

AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

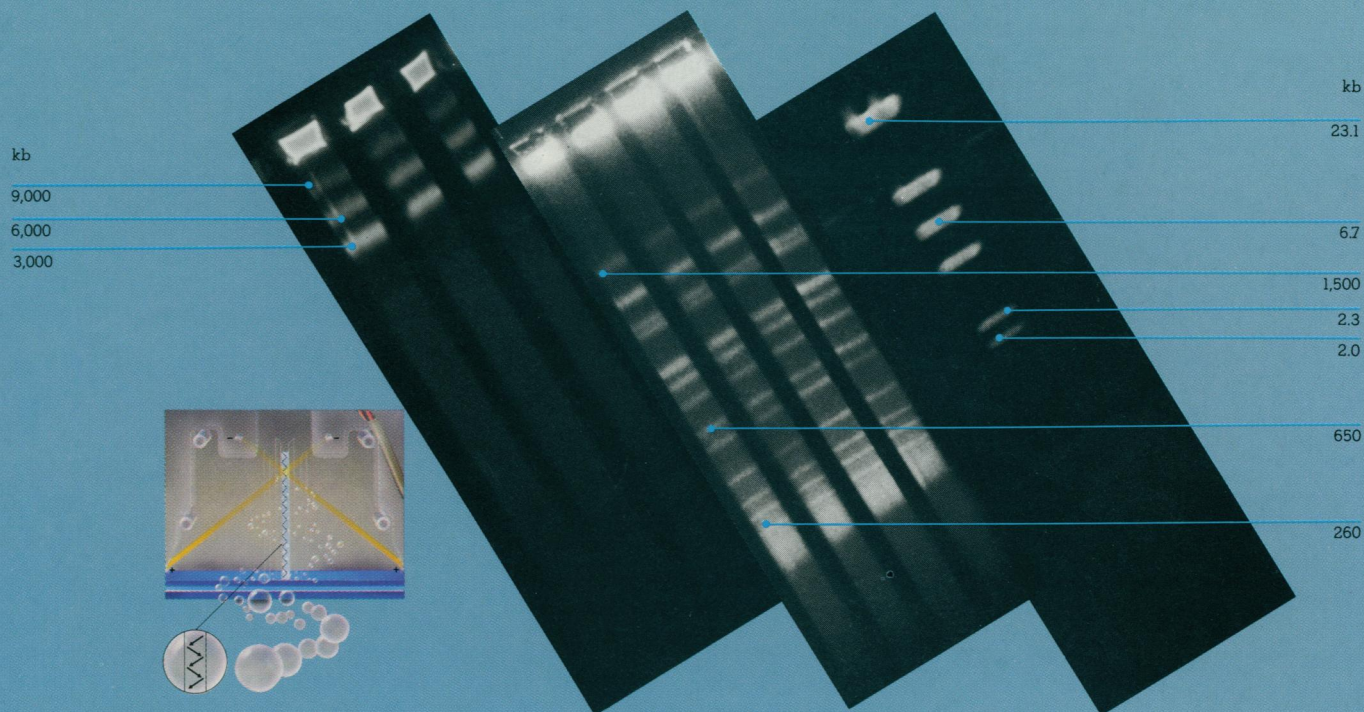
SCIENCE

11 DECEMBER 1987
VOL. 238 ■ PAGES 1483-1622

\$2.50



Now Separate Megabase DNA Fragments Easily and Distinctly... with GeneLine™



In the GeneLine chamber, the slab gel is positioned transverse to the electric field, so DNA zigzags through the thickness of the gel, ensuring straight lanes.

Fig. 1. 9000 kb separation achieved using GeneLine with whole chromosomes of *Schizosaccharomyces pombe*.

Fig. 2. High-resolution lanes produced using GeneLine with whole chromosomes of the yeast *Saccharomyces cerevisiae*.

Fig. 3. Separation down to 2 kb using GeneLine with a *HindIII* digest of lambda phage DNA.

New from Beckman, the GeneLine™ electrophoresis system separates DNA fragments and whole chromosomes from 2 kb to 9000 kb, in straight, high-resolution lanes!

A First: New TAFE Technique For Optimal Results

GeneLine uses the most advanced pulsed field electrophoresis technique to date—Transverse Alternating Field Electrophoresis (TAFE). As a result, GeneLine provides straight, distinct lanes with high resolution separation of DNA fragments, to allow easy comparison to DNA molecular weight standards and accurate DNA size estimates.

Another First: *In situ* DNA Blotting

GeneLine features interchangeable electrode cassettes that let you perform electrophoresis and electrophoretic transfer in the same chamber. TAFE Electrodes are used for electrophoresis; DNA Blot Electrodes for transfer.

Reagents Certified For Pulsed Field Electrophoresis

For results you can count on, use Beckman PFE-certified reagents, all tested on mammalian DNA. Our low frequency restriction enzymes come with optimal concentration recommendations. Agarose, buffer and standard marker yeast plugs are also available.

Circle No. 182 on Readers' Service Card

Find out more! Call toll-free 800/742-2345, or write to Beckman Instruments, Inc., Spinco Division, 1050 Page Mill Rd., Palo Alto, CA 94304. Offices in major cities worldwide.

BECKMAN

A SMITHKLINE BECKMAN COMPANY

GET SERIOUS

NEW MENUING
INTERFACE AND
RELIABILITY PROCEDURE



...ABOUT ANALYZING YOUR DATA.

You might be spreading your spreadsheet a little too thin. Or maybe you're starting from scratch. But if you're serious about data analysis, you're ready for SPSS/PC+™ — a full software family that brings you eight high-powered ways to complete any data analysis task.

Enter it. SPSS Data Entry II™ is a fully integrated data entry, cleaning and editing tool.

Analyze it. The SPSS/PC+ base package provides a powerful array of statistical and reporting procedures.

Picture it. SPSS/PC+ Graph-in-the-Box™ featuring New England Software's Graph-in-the-Box™ offers full color "snapshot" graphics.

Examine it. SPSS/PC+ Advanced Statistics™ lets you get more serious with your data.

