American Association for the Advancement of Science

SCIENCE

4 September 1987
Vol. 237 ■ Pages 1085–1272
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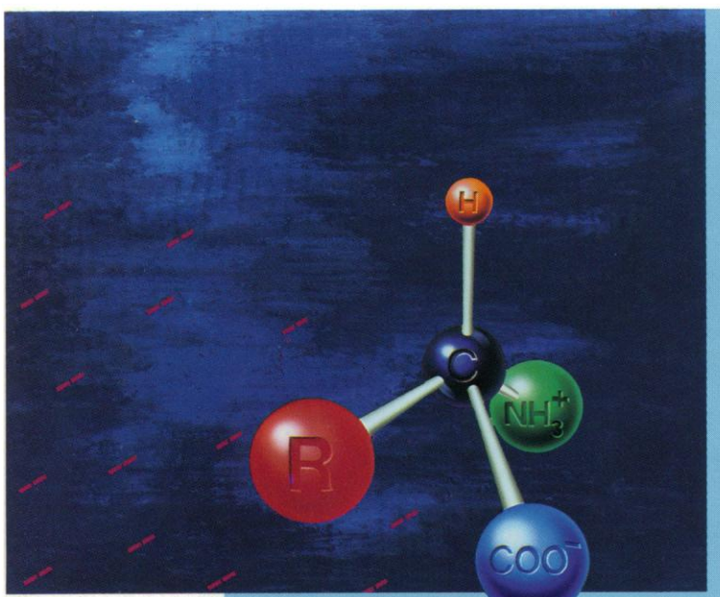

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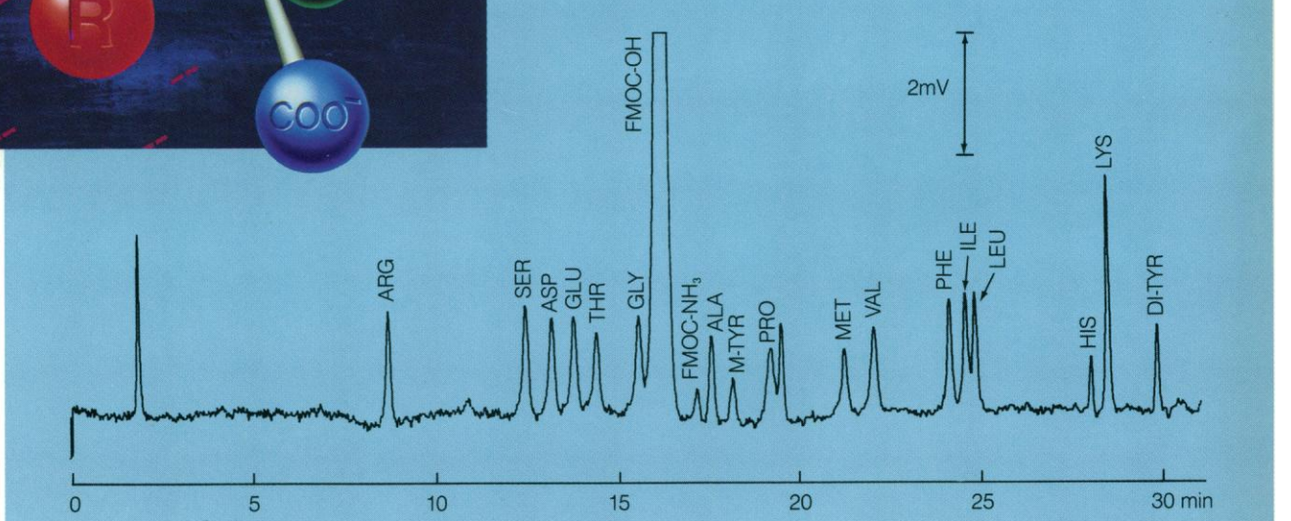

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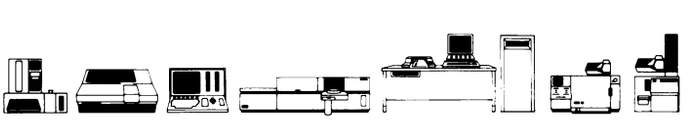

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COVER An overview of European scientific research is reported in this issue. See page 1125. [Collage by Sharon Wolfgang, Washington, D.C. Photo credits, clockwise (starting with top left): Neuron, Rita Levi-Montalcini, National Research Council, Rome, Italy; yeast cells, Kim Nasmyth and David Shore, Medical Research Council Laboratory of Molecular Biology, Cambridge, England; beam geometry, D. A. Wiersma, University of Groningen, Groningen, the Netherlands; street scene, anonymous; French text from *Annales de la Fondation Louis de Broglie*, p. 15, vol. 12, no. 1, 1987; corn, Ronald E. Phillips, University of Kentucky, Lexington, KY; superconductor, IBM; and (center) leukocyte, Bengt Samuelsson, Karolinska Institutet, Stockholm, Sweden (photo by Lennart Nilsson)]

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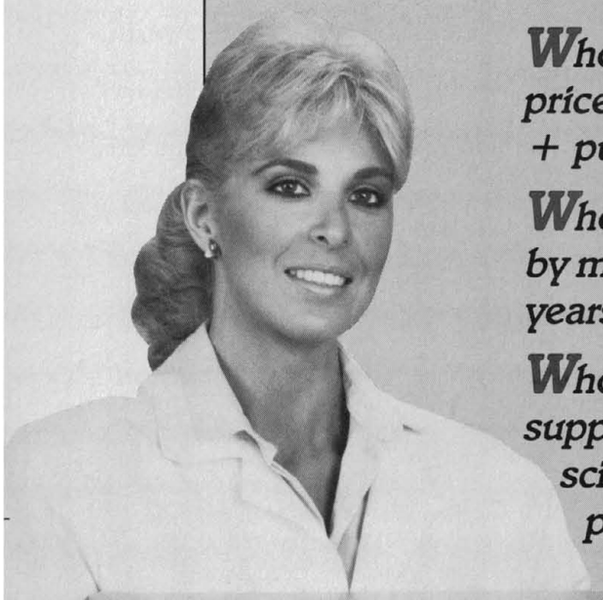

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This Week in SCIENCE

High-temperature superconductors

ONE of the major scientific news stories of the past year was the discovery of high-temperature superconductors; these materials carry electricity without experiencing electrical resistance (page 1133). With almost each new report (of which there have been 100 or more already), these layer-like copper oxides have been improved upon; each new generation of superconductors has conducted electricity at higher temperatures than the previous generation. Müller and Bednorz describe the scientific milestones that preceded their discovery of high-temperature barium-lanthanum-copper superconductors, the rapid confirmation of and improvements on their results by Japanese, Chinese, and U.S. scientists, properties of the new materials (including the observation of a superconductive glass state), and expected applications of the superconductors. This is one of nine articles highlighting European contributions to science; Koshland's editorial discusses the growth and development of science in Europe and factors that have contributed to Europe's scientific productivity (page 1093).

