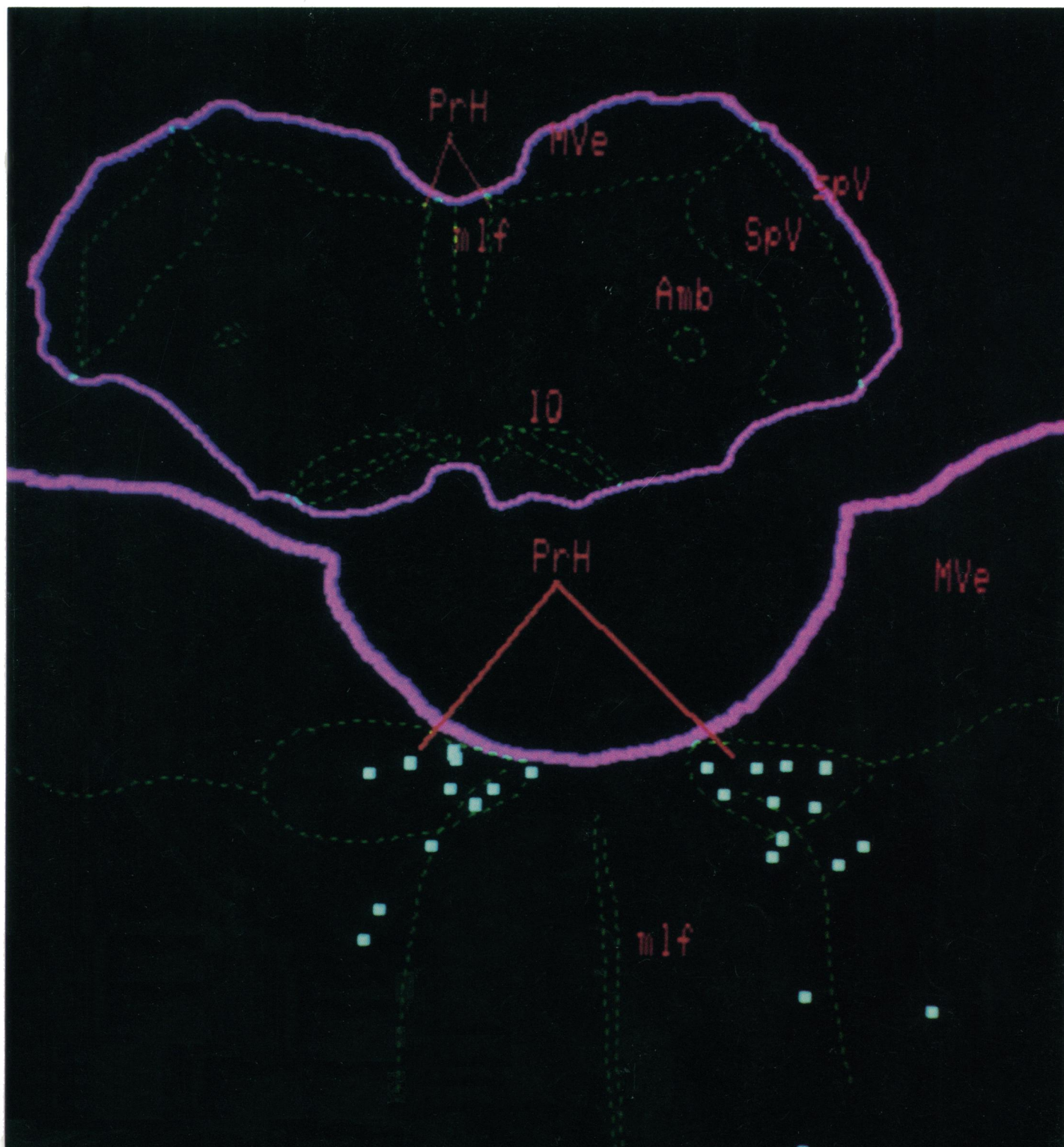


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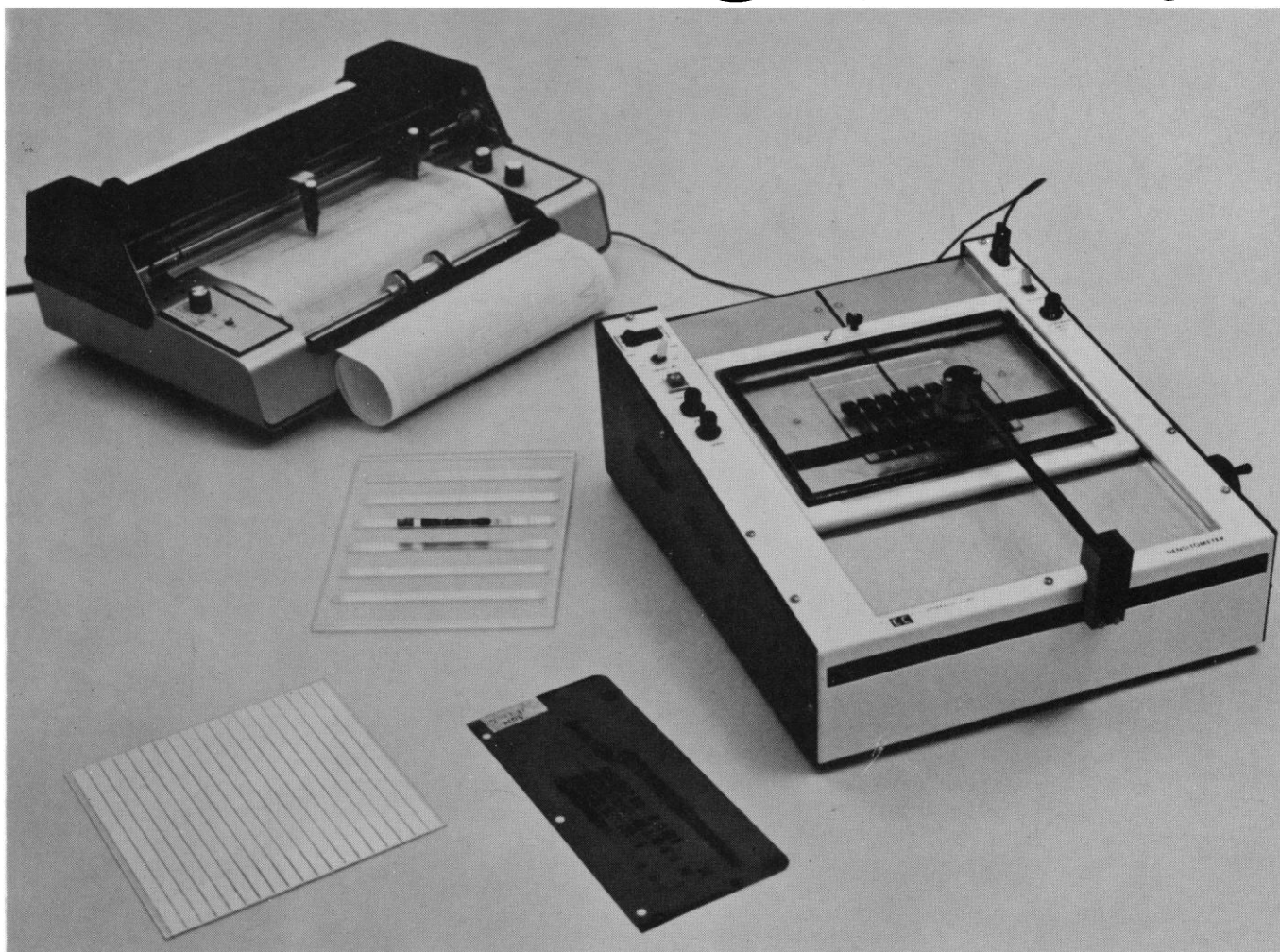
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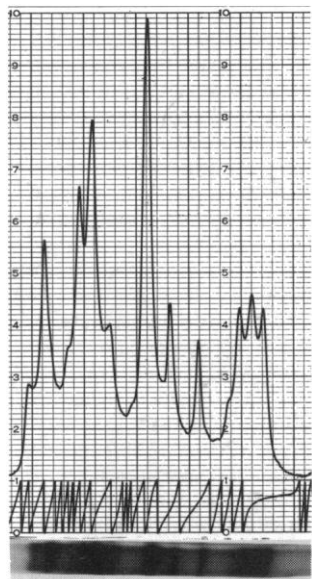
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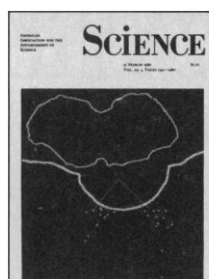
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**COVER** A video computer-aided plot (Nikon/Joyce-Loebl Magiscan) made over an enhanced video image of a brain section containing retrogradely labeled neurons (white squares) in the rostral medulla after an injection of wheat germ agglutinin-conjugated horseradish peroxidase into the locus coeruleus. Low- (upper) and high-power (lower) views of the same section are given for orientation. See page 734. [M. Shipley, University of Cincinnati Medical College, Cincinnati, OH 45267; and G. Aston-Jones, Washington Square Center for Neural Science, New York University, New York, NY 10003]