Predict it. SPSS/PC+ Trends™—our latest option—is the complete time series analysis/forecasting tool.

Table it. SPSS/PC+ Tables™ produces presentation-ready tables instantly.

Chart it. SPSS/PC+ Graphics™ featuring Microsoft® Chart creates show-stopping graphs and charts.

Map it. SPSS/PC+ Mapping™ featuring MAP-MASTER™ creates maps where vast amounts of data can be summarized and presented in one, simple picture.

SPSS/PC+ products are being put to productive use by serious fact finders in business, government and education. For countless purposes such as market research. Wage and salary studies. Survey analysis. And quality control. Plus each product is superbly documented and supported by SPSS Inc., a leader in statistical software for nearly 20 years. While specially tailored customer support is available through the VALUE PLUS™ plan. And SPSS now offers a SPSS/PC+ version for Novell LANs.

So if you're serious about data analysis, step up to SPSS/PC+. For details, contact our Marketing Department.

CALL 1/312/329-3319

SPSS inc.

SPSS Inc. • 444 North Michigan Avenue, Suite 3000 • Chicago, Illinois 60611

In Europe: SPSS Europe B.V. • P.O. Box 115 • 4200 AC Gorinchem, The Netherlands • Telephone: +31183036711 • TWX: 21019

SPSS/PC+ runs on IBM PC/XT/AT's with hard disk. Contact SPSS Inc. for compatible microcomputers, SPSS/PC+, SPSS Data Entry II, SPSS/PC+ Graph-in-the-Box, SPSS/PC+ Advanced Statistics, SPSS/PC+ Trends, SPSS/PC+ Tables, SPSS/PC+ Graphics and SPSS/PC+ Mapping are trademarks of SPSS Inc. VALUE PLUS is a trademark of SPSS Inc. Chart and Microsoft are trademarks of Microsoft Corporation. MAP-MASTER is a trademark of Ashton-Tate. Graph-in-the-Box is a trademark of New England Software, Inc.

© 1987, SPSS Inc.

Circle No. 155 on Readers' Service Card

1489 This Week in *Science*

Editorial

1491 University-Based Public Service: R. G. MAWBY

Letters

1493 More on Chemical Carcinogenesis: E. W. VOLKMANN; R. L. HALL ■ Agricultural R&D: G. PIAZZA; L. P. REYNOLDS; A. A. HANSON; D. HOLT ■ The Federal Deficit: H. A. RASHKIS; J. MENKART; G. W. SUTTON; R. EISNER ■ Facial Recognition Cells and Autism: J. B. FOTHERINGHAM; K. M. KENDRICK AND B. A. BALDWIN ■ Transmission of AIDS Virus: R. M. DOUGHERTY; C. L. CASTIGLIA ■ Confused Musician: W. E. STERRER

News & Comment

1498 NATO Ponders Its Nuclear Options
1501 Academy Helps Army Be All That It Can Be
1502 Gossip and Peer Review at NSF
1503 Biotechnology's Stock Market Blues
1504 Wyngaarden to Chair Biotech Council
1505 EPA to Cut U.S. CFC Production to Protect Ozone in Stratosphere
1506 Geographical Limit on Research Funds in Bill Seen as Swipe at Peer Review
Briefing: Applicants Deluge NSF ■ President's AIDS Panel Issues First Report

Research News

1507 Capturing El Niño in Models ■ El Niño and Winter Weather
1509 Domino Effect Invoked in Ice Age Extinctions
1510 Animals Yield Clues to Huntington's Disease
1512 A New Window onto the Chemists' Big Bang
1513 Gene Makeup a Surprise

Articles

1521 Low-Input Cropping for Acid Soils of the Humid Tropics: P. A. SANCHEZ AND J. R. BENITES
1528 Very High Energy Gamma-Ray Binary Stars: R. C. LAMB AND T. C. WEEKES
1534 Wind-Driven Ocean Currents and Ekman Transport: J. F. PRICE, R. A. WELLER, R. R. SCHUDLICH
1539 The Approaching Era of the Tumor Suppressor Genes: G. KLEIN

Research Articles

1545 Reading Frame Selection and Transfer RNA Anticodon Loop Stacking: J. F. CURRAN AND M. YARUS
1550 Star Formation in W49A: Gravitational Collapse of the Molecular Cloud Core Toward a Ring of Massive Stars: W. J. WELCH, J. W. DREHER, J. M. JACKSON, S. TEREBEY, S. N. VOGEL

Reports

1556 Rapid Change in the Symbolic Functioning of Very Young Children: J. S. DELOACHE

- **SCIENCE** is published weekly on Friday, except the last week in December, and with an extra issue in February by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005. Second-class postage (publication No. 484460) paid at Washington, DC, and at an additional entry. Now combined with **The Scientific Monthly**® Copyright © 1987 by the American Association for the Advancement of Science. The title **SCIENCE** is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): \$65. Domestic institutional subscription (51 issues): \$98. Foreign postage extra: Canada \$32, other (surface mail) \$27, air-surface via Amsterdam \$65. First class, airmail, school-year, and student rates on request. Single copies \$2.50 (\$3 by mail); back issues \$4 (\$4.50 by mail); Biotechnology issue, \$5.50 (\$6 by mail); classroom rates on request; Guide to Biotechnology Products and Instruments \$16 (\$17 by mail). **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$1 per copy plus \$0.10 per page is paid directly to CCC, 21 Congress Street, Salem, Massachusetts 01970. The identification code for *Science* is 0036-8075/83 \$1 + .10. **Postmaster:** Send Form 3579 to *Science*, 1333 H Street, NW, Washington, DC 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.
- The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects 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, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.