Antarctica's lower crust

VOLCANIC eruptions in recent geologic time have brought chunks of rock from the earth's lower continental crust to the surface; such rocks, found strewn over a 12,000-square-kilometer area of Antarctica, provide information about the composition, age, and other features of the lower crust, a portion of the earth about which little is known (page 1192). Kalamarides *et al.* describe the isotopic (strontium and oxygen) and major and trace element compositions of 20 inclusions; two different groups of inclusions were identified with no transitional rocks that would link the sets. One type was recovered on each side of the Transantarctic Mountains, the natural boundary splitting Antarctica into east and west. The Transantarctic Mountains in this region appear to be marking an ancient crustal suture, probably Precambrian in age. The lower crust under the Transantarctic Mountains appears to be older than that under the Ross Embayment; this heterogeneity supports the theory that Antarctica formed from collisions of regions that had different crustal compositions.

Earthquake signals

LOCAL magnetic field changes, registered as seismomagnetic signals by two proton magnetometers, were recorded in conjunction with the 8 July 1986 earthquake near North Palm Springs, California (page 1201). The detectors, 3 and 9 kilometers from the epicenter, had been positioned with 22 others along the San Andreas fault in 1979 for the purpose of detecting earthquake-associated changes; they had been collecting information at 10-minute intervals for 8 years. The magnetic changes were rapid, completed within 20 minutes, and permanent (the magnetic properties of the local rocks have remained offset). Stress of this magnitude (the earthquake was a moderate one of magnitude 5.9) can induce local magnetic field changes in rocks. The findings of Johnston and Mueller are consistent with a causal relation of the magnetic anomalies with tectonic change and stress; whether such signals will be of use in earthquake prediction depends on how early precursory signals can be detected and how perfectly the signals will correspond only to seismic events.

Cerebral malaria and tumor necrosis factor

CEREBRAL malaria develops in only 0.5 to 1% of the 200 million people afflicted annually with malaria, yet, of the 1 million malaria deaths each year, more than 50% suffered cerebral disease (page 1210). Some insights into how this complication arises and how its development might be stopped have been obtained through studies with a mouse model system. Grau *et al.* found that tumor necrosis factor (TNF-α), a product of macrophages, contributes to and appears to be essential for the development of neurovascular complications in mice infected with *Plasmodium berghei* anka. Accumulation and activation of macrophages in the brain blood vessels may account for the brain pathology. A single injection of antibody to TNF-α into mice at a time in infection before signs of cerebral malaria appeared protected the animals against cerebral symptoms; mice that did not receive antibody developed acute neurologic symptoms and died within 6 to 14 days. TNF-α has previously been shown to be toxic for some malaria parasites; thus, like other immune mediators, it may have both beneficial and detrimental effects.

Amphibian in amber

AN adult frog that was encased in amber 35 to 40 million years ago has been recovered from the La Toca amber mine in the Dominican Republic (page 1215). The *Eleutherodactylus* frog had a broken arm and leg and appears to have suffered some trauma before its entombment. Poinar and Cannatella suggest that a predator, perhaps a bird, may have carried the frog to a nest in a resin-secreting tree (amber is a fossil resin), where the frog and parts of the nest containing other frog bones, fly maggots, and a centipede were covered with resin before the frog could be devoured. The Dominican Republic is on Hispaniola, a composite island that formed 5 to 9 million years ago when the North Island (once connected to Cuba and Puerto Rico) and the South Island (once contiguous with Jamaica and the Yucatan) collided; the North Island region has 16 endemic species of *Eleutherodactylus*, the South Island has 28, and 5 species are common to both. The exact species identification of the encased frog will be of use for distinguishing between competing theories about how similar fauna become established on separate land masses.

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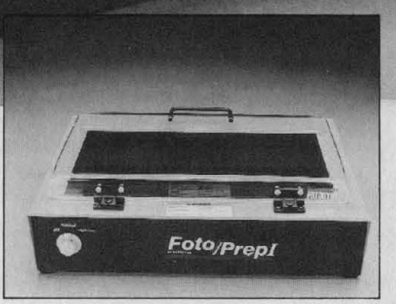

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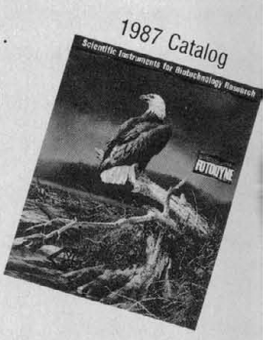

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SCIENCE

4 SEPTEMBER 1987
VOLUME 237
NUMBER 4819

Science in Europe

"Infinite riches in a little room" is a phrase of Christopher Marlowe's that aptly describes the past history and present accomplishments of the region that was the cradle of professional science as we know it today. Individual scientists in mathematics, chemistry, and physics existed in the early history of India, China, and the Middle East, but the great names of modern science began to emerge in the 17th and 18th centuries in Europe. It is of interest to speculate on the particular combination of factors that led to this flowering. Europe in that era combined qualities of elitism and democracy, respect for authority and rebelliousness, philanthropy and industrial aggressiveness, on which science flourishes. Science requires elitism, an elitism of ability and dedication rather than entrenched privilege, and it establishes a measure of accomplishment that is not based on the assumption that all are equal. However, science will flourish only in a democratic environment in which unknown investigators in a veterinary college can challenge the leading chemists in the most illustrious institutions. Science is built on respect for previous scientists but is accelerated by rebellions that overthrow dogmas of the past. Scientists must be adventurers, but they are usually impecunious and need wealthy patrons, either private individuals or government treasuries.

The political ferments, nascent democracies, industrial revolution, and geographical explorations by Europeans in that period undoubtedly provided an encouraging atmosphere for scientists. Gradually the gifted amateur was replaced by the paid professional, and larger laboratories and organized structures emerged. Today, science in Europe is flourishing, even though impending changes in funding pose some serious problems.

