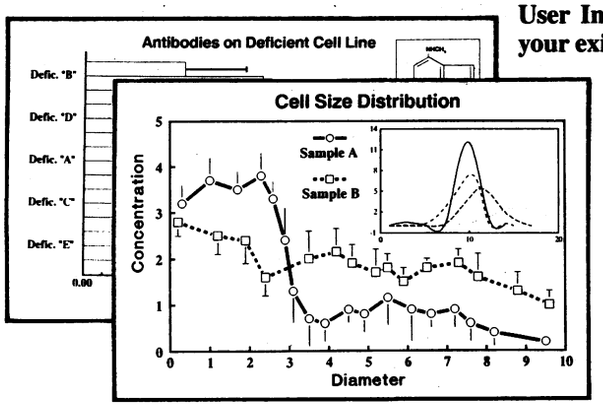

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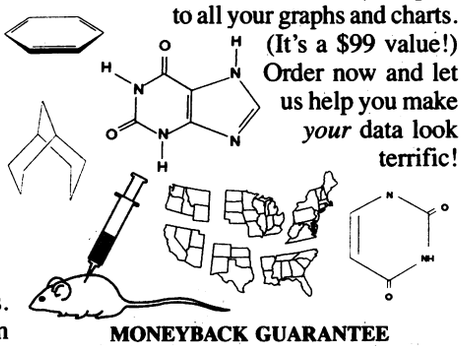

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