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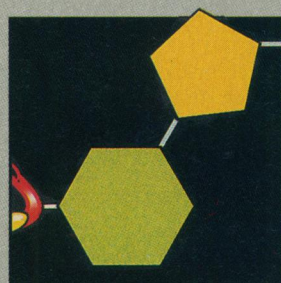
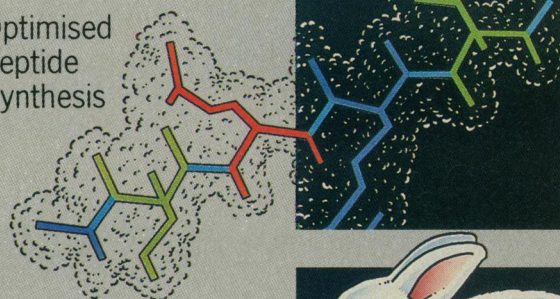


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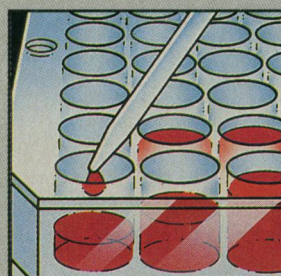
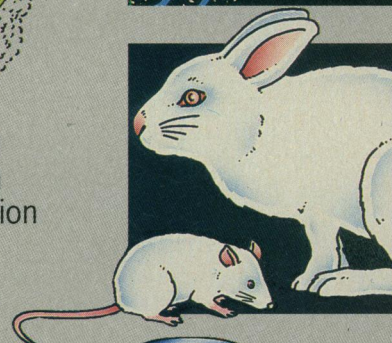
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## This Week in SCIENCE

### Complex surface interactions

**H**ow can immune complexes (antibody plus antigen) bind to receptors on cell surfaces and trigger such wide-ranging responses as the release of soluble factors, the activation of cells, and the killing of pathogens (page 718)? Ravetch *et al.* studied the DNA from mouse lymphocytes that encodes receptors for immune complexes containing the IgG2b and IgG1 immunoglobulins; macrophages had the same gene and a second one encoding such receptors. Receptor molecules had an extracellular domain, a transmembrane domain, and a cytoplasmic domain. Extracellular domains encoded by the two genes were almost identical, but the other domains were different. When immune complexes bind to what appear to be identical receptors on diverse cells, different responses can be elicited because the signals sent along the transmembrane and cytoplasmic domains to the cell's interior would differ.

### Quaking Pacific region

**I**f the pattern of the past half century continues, sometime between mid-1993 and the end of 1996 a mainshock earthquake will occur in the sparsely populated Kaoiki region of the island of Hawaii; this region has had a mainshock earthquake of magnitude 5.5 to 6.6 roughly every 10.5 years since 1930 (page 726). The Kaoiki region is situated between two volcanic summits, Mauna Loa and Kilauea, in which crustal expansion occurs. As magma rises in narrow conduits under the volcanoes and intrudes into the rift zones, stress accumulates in the crust; both strike-slip and thrusting motions have characterized Kaoiki earthquakes. Wyss suggests that the predicted timing of the next mainshock may be further refined if precursory signs can be better defined; for example, the most recent active period (in 1983) was preceded by a 2.4-year quiescence period. The model developed from the Kaoiki pattern of

earthquakes may be applicable for predicting earthquakes elsewhere in the world where similar tectonic features are found.

### Porphyrin defect

**A** serious disease of infants called hepatoerythropoietic porphyria (HEP) can occur as a result of a change in a single base in the gene that encodes the enzyme uroporphyrinogen decarboxylase (UD); the change makes the enzyme extremely unstable (page 732). Symptoms of HEP include photosensitivity, blisters, tissue destruction, overgrowth of hair, and red-colored urine; it develops in homozygous infants whose parents each carry one defective gene for the enzyme. De Verneuil *et al.* cloned complementary DNA from a porphyria patient and compared the base sequence with that of the gene for normal enzyme. Only one substantive mutation distinguished the two; the mutation led to replacement of the amino acid glycine with glutamic acid at position 281 in the defective protein molecule. Both proteins were then made in vitro; the protein encoded in the patient's gene was extremely unstable in the presence of cell lysates, but the normal enzyme molecule showed no degradation. How widely this single base change occurs and whether it accounts for all cases of HEP and for other forms of porphyria in which UD is defective must still be evaluated.

### Locus coeruleus revisited

**T**HE locus coeruleus (LC) of the brainstem, the major source of noradrenergic innervation for the brain, receives input mostly from two regions in the brain's rostral medulla, the prepositus hypoglossi and the paragigantocellularis (a region implicated in the processing of polysensory, painful, and autonomic stimuli) (page 734). Only minor input comes from two other areas, and no innervation comes from several regions previously thought to

send LC signals. This significant redefinition of the LC's neurologic circuitry is described by Aston-Jones *et al.*, who used electrophysiology and sensitive anatomic tracing techniques. When retrograde labeling defined fewer afferent connections than expected, anterograde labeling was carried out from regions previously identified as providing input to the LC; some anterograde tracer was transported to structures near the LC but not into the LC. The LC has been implicated in a range of behavioral functions (vigilance, emotions) and in the etiology of depression, Alzheimer's dementia, and other mental disorders. Its output is widespread throughout the central nervous system. Definition of its roles in brain functioning and behavior depends on precise determinations of the circuitry regulating its activity.

### Pertussis toxin, LPS, and G proteins

**B**ACTERIA and their hosts have uneasy combative relations (page 743). Bacterial substances can activate cells of the immune system, and these cells often can mount effective immune responses against the bacteria. One bacterial substance, lipopolysaccharide (LPS), readily activates both B cells and macrophages. Another bacterial product, pertussis toxin, secreted by the agent that causes whooping cough, is a potent toxin for the host; it may disarm the immune response elicited by LPS. Previous biochemical studies suggested that pertussis toxin and LPS each might interact with the G proteins that mediate transmembrane signals. Jakway and DeFranco demonstrate that pertussis toxin can inhibit activation of macrophage and B tumor cell lines by LPS and that modification (and presumably inactivation) of G proteins by pertussis toxin was complete. It is thus likely that LPS activation includes a crucial interaction with G proteins. The molecular steps in maturation and responsiveness of immunologically sensitive cells will become clearer as more signal substances participating in these processes are identified.