This issue of *Science* selects a few individuals out of hundreds who might have been chosen to represent the colorful spectrum of developments radiating from Europe. Müller and Bednorz describe the new class of superconductors that has turned solid-state physics into a turbulent fluid of publication and excitement. Samuelsson and colleagues describe the expanding universe of arachidonic acid metabolites that have been shown to play a dramatic role in cellular responses associated with immunity and inflammation. Wiersma and Duppen demonstrate that picosecond spectroscopy is an advance of many orders of magnitude over Galileo's use of his heartbeat for timing purposes. Schell moves plant genes ad libitum in another green revolution. Courtillot and Besse show that the earth's mantle moves too, but at 5 centimeters per year and even hesitates occasionally for a few million years. Nasmyth and Shore use modern techniques to clarify the cell cycle of the most domesticated of our eukaryotes, yeast, and Levi-Montalcini describes the growth factor that shapes our brains even as we sleep.

Therborn describes the movement of labor and the treatment of immigrants, and the policies and funding of science in representative countries in Europe are compared to that of Japan and the United States by Lederman. The personal and political aspects of those policies, particularly their international relationships, are described by staff writers Dickson and Norman. These articles show that the diversity of cultures in Europe, which possibly was a major factor in the development of science in its early days, has posed problems for science as bigger projects and large-scale interactions are needed. The manner in which the pride of nations is handled, the individualism of scientists and limitations of budgets, may be important not only for science but for other types of international cooperation.

No series of books, nor even a particularly perceptive issue of *Science*, could possibly do justice to science in Europe. A sampling of its variety and productivity, its differing patterns of funding and support not only pays tribute to a glorious past but highlights the productive present. Those who think that science is merely technology turned on by money can learn from the example of Europe, where a combination of adventurous individuals and farsighted supporters led ultimately to worldwide scientific productivity. Europe had the combination of established tradition and anarchic individualism that is essential for a discipline that depends on its past but should not be controlled by it. The scientific system that grew out of the European experience has led to increases in the standard of living that are more widespread and permanent than any territorial discovery. The entire world, as well as present Europeans, has benefited from this great legacy.—DANIEL E. KOSHLAND, JR.

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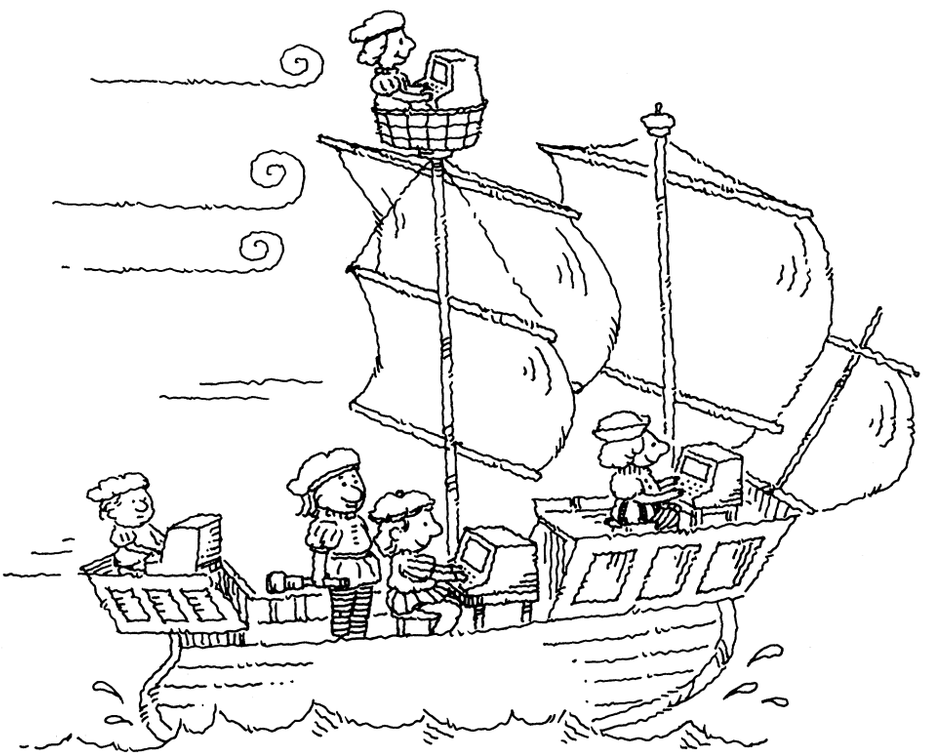

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Concurrent congresses...

CONGRESS ON CYTOKINE RESEARCH
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CONGRESS ON GROWTH FACTORS

October 25-28, 1987/The Wyndham Franklin Plaza Hotel, Philadelphia

CONGRESS ON CYTOKINE RESEARCH

Chairmen: Stanley Cohen, M.D., *Hahnemann University School of Medicine*
Jan Vilcek, M.D., *New York University School of Medicine*

This meeting* will focus primarily on interleukin, interferons, and cytotoxic cytokines, highlighting their potential importance in human disease. An attempt will be made to integrate studies of the mechanism of action of these agents and their application in the treatment of disease. Discussion groups based on the information presented at the poster sessions will be held Monday and Tuesday evenings.

**A portion of the funding for the scientific sessions has come from a generous grant from Immunex Corp.*

Sunday evening, October 25

Welcoming addresses: Doctors Cohen, Vilcek, and Baserga
Keynote address: EPIDERMAL GROWTH FACTOR, Stanley Cohen, Ph.D.
Vanderbilt University

Monday, October 26

JOINT SESSION

Morning

CYTOKINES AND GROWTH FACTORS
Chairman, *Graham Carpenter*
- Biology of Epidermal Growth Factor, *Graham Carpenter*
- Role of Platelet-Derived Growth Factor in Cell Proliferation and Transformation, *Bengt Westermark*
- Endothelial Cells and Fibroblast Growth Factor, *Thomas Maciag*
- Growth Modulation and Signal Transduction of Tumor Necrosis Factor, *Jan Vilcek*
- Intracytoplasmic Inhibitors and Activators of Cell Growth, *Stanley Cohen*

Afternoon

CYTOKINE AND GROWTH FACTOR RECEPTORS
Chairman, *Warren J. Leonard*
- Tyrosine Kinase Family of Growth Factor Receptors, *Joseph Schlessinger*
- Protein Kinase C and Transduction Pathway, *Ora M. Rosen*
- Transforming Growth Factor-Beta Receptors, *Joan Massague*
- Receptors for Gamma Interferon and Tumor Necrosis Factor, *Klaus Pfizenmaier*
- Interleukin-2 Receptor, *Warren J. Leonard*