COVER The 10-meter optical reflector at the Smithsonian Institution's Whipple Observatory in the Santa Rita mountains in southern Arizona. Built in 1968, it is still the largest instrument designed exclusively for use in very high energy gamma-ray astronomy. See page 1528. [Gary Ladd, Whipple Observatory, Amado, AZ 85645]

- 1558 Oxygen Isotope Effect in High-Temperature Oxide Superconductors: H.-C. ZUR LOYE, K. J. LEARY, S. W. KELLER, W. K. HAM, T. A. FALTENS, J. N. MICHAELS, A. M. STACY
- 1560 Spectrophotometry of Pluto-Charon Mutual Events: Individual Spectra of Pluto and Charon: S. R. SAWYER, E. S. BARKER, A. L. COCHRAN, W. D. COCHRAN
- 1563 Genetic Ablation: Targeted Expression of a Toxin Gene Causes Microphthalmia in Transgenic Mice: M. L. BREITMAN, S. CLAPOFF, J. ROSSANT, L.-C. TSUI, M. GLODE, I. H. MAXWELL, A. BERNSTEIN
- 1566 Similarity of Synthetic Peptide from Human Tumor to Parathyroid Hormone in Vivo and in Vitro: N. HORIUCHI, M. P. CAULFIELD, J. E. FISHER, M. E. GOLDMAN, R. L. MCKEE, J. E. REAGAN, J. J. LEVY, R. F. NUTT *et al.*
- 1568 Parathyroid Hormone-Related Protein of Malignancy: Active Synthetic Fragments: B. E. KEMP, J. M. MOSELEY, C. P. RODDA, P. R. EBELING, R. E. H. WETTENHALL, D. STAPLETON, H. DIEFENBACH-JAGGER, F. URE *et al.*
- 1570 Identification of the Iron-Responsive Element for the Translational Regulation of Human Ferritin mRNA: M. W. HENTZE, S. W. CAUGHMAN, T. A. ROUAULT, J. G. BARRIOCANAL, A. DANCIS, J. B. HARFORD, R. D. KLAUSNER
- 1573 Phagocytosis of *Candida albicans* Enhances Malignant Behavior of Murine Tumor Cells: I. GINSBURG, S. E. G. FLIGIEL, R. G. KUNKEL, B. L. RISER, J. VARANI
- 1575 Activation of the HIV-1 LTR by T Cell Mitogens and the Trans-Activator Protein of HTLV-I: M. SIEKEVITZ, S. F. JOSEPHS, M. DUKOVICH, N. PEFFER, F. WONG-STAAAL, W. C. GREENE
- 1578 Identification of Nuclear Receptors for VIP on a Human Colonic Adenocarcinoma Cell Line: M. B. OMARY AND M. F. KAGNOFF
- 1581 HTLV-V: A New Human Retrovirus Isolated in a Tac-Negative T Cell Lymphoma/Leukemia: V. MANZARI, A. GISMONDI, G. BARILLARI, S. MORRONE, A. MODESTI, L. ALBONICI, LAURA DE MARCHIS, V. FAZIO, A. GRADILONE *et al.*

Technical Comments

- 1584 Antigenicity of Myohemerythrin: J. NOVOTNY, R. E. BRUCCOLERI, W. D. CARLSON, M. HANDSCHUMACHER, E. HABER; H. M. GEYSEN, S. J. RODDA, T. J. MASON; J. A. TAINER, H. ALEXANDER, E. D. GETZOFF, R. A. LERNER ■ Do 15 Million Cat Neurons Mediate the Memory of a Circle and a Star?: F. NOTTEBOHM AND H. WILLIAMS; D. L. MCEACHRON, C. R. GALLISTEL, P. J. HAND; E. R. JOHN, Y. TANG, A. B. BRILL, R. YOUNG, K. ONO

Book Reviews

- 1589 The Dread Disease, *reviewed by* C. G. LASBY ■ Space and National Security, G. L. EPSTEIN ■ Population Ecology of the Cooperatively Breeding Acorn Woodpecker, C. R. BROWN ■ The Biology of the Honey Bee, J. B. FREE ■ Kin Recognition in Animals, G. J. GAMBOA ■ Books Received

Products & Materials

- 1597 Antibody to Fluorescein ■ Magnetic Drive ■ DNA Scanner ■ Entry-Level Minicomputer ■ Water-Bath Insulating Balls ■ Calibration Kit for Electrophoresis ■ Function-Graphing Software ■ Statistical Expert System ■ Literature

Board of Directors

Lawrence Bogorad
*Retiring President,
Chairman*

Sheila E. Widnall
President

Walter E. Massey
President-elect

Robert McC. Adams
Floyd E. Bloom
Mary E. Clutter
Mildred S. Dresselhaus
Beatrice A. Hamburg
Donald N. Langenberg
Frank von Hippel
Linda S. Wilson
William T. Golden
Treasurer

Alvin W. Trivelpiece
Executive Officer

Editorial Board

Elizabeth E. Bailey
David Baltimore
William F. Brinkman
Philip E. Converse
Joseph L. Goldstein
James D. Idol, Jr.
Leon Knopoff
Seymour Lipset
Oliver E. Nelson
David V. Ragone
David M. Raup
Vera C. Rubin
Larry L. Smarr
Solomon H. Snyder
Robert M. Solow
James D. Watson