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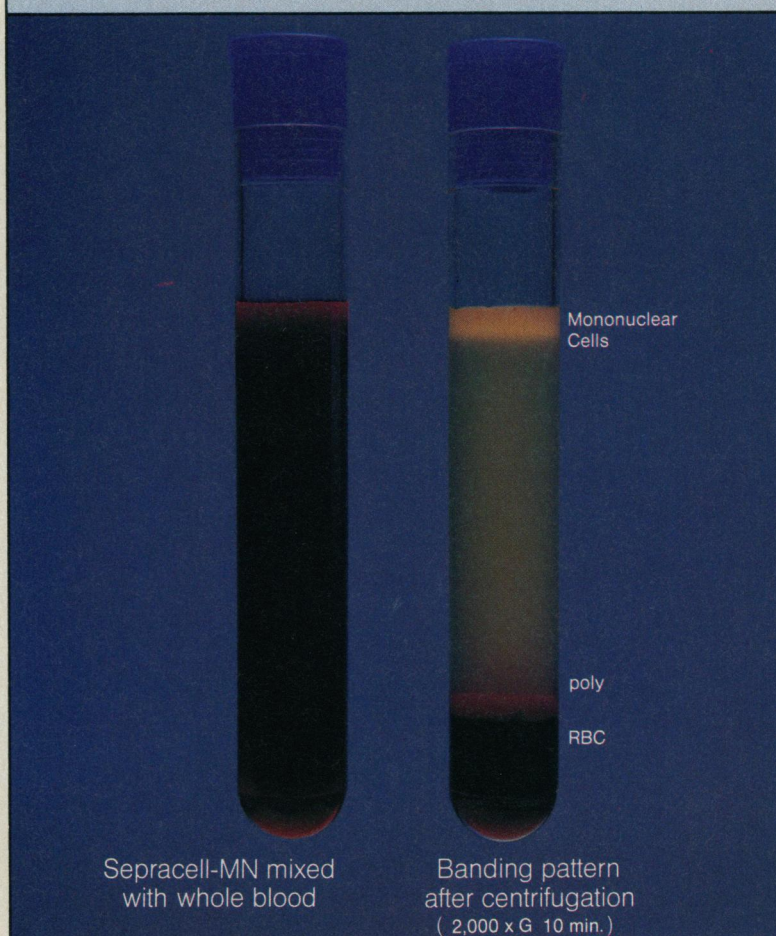
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## The International Geosphere-Biosphere Program

Continuing and increasing concern about possible anthropogenic influences and other factors that determine habitability of the earth has led to initiation of a decades-long international program by the International Council of Scientific Unions (ICSU). Authorization of the International Geosphere-Biosphere Program (IGBP) occurred at ICSU's 21st General Assembly in Berne, Switzerland, 14 to 19 September 1986. The International Council of Scientific Unions is one of a number of organizations fostering this program,\* and it has limited financial resources. However, when a global scientific effort is to be made, ICSU is the best today to coordinate the effort. It has the necessary convening power and prestige to elicit cooperation of leading scientists of countries of the East and the West, the North and the South. The objectives of IGBP are "to describe and understand the interactive physical, chemical and biological processes that regulate the total Earth system, the unique environment it provides for life, the changes that are occurring in that system, and the manner by which these changes are influenced by human actions." What makes these objectives approachable is the existence and potential existence of enormously powerful new instrumentation coupled with data-handling systems, computational power, and models to be tested.

Thomas Malone reminds us that "the emerging capabilities of remote sensing from satellites are making possible global synoptic measurement of . . . the surface temperature of the earth to an accuracy of 1°C; the global distribution of atmospheric clouds, ocean waves, currents, and eddies; the extent of ice on both sea and land; the mean chlorophyll density on land and in the ocean surfaces; and global patterns of agriculture and forests."\*

Geophysicists have taken a leading role in the formulation of the program. However, they realize the importance of biological processes in determining global conditions. For example, enhanced production of methane by methanogenic organisms is influencing ozone content of the atmosphere. Careful measurements of production of gases at biomes will produce important information. Satellite measurements of vegetation and chlorophyll content of marine organisms require calibration and interpretation.

The program will include observations that extend from the sun to the interior of the earth. The study of the sun will include observations at many wavelengths. Variations in solar radiation striking the earth are thought to have had a key role in great climatic changes such as the ice ages. Thus one of the difficulties of detecting and measuring a greenhouse effect is uncertainty about variations or trends due to changing relationships between the sun and the earth.

It is accordingly particularly desirable to continue to examine evidence of prehistoric environmental changes. The global changes in the past half-million years were far larger than anything seen in historic times and may have been more rapid. Sea level fluctuated more than 100 meters during the transition from eras that were warm and wet to those that were cold and dry. The indicators of change or objects to be studied include global ice volume, tree-ring widths, ice cores, and isotope and chemical ratios in lake and ocean sediments.

The likelihood is that the International Geosphere-Biosphere Program will begin slowly during a continuing planning stage as various countries decide how they will participate. During the early phases the National Science Foundation will be a key supporter of U.S. activity related to the program. Eric Bloch, director of NSF, has announced an effort in Global Geosciences for fiscal year 1987 that includes global tropospheric chemistry, global ocean climate, global ocean flux, global ecosystem dynamics, oceanic ridge crest processes, and a global digital seismic network. Other U.S. agencies such as NASA and NOAA will participate and more intensively later. In any event, the United States is beginning fast. It cannot alone carry out a global program, but its commitment and example will not be lost on others.—PHILIP H. ABELSON

\*T. F. Malone, *Environment* 28, 6 (1986).