Tuesday, October 27

CYTOKINE RESEARCH

Morning

REGULATION OF B CELL GROWTH AND DIFFERENTIATION
Chairman, *William E. Paul*
- Interleukin-2 in B Cell Differentiation, *Marian E. Koshland*
- Interferon-Beta$_2$: Molecular Biology and Function, *Michel Revel*
- Hybridoma/Plasmacytoma Growth Factor and BSF$_2$, *A. Billiau*

Afternoon

CELL-MEDIATED EFFECTOR FUNCTIONS
Chairman, *Ronald B. Herberman*
- Molecular Mechanisms of Lymphocyte-Mediated Cell Lysis, *Eckhard R. Podack*
- Interactions of NK Cells with Cytokines, *Bice Perussia*
- The LAK Cell: Mechanism of Action, *Ronald B. Herberman*
- Molecular Mechanisms Regulating Macrophage Functions, *Dolph O. Adams*
- Macrophage Activation by Lymphokines, *Carol A. Nacy*

CONGRESS ON GROWTH FACTORS

Chairman: Renato Baserga, M.D., *Temple University School of Medicine*

This Congress will focus on growth factors and the biology of cell reproduction; two sessions will be shared with the Congress on Cytokines (Monday's program). This meeting will bring up-to-date knowledge of the environmental signals that control cell reproduction and of the genes and gene products that interact with and respond to these signals.

GROWTH FACTORS

Morning

REGULATION OF GENE EXPRESSION IN DEVELOPMENT AND GROWTH
Chairman, *Renato Baserga*
- Regulation of @-Feto Protein and Albumin Genes during Development, *Shirley Tilghman*
- Regulation of c-mcy Oncogene, *Kenneth Marcu*
- Role of Oncogenes in Hemopioetic Cell Differentiation, *E. Preem Reddy*
- Modulation of Growth Regulated Genes, *Renato Baserga*
- Regulation and Function of c-fos Gene, *Edward Ziff*

Afternoon

THE G_1 PHASE AND S PHASE OF THE CELL CYCLE
Chairman, *Arthur B. Pardee*
- The G_1 Phase of the Cell Cycle, *W. Jack Pledger*
- Biochemistry of Interferon System, *Peter Lengyel*
- Signals for Onset of DNA Synthesis, *Arthur B. Pardee*
- Regulation and Localization of IGF Biosynthesis, *Kay Lund*
- Growth Factors and Oncogenes in G_1 Progression, *Judith Campisi*

Wednesday, October 28

CYTOKINE RESEARCH

Morning

CYTOKINES: MEDICAL ASPECTS
Chairman, *Steven Gillis*
- Activation of Vascular Endothelium by Tumor Necrosis Factor and Other Cytokines, *Jordan S. Pober*
- Colony Stimulating Factors, *Peter Ralph*
- Interleukin 1 and its Receptor: Role in Hematopoiesis and Immunity, *Steven Gillis*
- Cytokine Activation of Lesional Lymphocytes, *James T. Krunick*
- Proteins Controlling Angiogenesis, *Daniel B. Rifkin*

Concluding Remarks, Stanley Cohen and *Jan Vilcek*

GROWTH FACTORS

Morning

TOPICS ON CELL PROLIFERATION
Chairman, *Vincent Cristofalo*
- Relationship of Thyroid Hormone Factor to Oncogenesis, *Cary Weinberger*
- Growth Factor Regulation of Human Diploid Cell Proliferation, *Vincent Cristofalo*
- Optimal Conditions for Growth of Cells in Serum Free Media, *Wallace McKeehan*
- Growth Factor-Dependent Proliferation and Differentiation of Myelomonocytic Cells, *Giovanni Rovera*
- Regulation of Thymidine Kinase Gene, *Prescott L. Deininger*

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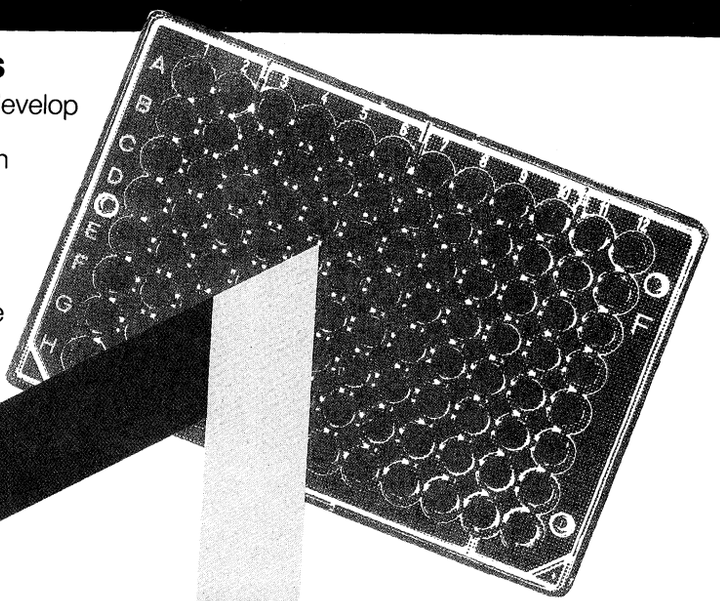

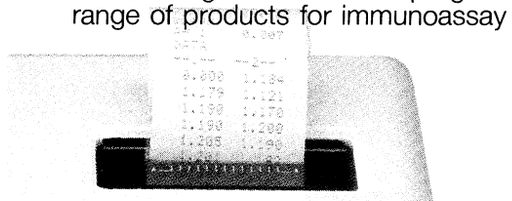

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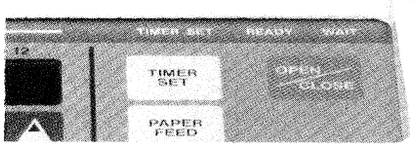


● Hardware:

The Euroreader microtiterplate reader is designed for ease of use, speed and flexibility.
It offers networking via RS232C with IBM compatible hookup.

● Software:

Elisa Aid is a software package for data reduction and analysis in the immunodiagnostic laboratory. Especially written for the Euroreader, it let the user concentrate on the lab work, the quality control and the resultinterpretation without worrying about the datahandling.

It allows in depth quality control follow-up, and histogram calculations.