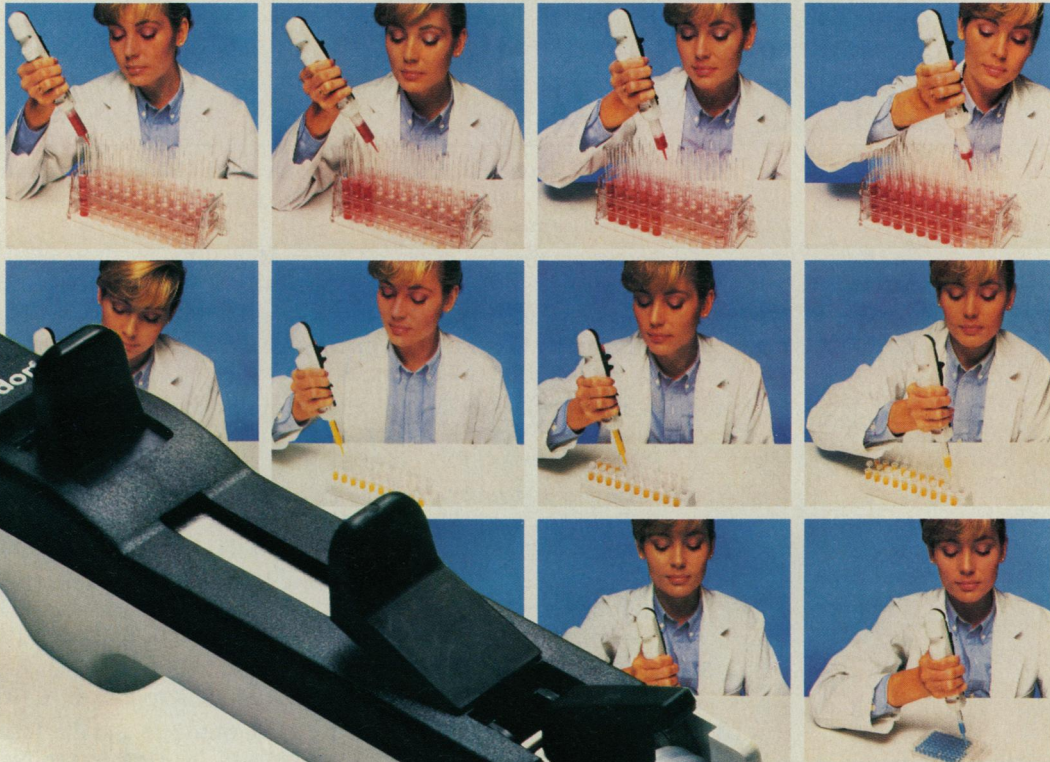
Board of Reviewing Editors

John Abelson
Qais Al-Awqati
James P. Allison
Don L. Anderson
Elizabeth H. Blackburn
Floyd E. Bloom
Charles R. Cantor
Ralph J. Ciccone
James H. Clark
Bruce F. Eldridge
Stanley Falkow
Theodore H. Geballe
Roger I. M. Glass
Stephen P. Goff
Robert B. Goldberg

Corey S. Goodman
Stephen J. Gould
Richard M. Held
Gloria Heppner
Eric F. Johnson
Konrad B. Krauskopf
I. Robert Lehman
Karl L. Magleby
Joseph B. Martin
John C. McGiff
Alton Meister
Mortimer Mishkin
Peter Olson
Gordon H. Orians
Carl O. Pabo
John S. Pearce

Yeshayau Pocker
Jean Paul Revel
James E. Rothman
Thomas C. Schelling
Ronald H. Schwartz
Stephen M. Schwartz
Otto T. Solbrig
Robert T. N. Tjian
Virginia Trimble
Geerat J. Vermeij
Martin G. Weigert
Harold Weintraub
Irving L. Weissman
George M. Whitesides
Owen N. Witte
William B. Wood

The repeater.



Eppendorf Repeater™ Pipette

Reliable, repetitive pipetting.

With the Eppendorf Repeater* Pipette, dispensing up to 48 samples without a refill is a snap. Just set the selection dial for the volume you need and your choice is locked in place to prevent errors. That means the last sample will be as accurate and precise as the first. And the unique Combitip™ polypropylene/polyethylene reservoir eliminates cleaning, contamination, and carryover because it's disposable.

1-second delivery.

The Repeater makes serial pipetting procedures faster than ever before. Simply press the lever to deliver your samples at 1-second intervals. The volume range is wide enough to accommodate

*U.S. Pat. No. 4406170

almost any procedure. With six Combitip sizes and five dial settings, you choose from 22 different volumes between 10 µL and 5 mL.



Six Combitip sizes

A wide variety of applications.

The Repeater can handle any liquid easily. Even difficult or hazardous liquids aren't a problem, since the liquid contacts only the Combitip—not the instrument itself. The Combitip is available

in nonsterile or sterile packaging for microbiologic and tissue culture techniques. And it can be refilled and re-used as long as the same liquid is being pipetted.

For more information: call 800-645-3050; in New York, 516-334-7500. Or write Brinkmann Instruments, Inc., Cantiague Road, Westbury, NY 11590. (In Canada: 416-675-7911; 50 Galaxy Blvd., Rexdale, Ont. M9W 4Y5)

For information circle reader service number 163
For a demonstration circle reader service number 164

eppendorf

Shaping the future. **Brinkmann**
INSTRUMENTS, INC.

This Week in **SCIENCE**

Flexibility of transfer RNA molecules

ACCURATE expression of a gene depends on the proper translation of information encoded in the corresponding messenger RNA molecule (page 1545). Transfer RNA molecules read successive triplets (comprising a reading frame) in the messenger, generally with high accuracy. Typically, transfer RNA molecules have seven nucleotides in their anticodon loop, three of which line up with nucleotides in the message. However, under certain circumstances, transfer RNA molecules may have an extra nucleotide in the anticodon loop, and these can compensate for mistakes in the message by reading genes that have an extra nucleotide in the messenger sequence. Curran and Yarus studied a series of mutant transfer RNA molecules, assessing the effects caused by additional nucleotides in the anticodon loop. In a molecular model, structure was tied to the functioning of transfer RNA molecules; the model accounts for both the high level of reading accuracy that is normally accomplished and the role played by certain transfer RNA molecules in suppressing genetic mutations that otherwise would have the effect of causing shifts in the reading frame.

Formative years for stars

EVIDENCE in support of the theory that star formation occurs through inside-out gravitational collapse of a molecular cloud has come from observations of one of the most spectacular star-forming regions of the Milky Way galaxy, region W49A (page 1550). The model envisions the collapse beginning in the interior of such a cloud and then extending outward at increasingly large radii from the core. Welch *et al.* have now mapped portions of region W49A using radio interferometers at the Hat Creek Observatory in California and the Very Large Array in New Mexico. Out from the core of region W49A there is a ring of compact, discrete, ionized clumps of gas; in

each clump there is at least one star and the ring itself consists of a dense warm rotating disk of molecular gas. Strong magnetic fields have played an important part in the formation of this cluster of massive stars, with the outward propagation of the collapse proceeding at the speed of magnetic Alfvén waves.