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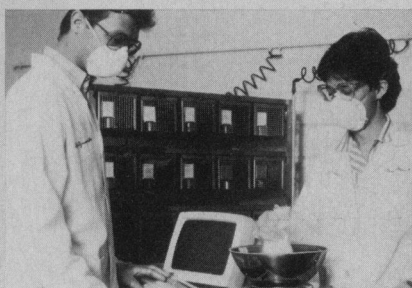
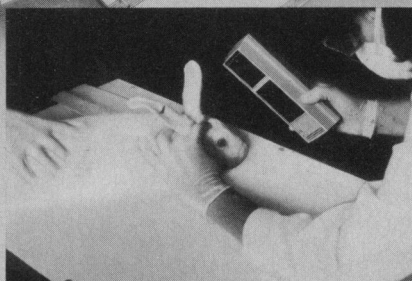
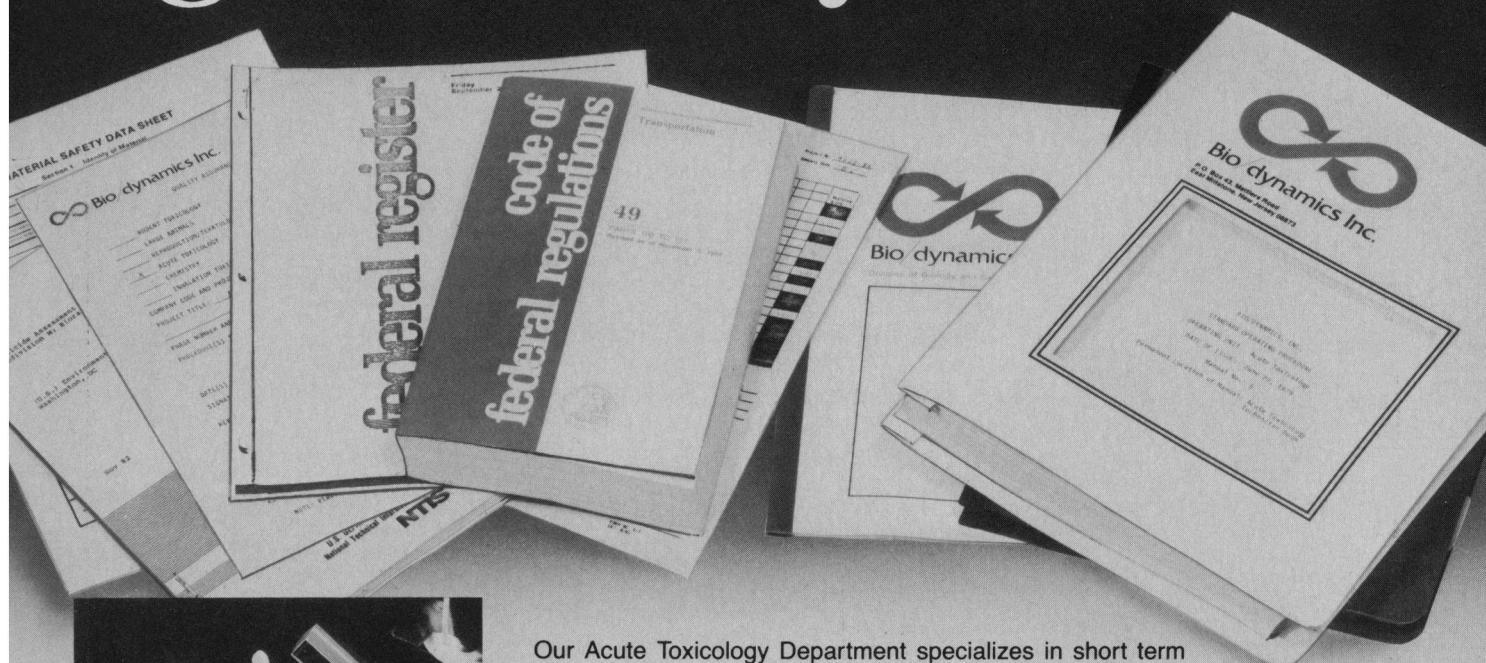