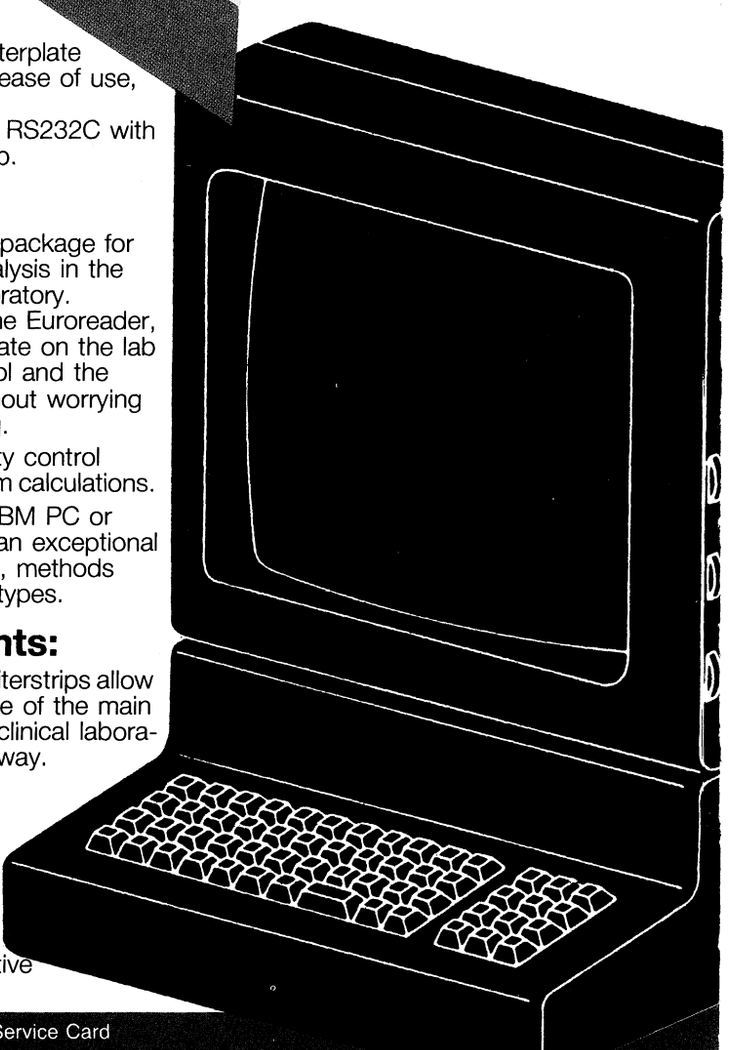
The package runs on IBM PC or compatible and offers an exceptional portfolio of curve-fitting, methods adaptable to all assay types.

● Elisa reagents:

ELISA assays on microtiterstrips allow a flexible rapid coverage of the main diagnostic tests in the clinical laboratory, in a non isotopic way.

- CMV
- LH
- TOXO
- FSH
- CRF
- HCG
- RF
- Prolactin
- ASLO
- TSH
- Ferritin
- IgE

All assays are quantitative determinations.



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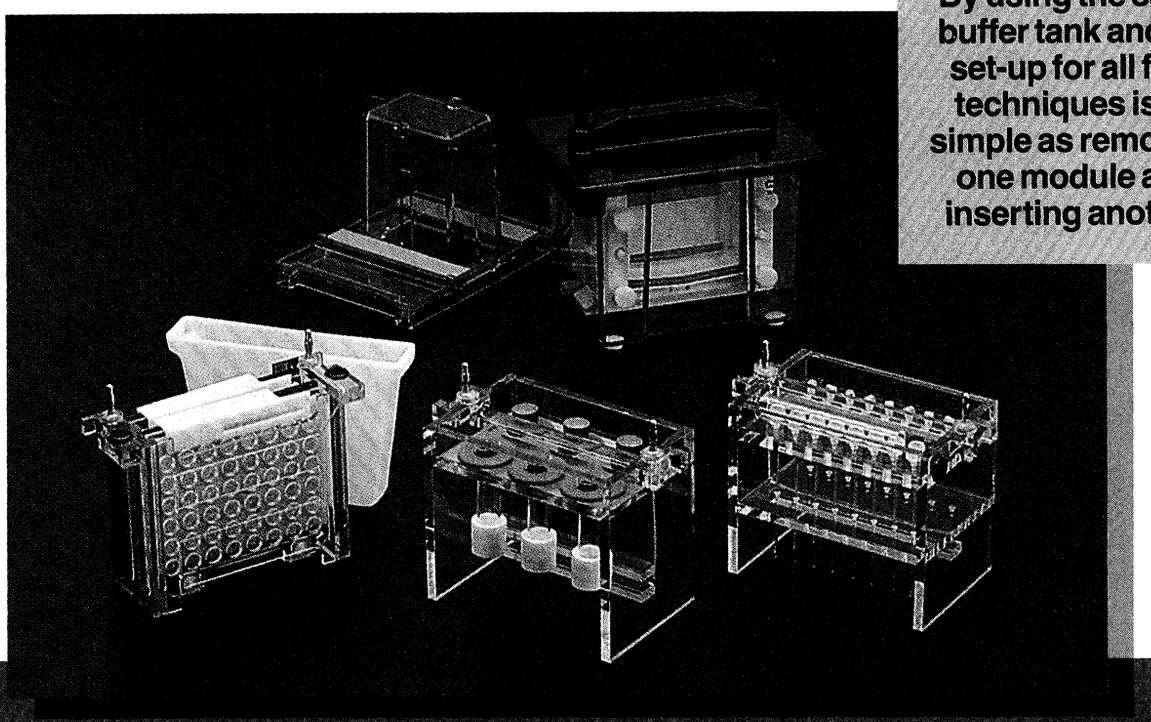