Hide-and seek-skills in children

EARLY in a child's development, between the ages of 2 1/2 and 3, an abrupt developmental milestone has been identified: children can develop the ability to solve problems with symbols (page 1556). A group of 3-year-olds who were shown a model of a room and the location of a model toy hidden in it were able to find a real toy straightaway in a real room; the younger children did not succeed immediately. Both groups had equally good memories of where the toy had been hidden in the model; it was only in their abilities to use this memory to find the toy that they so dramatically differed. DeLoache suggests that the 3-year-olds are able to think of the model both as a symbol for the room and as a structure itself, whereas the younger children may see the model only as a thing, not as a symbol as well. The younger children readily found the hidden toy when its location was shown to them first in a photograph, a more familiar symbolic medium for them.

Infection and tumor growth

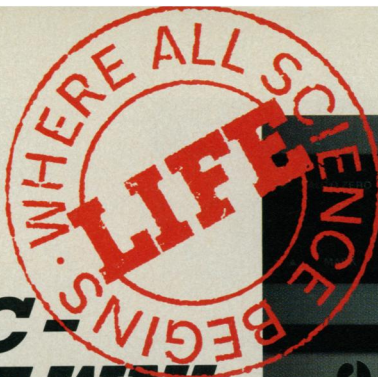
CAN an infection affect the development of a tumor (page 1573)? Using mouse fibrosarcoma cells that had been induced to ingest the yeast *Candida albicans*, Ginsburg *et al.* show that when yeast-containing cells are injected into mice, tumors develop earlier, grow faster, invade surrounding tissues more quickly, and metastasize to the lungs sooner than do tumors induced by cells that lack yeast particles, even when both types of tumors are

growing in the same animal. The yeast-containing tumors elicit larger initial local inflammatory reactions in the host, but histologic differences between the yeast-containing and the yeast-free tumors are not apparent. This animal model facilitates the study of a phenomenon—the infectious component to the etiology of certain cancers—that appears to have important physiologic consequences and that has so far eluded in vitro analysis: tumor cells that have ingested yeast or microbial particles continue to grow normally in tissue culture medium.

Hypercalcemia in malignancy

PATIENTS with malignancies frequently develop high concentrations of calcium in their blood (pages 1566 and 1568). More than 40 years ago it was suggested the secretion of parathyroid hormone by certain tumors caused this malignancy-associated hypercalcemia. However, a protein secreted from tumors has recently been shown to have significant sequence homology with a portion of the parathyroid hormone molecule but to be a distinct substance; reports by Horiuchi *et al.* and Kemp *et al.* show that the amino-terminal portion of the tumor product can induce hypercalcemia and related biochemical abnormalities in several experimental systems. In vivo and in vitro, synthetic peptides based on the amino-terminal 34 amino acids of the substance induced effects similar to those induced by parathyroid hormone, including altered calcium and vitamin D metabolism, increased kidney and bone-cell secretion of cyclic adenosine monophosphate, and fluxes in phosphorus levels. The synthetic peptides reacted with parathyroid hormone receptors and, like parathyroid hormone, their effects on bone, kidney, and (indirectly) gut resulted in decreased calcium excretion. The possibility is raised by these findings that antagonists of parathyroid hormone or the tumor-secreted analog will have uses in the treatment of malignancies.

FPLC - THE FAST WAY TO PREPARATIVE SEPARATIONS.



Why do so many researchers choose FPLC® for scaling up biomolecule separations?

Simply because the demands of preparative high performance chromatography were included when we designed FPLC. Simple method development and optimisation. Fast and straightforward scale-up. A wide choice of multi-dimensional techniques. And above all, full biocompatibility to ensure maximum recovery of biological activity.

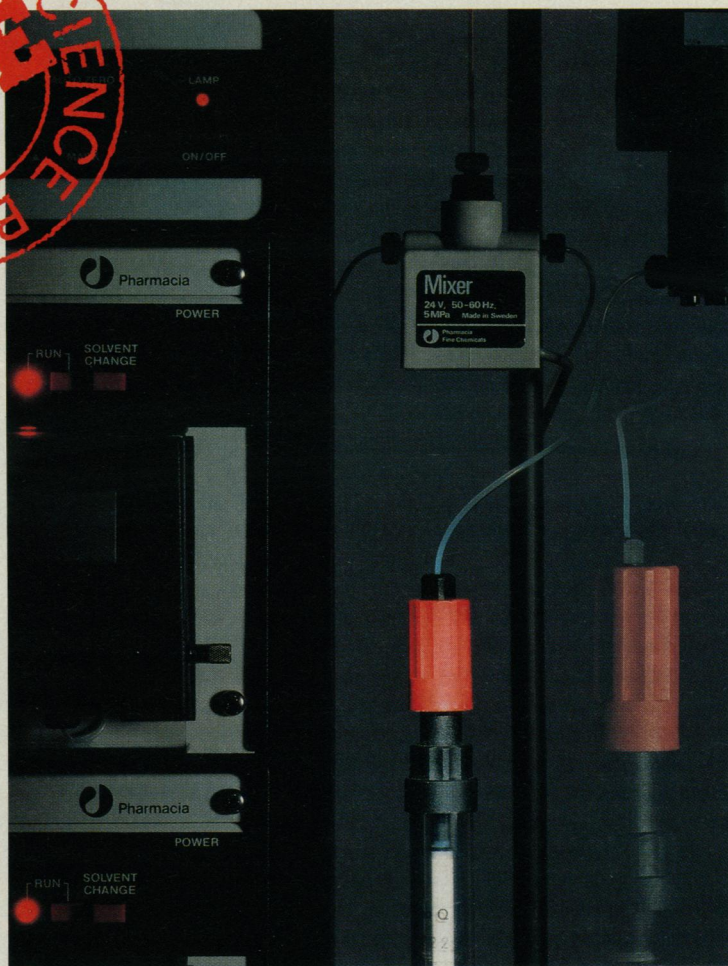
From the beginning, FPLC was designed as an integrated system of high performance media, techniques and instruments for analytical and preparative separations.

The wide range of media and prepacked columns specifically developed for preparative separations simplify scale-up and ensure high resolution. Using simple scaling factors, the step from analytical to preparative separation is fast and reliable, whichever technique you choose. And with each technique you can be assured of maintained high resolution. Standard media which have been optimised for large scale purification can be combined directly with the high performance media into single, automated purification schemes.