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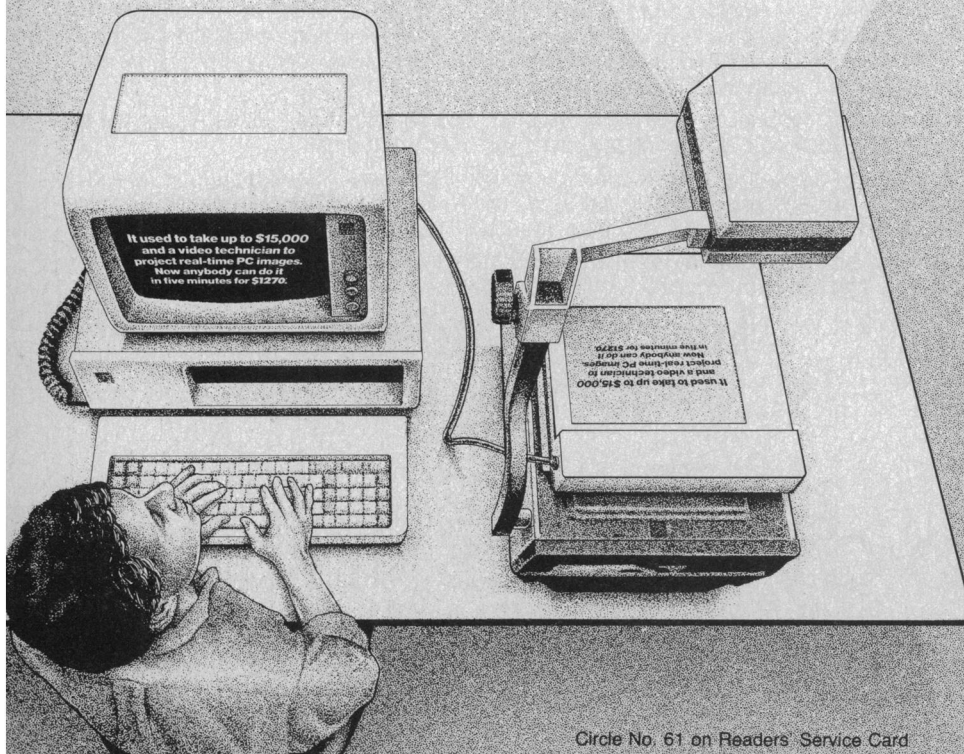
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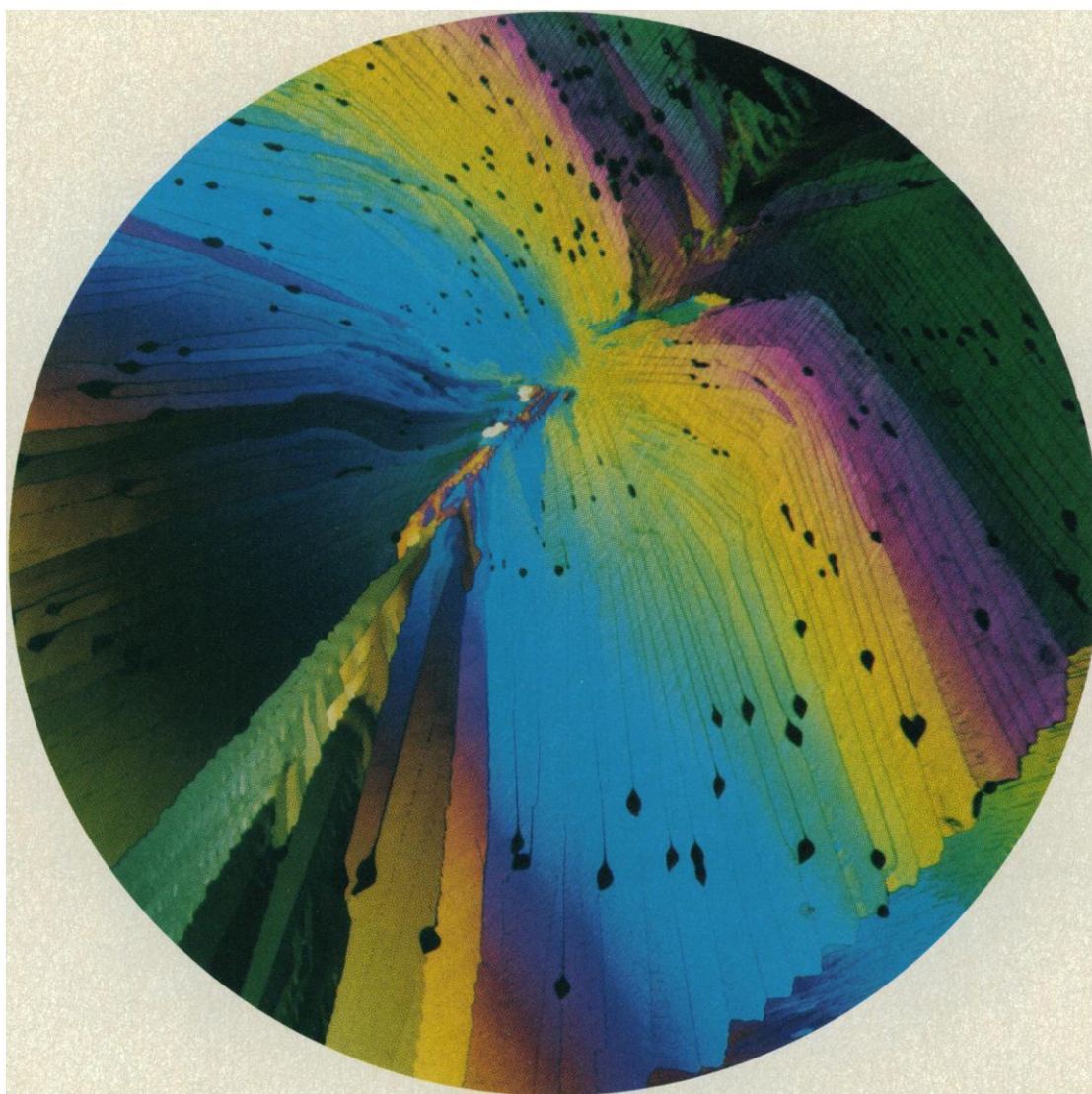
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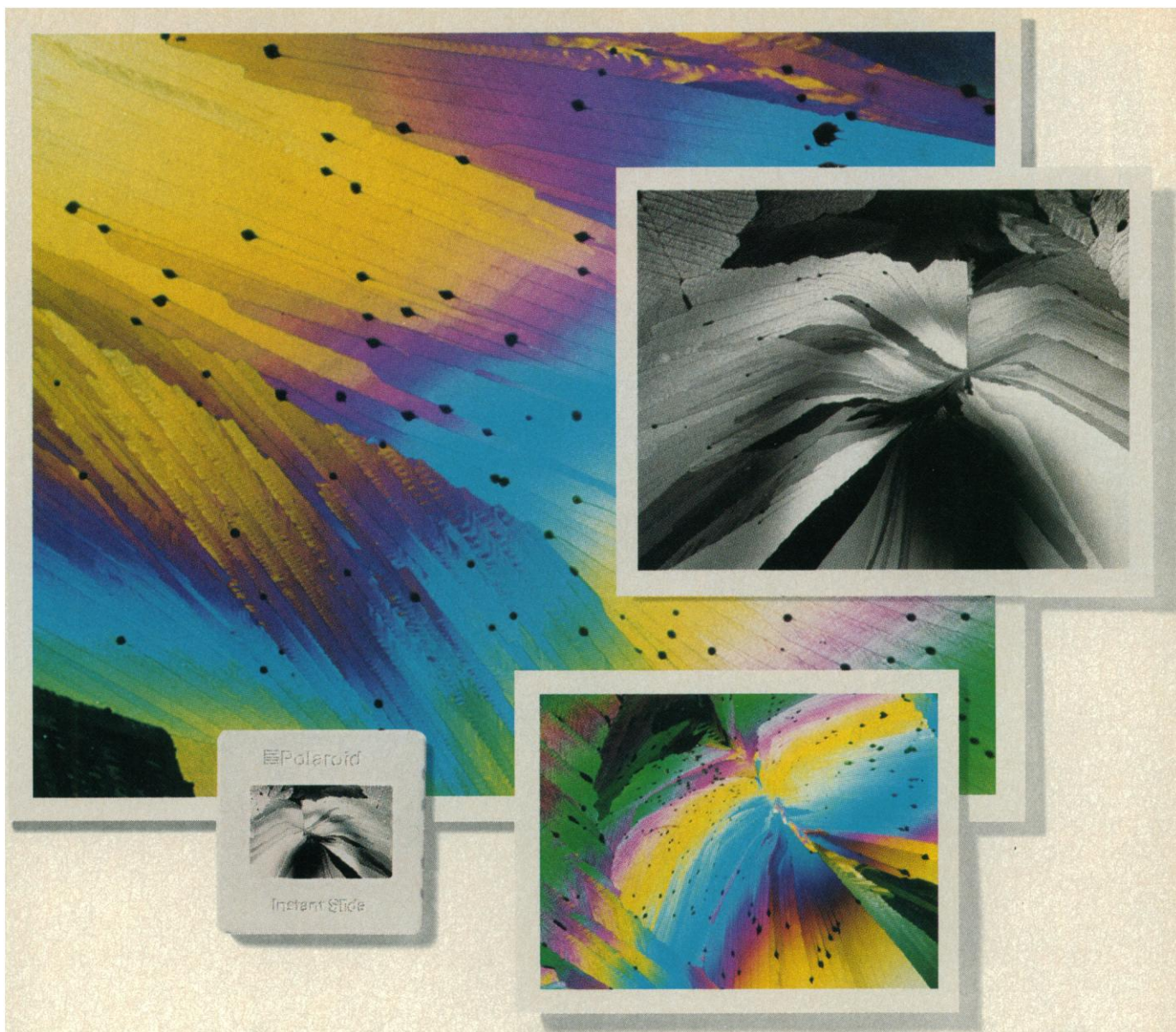
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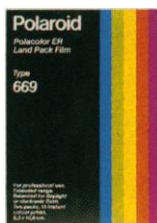
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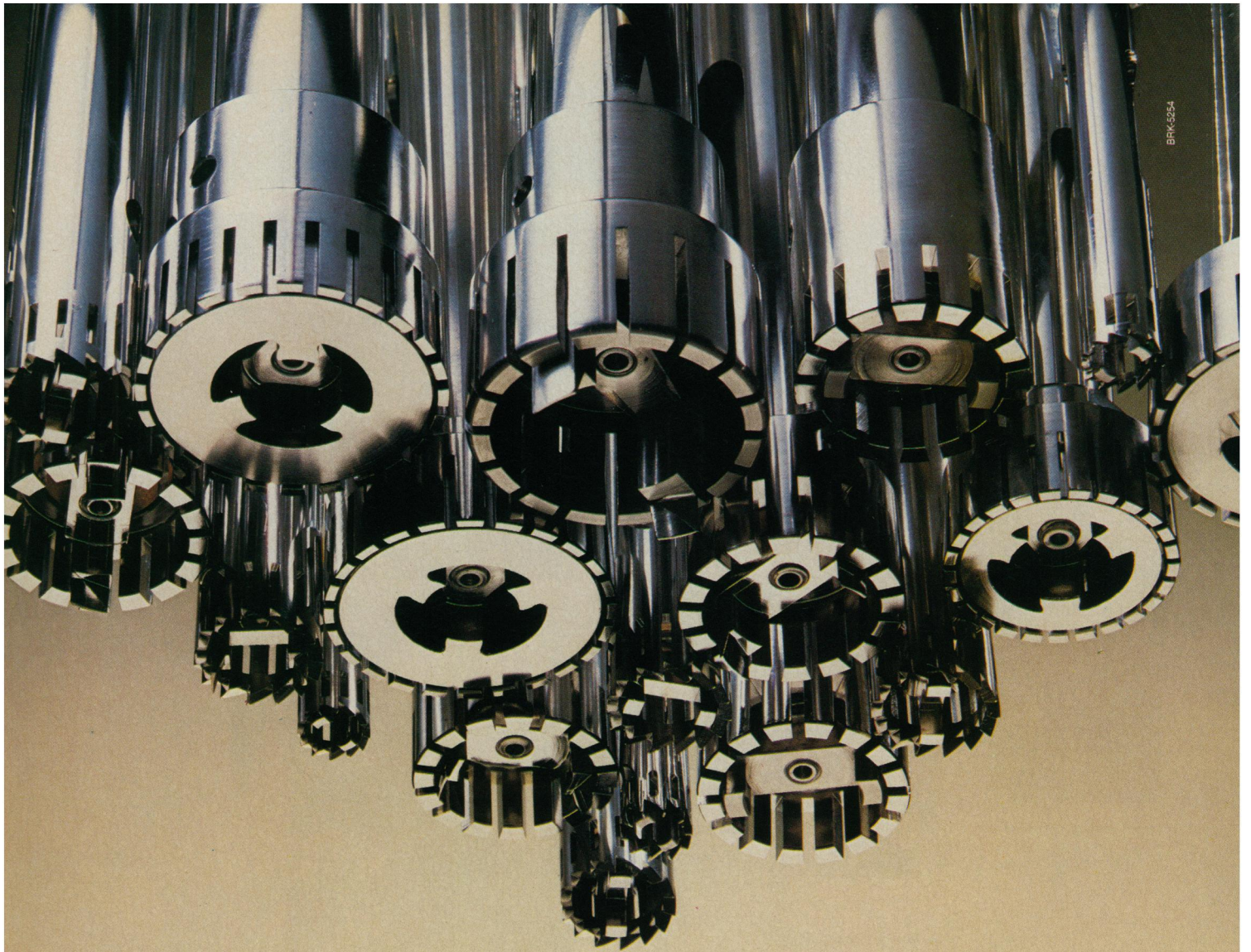
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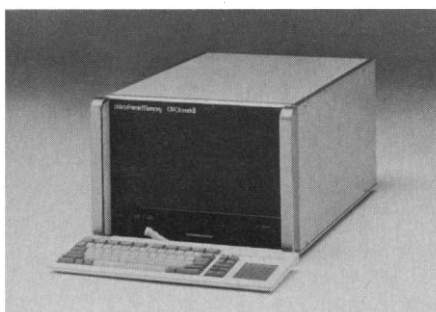
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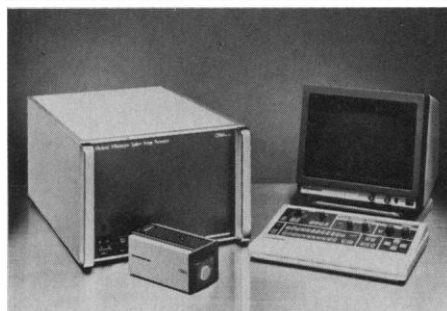