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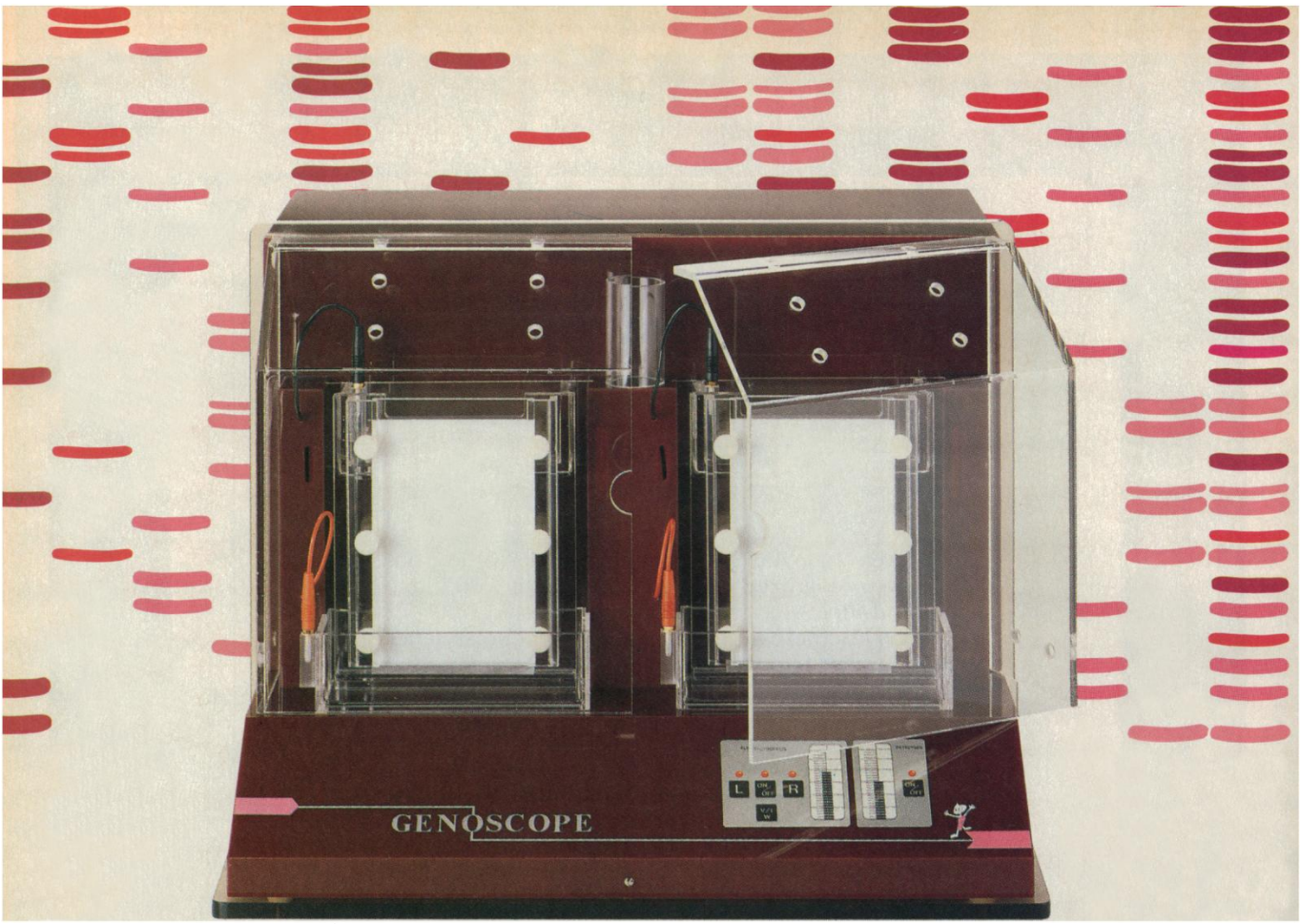

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The Division of Cancer Etiology

National Cancer Institute

Announces To The Scientific Community The Availability of the Following Resources/Services For Cancer Related Research As Noted Below:

Biological Resources

Avian Myeloblastosis Virus Reverse Transcriptase—2,000 Unit Minimum Order.

Contact: Dr. G.E. Houts
Molecular Genetic Resources
6201 Johns Road, Suite 8
Tampa, Florida 33614
(813) 886-5338

Citing Contract #N01—CP—51007

Cost: $0.05/Unit
(Plus Shipping Outside Contiguous United States)

Cell Culture Identification Service. Using Isozyme Analysis, Immunofluorescence and Karyotypic Analysis (Chromosome Banding).

Contact: Dr. Ward Peterson
Children's Hospital of Michigan
3901 Beaubien Boulevard
Detroit, MI 48201
(313) 745-5570

Citing Contract #N01—CP—21017

Cost: $300/Analysis

Viruses: Avian, Feline, Murine, and Primate Viruses Prepared in Tissue Culture.

Contact: Ms. P. Massagee
BCB Repository
Microbiological Associates, Inc.
5221 River Road
Bethesda, MD 20816
(301) 657-8169

Citing Contract #N01—CP—61020

Cost: Inquire

Goat Antisera Against: Avian, Bovine, Feline, Murine, and Primate Intact Viruses and Viral Proteins; Antibodies to Immunoglobulins for a number of species. Preimmune Sera available for some Virus Antisera.

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Microbiological Associates, Inc.
5221 River Road
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(301) 657-8169

Citing Contract #N01—CP—61020

Cost: $50.00/5 ml. (Antisera)
25.00/5 ml. (Preimmune Sera)
Plus shipping and handling
(Frozen Material)

Monoclonal Antibodies are available with specificities for synthetic peptides representing the amino acid sequences of the left end, right end and active site of the oncogene products of avian and mammalian retroviruses. Blocking peptides are also available, as are a limited number of cell lines producing the monoclonal antibodies.

Contact: Ms. P. Massagee
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Microbiological Associates, Inc.
5221 River Road
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(301) 657-8169

Citing Contract #N01—CP—61020

Cost: Peptides — $20.00/mg.
Ascites Fluid — 35.00/ml.
Cell Culture — 75.00/culture
(Plus shipping and handling)

Cotton—Top Marmosets (S. oedipus) for Use as Models for Carcinogenesis: Holding, Inoculation, Observation, and Pathology Services are Available.

Contact: Dr. Neal Clapp
Marmoset Research Program
Oak Ridge Associated Universities
P.O. Box 117
Oak Ridge, TN 37831
(615) 576-4103

Citing Contract #N01—CP—51006

Cost: $10.00 per diem (or higher for procedures involving additional care, etc.) $10.00 per blood sample.

Human sera from donors with: Carcinomas, Sarcomas, Melanomas, Lymphomas, Leukemias, Benign Tumors, Normal Individuals, Family Members of Leukemics, Hematological Diseases, and other Non-Malignant Discorders.

Contact: Coordinator for Research Resources
Biological Carcinogenesis Branch, DCE, NCI, NIH
Landow Building, Room 9A22
Bethesda, MD 20892
(301) 496-1951

Cost: Shipping and handling charges only.

Chemical Resources

Analytical resources for the collection, separation, and elucidation of the components of cigarette smoke and cigarette smoke condensates: A contractor with experience in the development of analytical methods for the determination of constituents of cigarette smoke and of specialty instrumentation for inhalation toxicology is available to assist qualified investigators with particular interest in studies on human and animal model exposure to environmental and sidestream smoke. A large inventory of reference experimental cigarettes, Standard Low Yield Reference Cigarettes, and an extensive chemical data base on smoke and smoke condensate components is available.