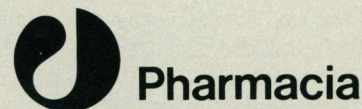
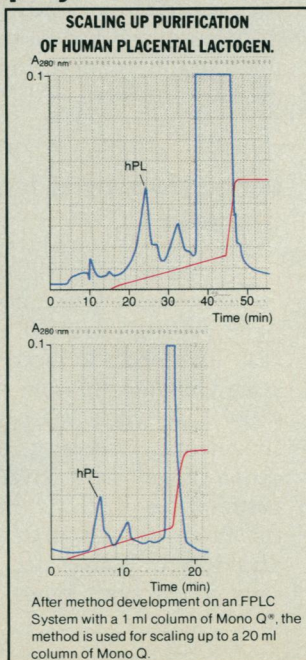
As an alternative to further scale-up, you can exploit the speed and automation of FPLC for fast, sequential cycling of a purification scheme to accumulate significant quantities of product.

This combination of easy scale-up from analytical to preparative separations, together with full biocompatibility, genuine automation and a wide choice of techniques, makes FPLC unique in the world of high performance chromatography.

Contact us today and let us prove how FPLC is the fast way for you to scale up biomolecule separations.



WITH AN FPLC SYSTEM, SCALE-UP OF HIGH PERFORMANCE SEPARATIONS IS EASY USING SIMPLE SCALING FACTORS.



Pharmacia LKB Biotechnology Inc.
800 Centennial Avenue
Piscataway, NJ 08854
Information: (800) 526-3618
In NJ: (201) 457-8000 735

American Association for the Advancement of Science

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Publisher: Alvin W. Trivelpiece

Editor: Daniel E. Koshland, Jr.

Deputy Editors: Philip H. Abelson (*Engineering and Applied Sciences*); John I. Brauman (*Physical Sciences*)

EDITORIAL STAFF

Managing Editor: Patricia A. Morgan

Assistant Managing Editor: Nancy J. Hartnagel

Senior Editors: Eleanore Butz, Ruth Kulstad

Associate Editors: Martha Collins, Barbara Jasny, Katrina L. Kelner, Edith Meyers, Phillip D. Szuroni, Kim D. Vandegriff, David F. Voss

Letters Editor: Christine Gilbert

Book Reviews: Katherine Livingston, *editor*; Deborah F. Washburn

This Week in Science: Ruth Levy Guyer

Contributing Editor: Lawrence I. Grossman

Chief Production Editor: Ellen E. Murphy

Editing Department: Lois Schmitt, *head*; Michele A. Cleary, Mary McDaniel, Barbara E. Patterson

Copy Desk: Joi S. Granger, Beverly Shields, Anna Victoreen

Production Manager: Karen Schools

Assistant Production Manager: James Landry

Graphics and Production: Holly Bishop, James J. Olivari, Eleanor Warner

Covers Editor: Grayce Finger

Manuscript Systems Analyst: William Carter

NEWS STAFF

News Editor: Barbara J. Culliton

News and Comment: Colin Norman, *deputy editor*; William Booth, Mark H. Crawford, Constance Holden, Eliot Marshall, Marjorie Sun, John Walsh

Research News: Roger Lewin, *deputy editor*; Deborah M. Barnes, Richard A. Kerr, Jean L. Marx, Leslie Roberts, M. Mitchell Waldrop

European Correspondent: David Dickson

BUSINESS STAFF

Business Staff Manager: Deborah Rivera-Wienhold

Classified Advertising Supervisor: Karen Morgenstern

Membership Recruitment: Gwendolyn Huddle

Member and Subscription Records: Ann Ragland

Guide to Biotechnology Products and Instruments: Shauna S. Roberts

ADVERTISING REPRESENTATIVES

Director: Earl J. Scherago

Traffic Manager: Donna Rivera

Traffic Manager (Recruitment): Gwen Canter

Advertising Sales Manager: Richard L. Charles

Marketing Manager: Herbert L. Burkland

Sales: New York, NY 10036: J. Kevin Henebry, 1515 Broadway (212-730-1050); Scotch Plains, NJ 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); Chicago, IL 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-337-4973); San Jose, CA 95112: Bob Brindley, 310 S. 16 St. (408-998-4690); Dorset, VT 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581); Damascus, MD 20872: Rick Sommer, 24808 Shrubbery Hill Ct. (301-972-9270); U.K., Europe: Nick Jones, +44(0647)52918; Telex 42513; FAX (0392) 31645.

Information for contributors appears on page XI of the 25 September 1987 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005. Telephone: 202-326-6500.

Advertising correspondence should be sent to Tenth Floor, 1515 Broadway, NY 10036. Telephone 212-730-1050 or WU Telex 968082 SCHERAGO.

University-Based Public Service

As the public universities have grown and matured, the triumvirate of their mission—teaching, research, and public service—has become generally accepted, at least in rhetoric. In this process, two clearly identifiable tendencies have occurred. First, teaching has become narrowly defined, referring only to that which occurs in a classroom or laboratory setting. Second, the research mission of the university has become omnipotent. In the academic life of public institutions today, research represents the ultimate exercise, with teaching, especially at the undergraduate level, seen as a mandated duty, and public service an obligation accepted with reluctance. Public universities, however, do perform several large categories of activities that are actually public service even though, up to now, few people may have thought of them under that rubric. Here are five examples of what I mean.

The first is the preservation of knowledge. This public service can stand alone as a prime function. To an encouraging degree, museums and libraries are coming to be seen as valuable teaching institutions in themselves. To whatever extent finances permit, universities can do the same thing. To accept this function as being coequal with research and teaching is to hark back to the ancient formulation that the three purposes of a university are to seek, to convey, and to preserve knowledge.

The second is the provision of aesthetic experience. On most campuses, appreciation of the various expressions of art and high culture are reinforced by the desire to learn or to teach. Beyond that, concert bureaus, radio, and television carry campus-based arts to statewide, even national, audiences.