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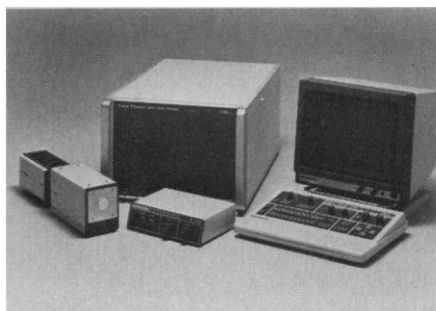


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14-18 February 1987 ♦ Chicago

### Program:

#### Sunday 15 February:

- 9:00AM **Neurogenetics:** F. BLOOM (Scripps),  
J. MARTIN (Harvard), R. QUARLES (NIH)
- 1:15PM **Keynote Lecture:** S.H. SNYDER (Johns  
Hopkins) on Receptor Systems in the Brain
- 2:30PM **Ion Channels:** W. AGNEW (Yale),  
J.P. CHANGEUX (Pasteur Inst.),  
J. LINDSTROM (Salk Inst.),  
K. MAGELBY (U. Miami)
- 6:30PM **Cocktail Reception** (cash bar)
- 9:00PM **Poster Session** for all seminar registrants\*

#### Monday, 16 February:

- 8:30AM **Ion Channels:** F. BEZANILLA (UCLA),  
R. LLINAS (NYU), R. TSIEN (Yale),  
K.W. YAU (Johns Hopkins)

- 1:15PM **Plenary Lecture:** D.L. ALKON (NIH)  
on Biophysical and Molecular Mechanisms  
of Associative Memory
- 2:30PM **Second Messengers:** R. DELORENZO  
(Med. Coll. of VA), L. KACZMAREK  
(Yale), I. WALAAS (Rockefeller)
- 10:00PM **Poster Session** for all seminar registrants\*

#### Tuesday 17 February:

- 9:00AM **Axonal Transport:** J. GRIFFIN (Johns  
Hopkins), R. LASEK (Case Western  
Reserve), T. REESE (NIH)
- 2:30PM **Neural Systems:** E. BIZZI (MIT),  
C. GILBERT (Rockefeller), A. GRINVALD  
(Rockefeller), R. RAKIC (Yale)

\* All registrants are encouraged to submit abstracts for  
poster sessions. (See 12 September 1986 issue of  
*Science*, page 1206, for appropriate format.)

Space is limited, so register now by completing and returning the form below.

### Advance Registration Form AAAS Annual Meeting

Name of registrant \_\_\_\_\_  
(Last) (First & initial)

Name of spouse registrant \_\_\_\_\_  
(Last) (First & initial)

Institution/Company \_\_\_\_\_  
(To be printed on badge) (Registrant)

\_\_\_\_\_  
(Spouse registrant)

Mailing address \_\_\_\_\_  
(Street)

\_\_\_\_\_  
(City/State) (Zip code) (Telephone number)

Convention address \_\_\_\_\_  
(Where you can be reached) (Hotel and/or telephone number)

Sat Sun Mon Tue Wed

Check days on which you will attend meeting: ☐ ☐ ☐ ☐ ☐

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■ Your registration badge, receipt, and voucher for full Program and Abstracts will be mailed to you in early January. ■ Registrations received after 30 January will be held at the Advance Registrants' Desk at the Hyatt Regency Hotel. ■ Refund requests must be made by letter or telegram to the above address before 6 February 1987 and will be honored after the Meeting. No refunds are made on cancellations received after this date. ■ Student registration fees apply to full-time undergraduate or graduate students only.

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Send confirmation to:

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(Street)

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(Name) (Name)

Indicate special housing needs due to a handicap:

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Arrival date \_\_\_\_\_

Time \_\_\_\_\_ ☐ a.m. ☐ p.m.

Departure date \_\_\_\_\_

Time \_\_\_\_\_ ☐ a.m. ☐ p.m.

Be sure to list definite arrival and departure dates and times. reservations will be held only until 6 p.m. unless accompanied by 1 night's deposit or major credit card guarantee.