Contact: Thomas B. Owen, Ph.D.
Chemical and Physical Carcinogenesis Branch
DCE, NCI
Landow Building, Room 9C18
Bethesda, MD 20892
(301) 496-5471

Cost: Inquire

Chemical Carcinogen Reference Standard Repository: Reference quantities of over 700 compounds are available. In addition to the newer Fecapentaenes and food mutagens, numerous representatives of the following classes of compounds are available: polynuclear aromatic hydrocarbons (PAH), PAH metabolites, radiolabeled PAH metabolites, nitrogen heterocycles, nitrosamines/nitrosamides, aromatic amines, aromatic amine metabolites, radiolabeled retinoids, azo/azoxy aromatics, inorganics, nitroaromatics, pesticides, pharmaceuticals, natural products, dyes, dioxins, chlorinated aliphatics and miscellaneous groups. Data sheets provided with the compounds include chemical and physical properties, analytical data, hazards, storage, and handling information. Catalog available upon request.

Contact: Coordinator for Chemical Research Resources
Chemical and Physical Carcinogenesis Branch
DCE, NCI
Landow Building, Room 9B10
Bethesda, MD 20892
(301) 496-5471

Cost: Subject to chemical class code and quantity (see catalog) plus handling and shipping charges.

Environmental Cancer

NCI's Chemical Carcinogenesis Research Information System (CCRIS) database is available online through the National Library of Medicine's new Toxicology Data Network (TOXNET) system. Through an interagency agreement between NCI and NLM, the CCRIS database will be built, maintained and updated in 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
Division of Cancer Etiology
National Cancer Institute
Landow Building, Room 1D34
Bethesda, MD 20892
(301) 496-1625

Cost: Inquire

The Special Assistant for Environmental Cancer, Office of the Director, announces the availability of a limited number of copies of the following reports, which have been prepared under contract to NCI:

Survey of Compounds Which Have Been Tested for Carcinogenic Activity, PHS-149, 1976-1977, 1979-1980, 1981-1982, and Cumulative Indexes through 1980.

Contact: Ms. I.C. Blackwood
Office of the Director
Division of Cancer Etiology
National Cancer Institute
Landow Building, Room 1D34
Bethesda, MD 20892
(301) 496-1625

Cost: Free to investigators interested in environmental cancer.

Epidemiology Resources

The Tumor Virus Epidemiology Respository (TVER) contains sera and other biological samples from more than 13,000 patients and controls obtained in 12 different countries. The TVER was established primarily to support collaborative research on the role of Epstein-Barr virus (EBV) in Burkitt's lymphoma, nasopharyngeal carcinoma, and related diseases. Part of the collection includes sera that were obtained from non-human primates inoculated with EBV.

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
Landow Building, Room 3C25
Bethesda, MD 20892
(301) 496-4375

Cost: Free to Collaborating Investigators; Others, Shipping charges only.

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 and pertinent epidemiological data is now available from the NIAID Project Officer or the NCI Co-Project Officer. For further information, write to:

Project Officer, AIDS Repository
National Institute of Allergy and Infectious Diseases
Westwood Building, Room 3A12
National Institutes of Health
Bethesda, MD 20892

or to Dr. G. Iris Obrams
Extramural Programs Branch, EBP,
Division of Cancer Etiology, NCI,
Landow Building, Room 8C16
Bethesda, MD 20892.

Human fibroblast cultures from individuals at high risk of cancer, members of cancer-prone families, and normal family members.

Contact: Dr. Margaret Tucker
Family Studies Section, EEB, DCE, NCI, NIH
Landow Building, Room 3C29
Bethesda, MD 20892
(301) 496-4375

Cost: Free to collaborating investigators
Others: $60/cell line.

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
Landow Building, Room 3C07
Bethesda, MD 20892
(301) 496-1691

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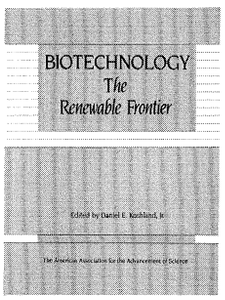
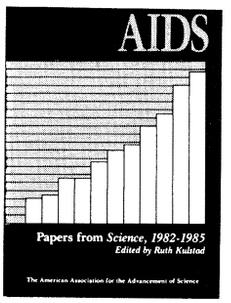


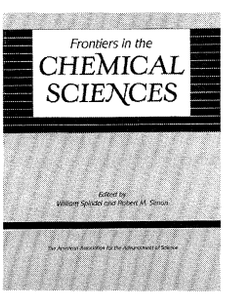
Biotechnology: The Renewable Frontier, *D.E. Koshland, Jr., ed.* Like its predecessor, this volume covers the latest and most important topics in biological R&D. It illustrates the extraordinary cross-disciplinary aspects of modern biology and its tremendous impact on the future with sections ranging from new techniques, immunology, developmental biology, cancer, hormones, sensory phenomena, and more.

1986; case $29.95, $23.95 for AAAS members; paper $17.95, $14.35 for AAAS members; 384pp



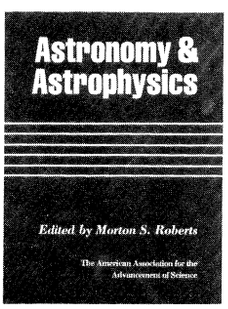
AIDS, *R. Kulstad, ed.* Research papers and reports on acquired immune deficiency syndrome (AIDS) published between August 1982 and September 1985 show how far AIDS research has come and provide an indication of the direction in which it might go. An overview of research in AIDS is provided by Myron Essex, chairman of the Department of Cancer Biology, Harvard University School of Public Health.

1986; case $32.95, $26.35 for AAAS members; paper $19.95, $15.95 for AAAS members; 654pp



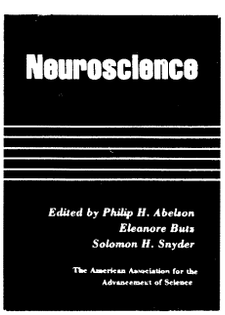
Frontiers in the Chemical Sciences, *W. Spindel, R.M. Simon, eds.* Focuses on the themes of fundamental chemical change and extreme molecular complexity. Details progress in all areas of chemistry, including new work in ultrafast reactions, catalysis, conduction organics, enzyme mechanisms, and materials and analysis.