A third cluster of university activities worth examining relates to the provision of direct consumer services to the community. This is exemplified by maintenance of hospitals, clinics, testing laboratories, publishing companies, hotels, restaurants, bookstores, and the like. These are usually created to fulfill needs related to teaching and research.

A fourth contribution of universities is the custodianship of young people of collegiate age. Although we no longer believe in completely open admission to college, we are prepared to admit most young people who want to enroll, so that they will have a chance to “find themselves” and so that their continued maturation will occur under relatively safe circumstances. The task would be reduced if students had more experience of life before they enrolled. However, short of war or some other vast campaign of national service (which we ought to seriously consider as part of the socialization process for future generations), we will probably continue to have students of about the same age as at present. If so, we must take the initiative to see that as many of them as possible are interested in learning and not simply spending critically formative years in our custodial care.

The fifth kind of activity is the university’s role as entertainer for the masses, particularly the masses who watch intercollegiate athletic events. The most troubling consequence of big-time athleticism has to do not with its role as a public service but with its impact on campus instruction. The training of the body does not seem central to modern discussions of either athletics or the college curriculum. Today anybody who advocates education for the perfection of the body tends to be scorned as just another apologist for high-pressure athleticism. I hope that health and physical education departments will someday live up more fully to the literal promise of their name and that their professors will be central figures in discussions of liberal education.

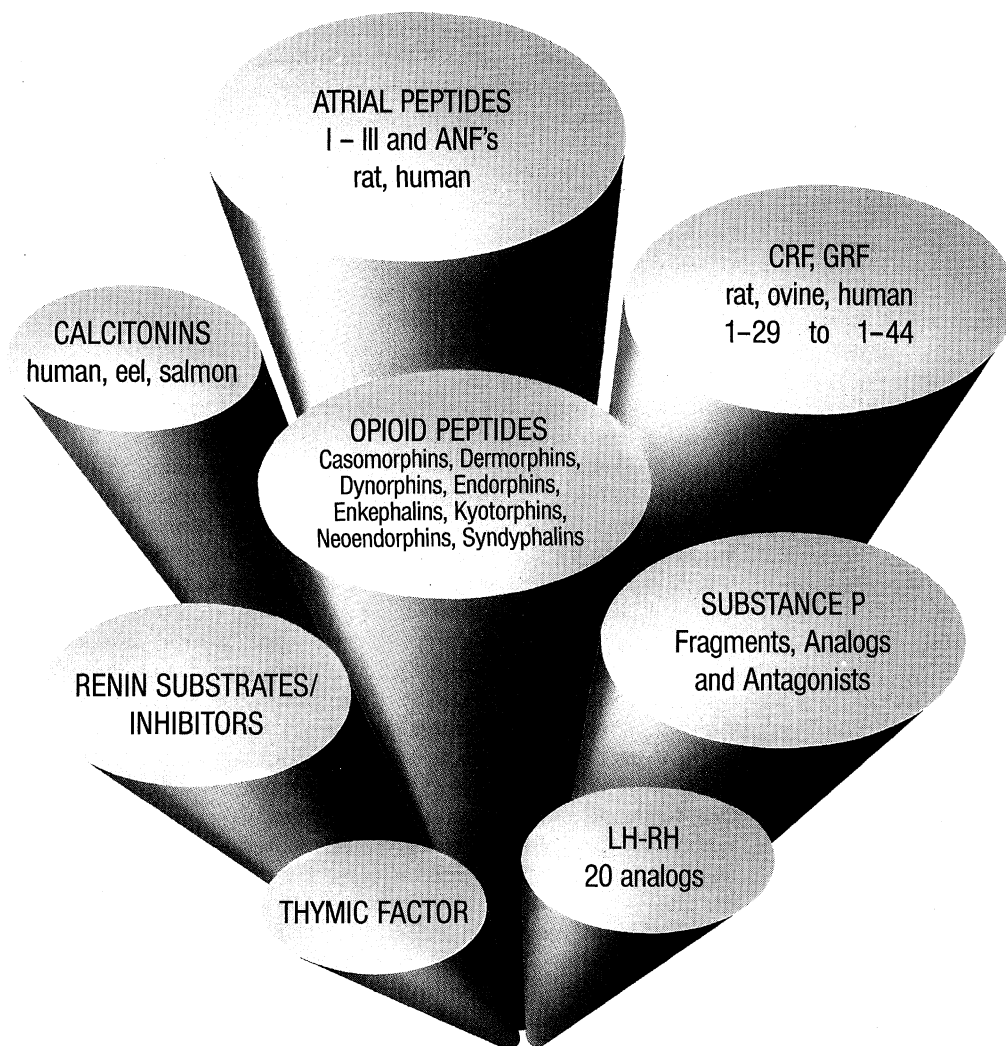
When we examine these five clusters of activities, we discover that we are most comfortable with those that relate most closely to teaching or research. In fact, the level of quality of each of these five forms of public service is directly proportional to the extent to which each incorporates teaching or research.

After 75 years of full-scale experience, the major lesson we have learned about university-based public service is that it is best conceived as dynamic and creative teaching and research carried out in the full dimensions of the human life-span and the broad range of human association both on and off campus.*—RUSSELL G. MAWBY, *Chairman and Chief Executive Officer, W. K. Kellogg Foundation, Battle Creek, Michigan 49017*

*Adapted from a talk, “Public Service,” presented as a plenary lecture on the occasion of the centennial celebration of the National Association of State Universities and Land-Grant Colleges on 10 November 1987.