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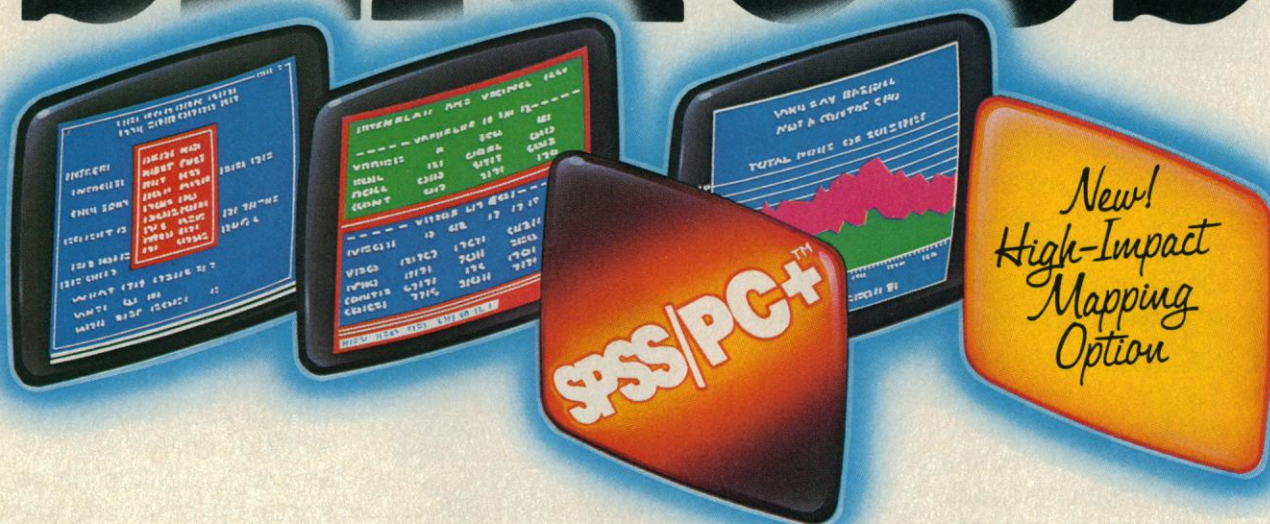
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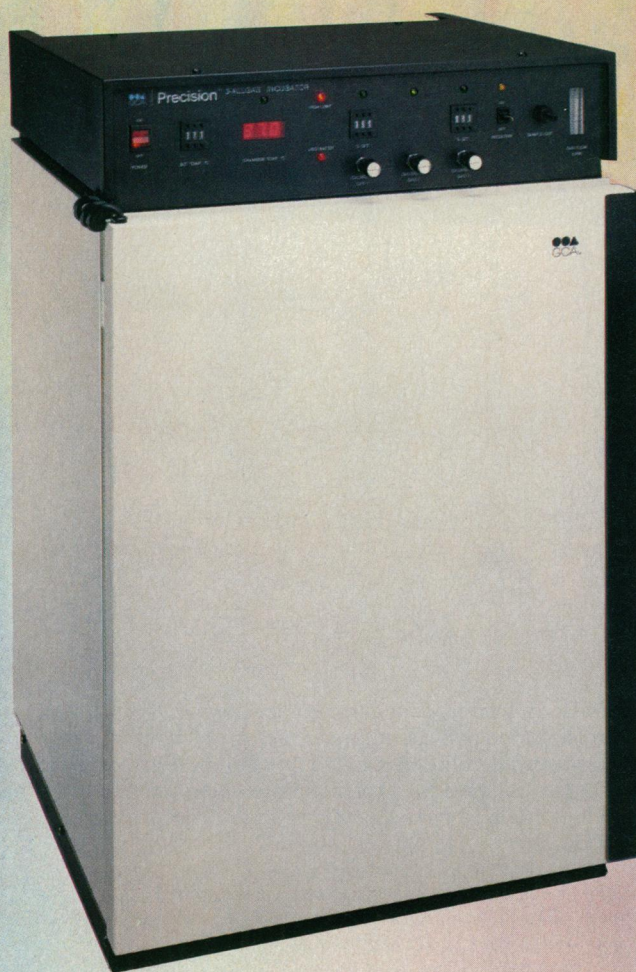


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*presented by Scherago Associates and Mary Ann Liebert, Inc., publishers*

**Co-chairmen** DNA: Walter L. Miller, Peter Gruss  
HYBRIDOMA: Zenon Steplewski, Hilary Koprowski, Joseph Davie

**Sunday, March 1** Joint keynote addresses: Stephen Goff, Alexander Rich

**Monday, March 2** Joint Session: **Aids Research and Therapy** Erling Norrby, *chairman*

**Speakers** Dani Bolognesi Robert Gallo Jay Levy Bernard Moss Robin Weiss  
Myron Essex William Haseltine Luc Montagnier Simon Wain Hobson Flossie Wong-Staal

DNA Immunopathology of AIDS Erling Norrby, *chairman*  
Chromatin Gary Felsenfeld, *chairman*

**Tuesday, March 3**

DNA Transcription George Khoury, *chairman*  
Intracellular Protein Targeting Harvey Lodish, *chairman*

HYBRIDOMA Working Groups on Immunodiagnosis and Immunotherapy  
Transgenic Mice as Tool in Immunology Davor Solter, *chairman*  
Anti-idiotype Vaccines Donald Capra, *chairman*

**Wednesday, March 4**

DNA Neurobiology James L. Roberts, *chairman*  
Developmental Biology Peter Gruss, *chairman*

HYBRIDOMA Use of Hybridomas in Determining Cytokine Structures and Functions Robert Schreiber, *chairman*  
Anti-carbohydrate Mab's in Study of Glycolipid-Mediated Cellular Effects Jan Thurin, *chairman*