1986; case $29.95, $23.95 for AAAS members; paper $17.95, $14.35 for AAAS members; 624pp



Astronomy & Astrophysics, *M.S. Roberts, ed.* From the solar system to the pulsars at the very edge of the observable universe, this volume reveals a broad, coherent, and contemporary picture of our astronomical universe. Topics range from the solar system, the structure and content of the galaxy, galaxies and cosmology, and instrumentation.

1985; case $29.95, $23.95 for AAAS members; paper $17.95, $14.35 for AAAS members; 384pp



Neuroscience, *P.H. Abelson, E. Butz, S.H. Snyder, eds.* Neuroscience research ranging from genetic engineering to clinical therapy is presented. Provides an integrative treatment of brain anatomy, physiology, and chemistry and addresses fundamental questions concerning nervous system functioning.

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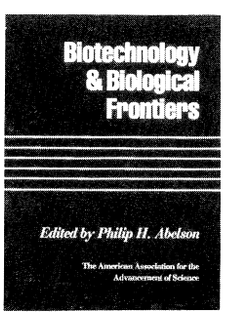

Biotechnology & Biological Frontiers, *P.H. Abelson, ed.* Covers the most important topics at the forefront of biological R&D and deals with both fundamental research techniques and practical applications. For researchers and students in all fields of biology, agriculture, and the health sciences.

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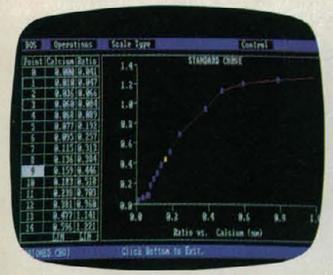
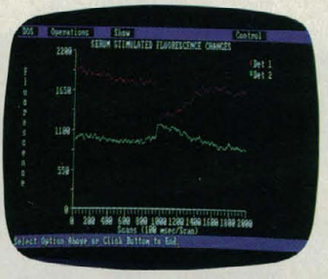
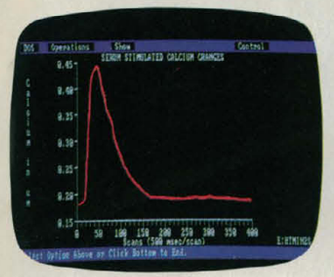
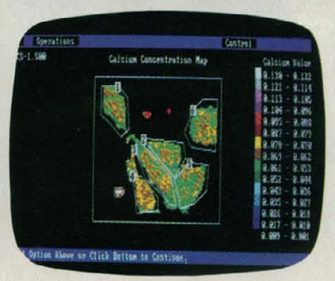
CALCIUM Measurements in Living Cells









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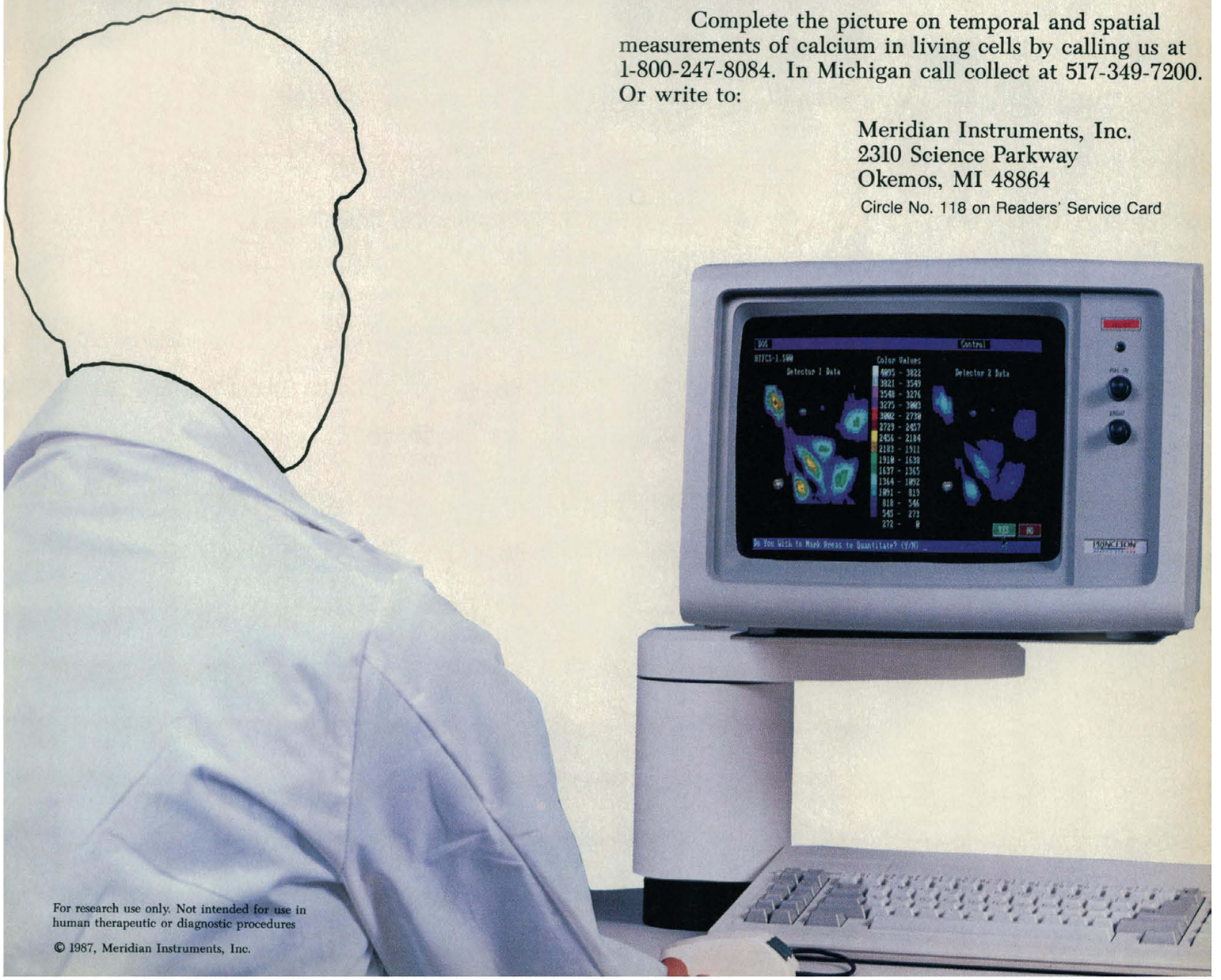

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