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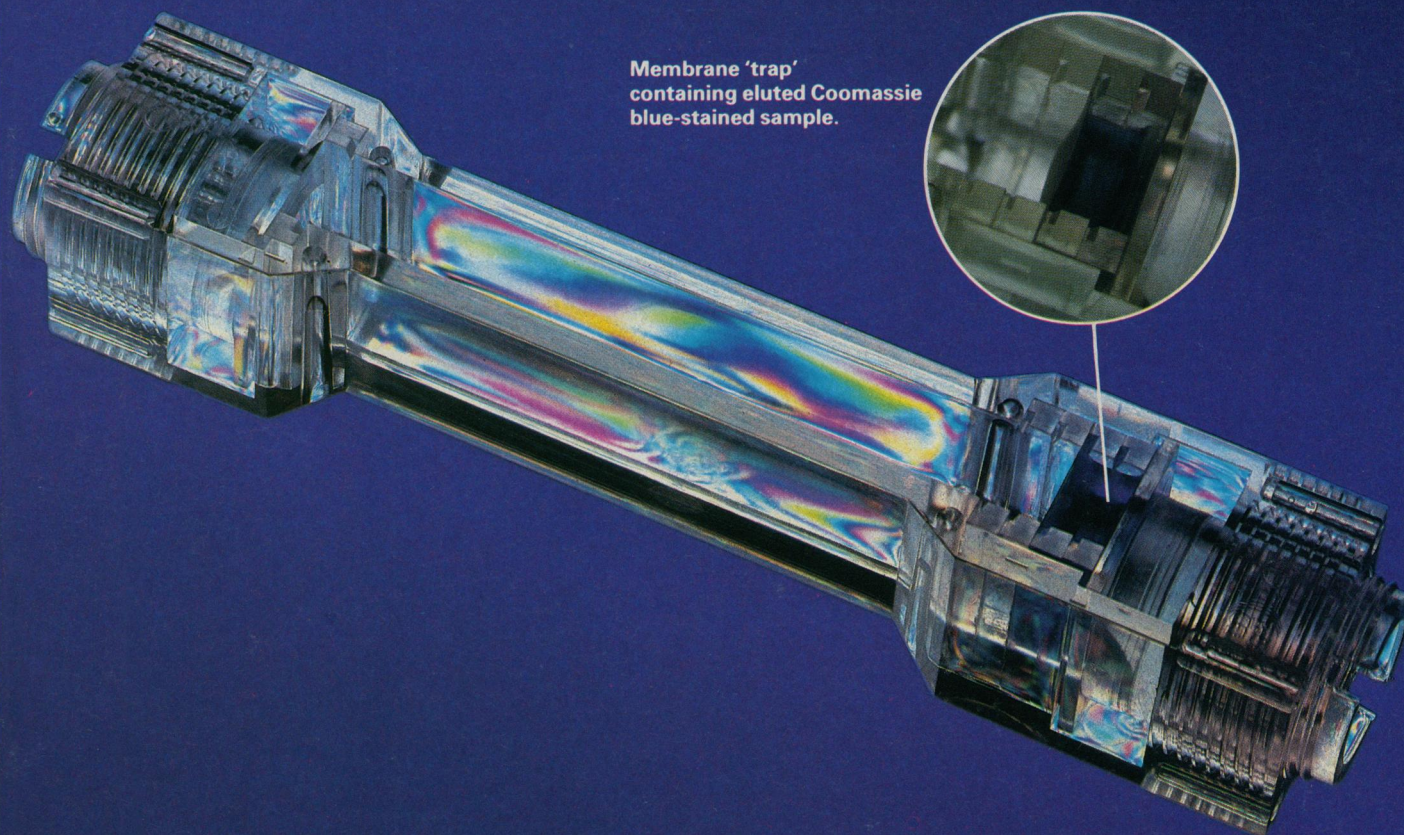
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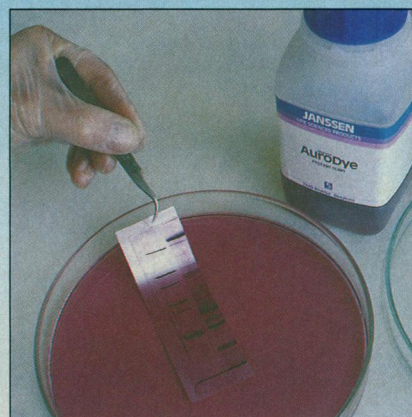
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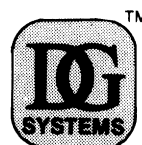
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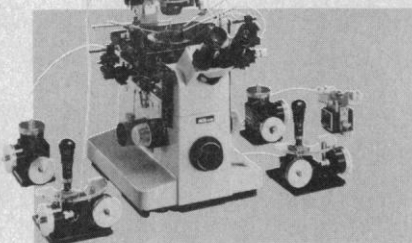
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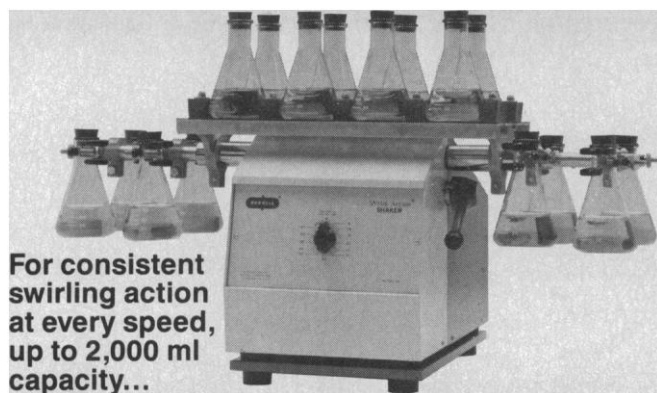
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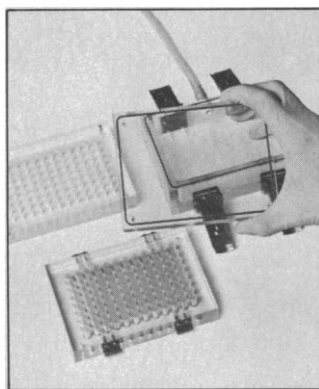
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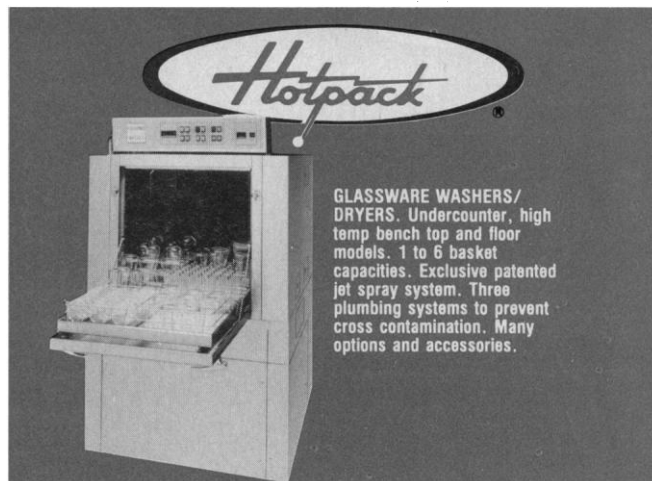


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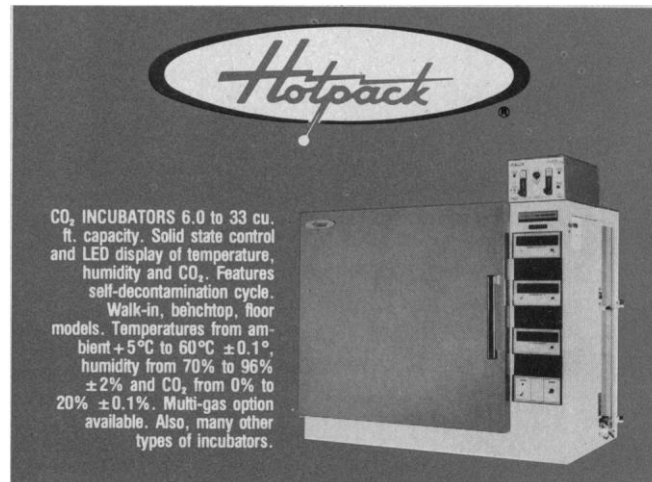
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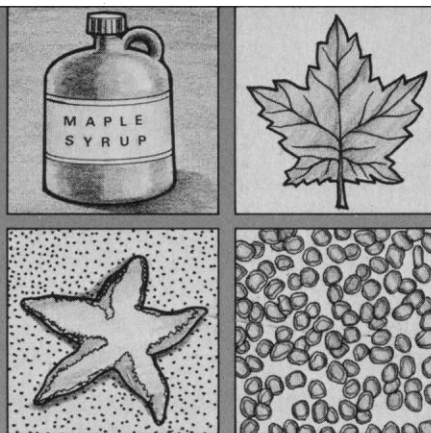


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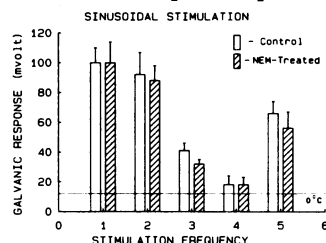
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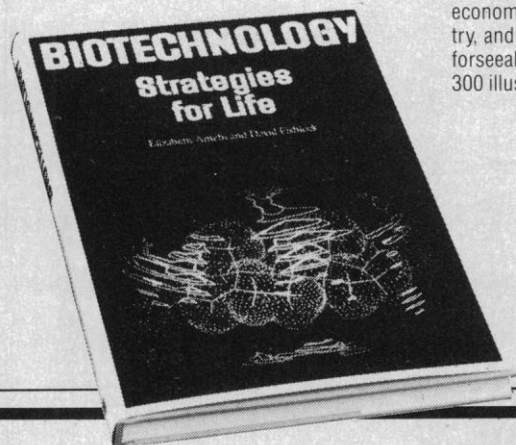
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


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- |  |   |
|--|---|
| 1. What kind of work do you do?<br><input type="text"/>  | 5. If YES, what size quantity would be<br>most useful to you?<br><input type="text"/>   |
| 2. Does your work involve amino acids?<br><input type="checkbox"/> YES <input type="checkbox"/> NO   | 6. Do you make actual purchasing decisions<br>on the amino acids you use?<br><input type="checkbox"/> YES <input type="checkbox"/> NO |
| 3. What other chemicals do you regularly<br>use?<br><input type="text"/>   | 7. If NO, who does make the actual<br>purchasing decision, by title?<br><input type="text"/>  |
| 4. Would it be helpful to you if amino acids<br>were available in smaller quantities?<br><input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> NO PREFERENCE |   |

*Thank you for your help.*

Circle No. 95 on Readers' Service Card