INDUSTRIAL QUANTITIES OF BIOLOGICALLY ACTIVE PEPTIDES

a selection of BACHEM'S products

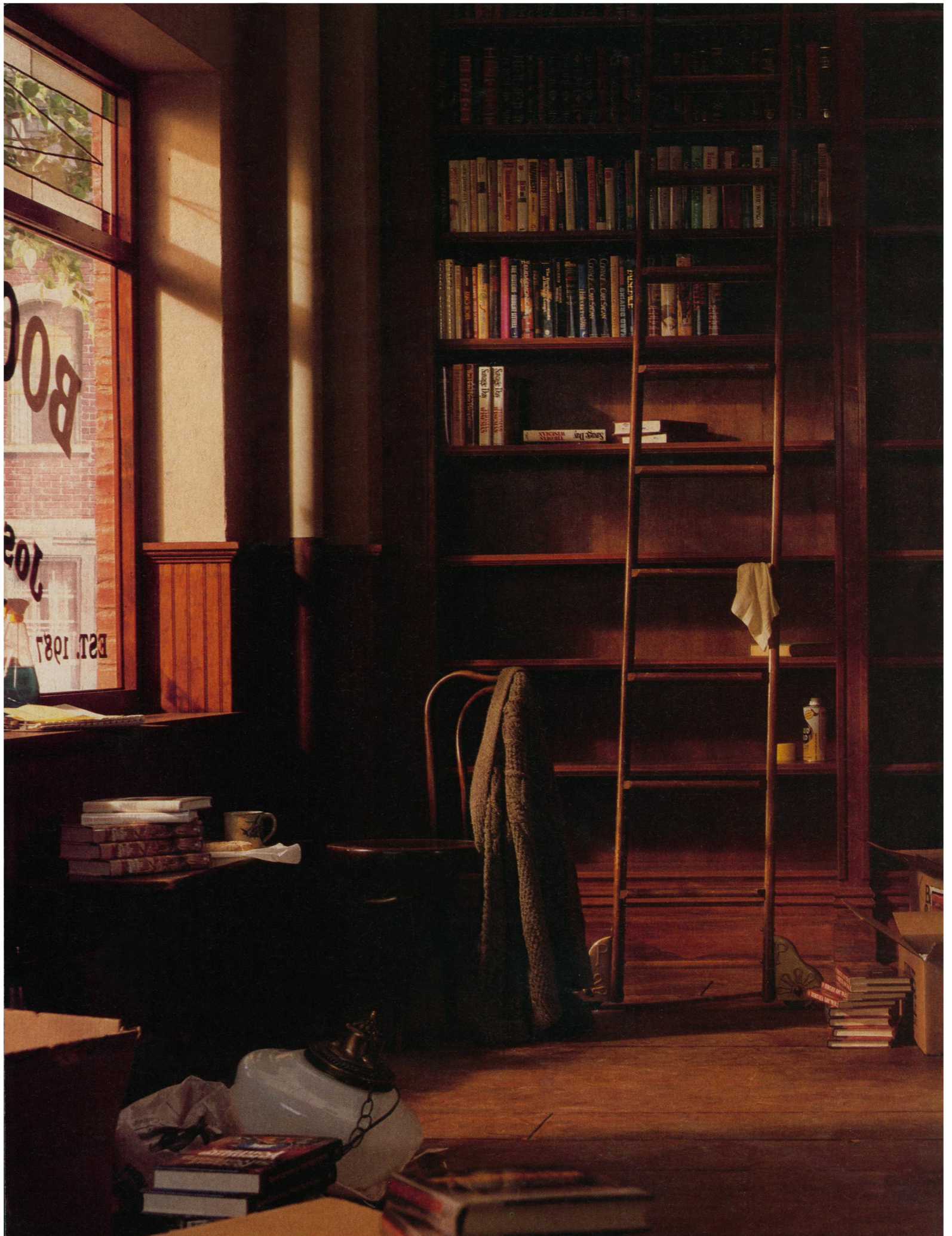


BACHEM Feinchemikalien AG
Hauptstrasse 144
CH-4416 Bubendorf/Switzerland
Phone 061/95 23 33 Fax 061/95 25 49
Telex 966 081

BACHEM Bioscience Inc.
Div. of BACHEM Switzerland
3700 Market Street
Philadelphia PA 19104
Phone 215/387 0011 Fax 215/387 1170
Telex 910/250 2352 Easy link 620/268 65

PS. BACHEM stands for Basel CHEMistry

Circle No. 193 on Readers' Service Card



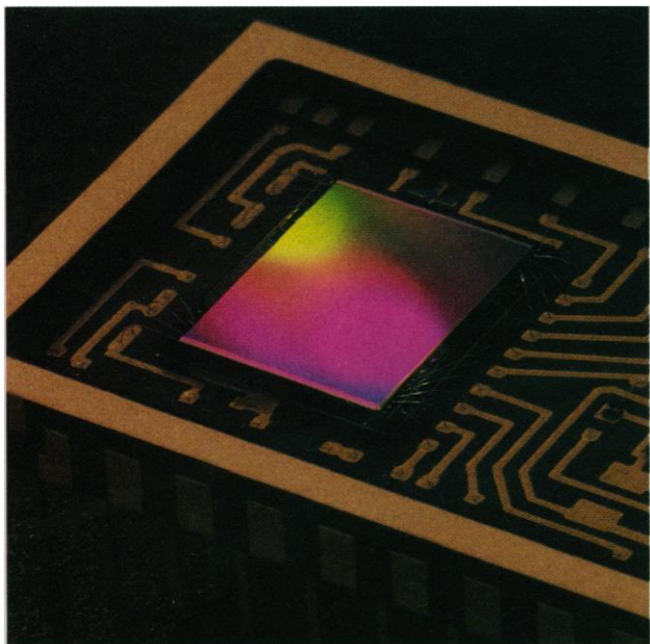
Open the books after school.

It is the best of times. Dickens. Dickinson. Dostoevski. Dumas. There's a way to go before Zola is tucked into place, but that's okay. Book by book the shelves will fill, and you'll be in business. Retiring from one job to start another one isn't everyone's dream. But it's always been yours. And years ago when you first set your goals, TIAA-CREF helped you find the best way to meet them. Now, thanks to your years of participation in TIAA-CREF, you've got what you want, a lifetime retirement income, and your own bookstore. And with the words, Open for Business, you'll begin what could be the most satisfying chapters in your life.



Ensuring the future
for those who shape it.sm

*TIAA-CREF can help your dreams come to life.
For information about our retirement plans and
other products call 1 800 842-2733.*



Kodak has introduced the highest-density image sensor in the world. A charge-coupled device with a 1.4 million pixel capacity. That's six times the information-gathering capability of any other device currently available. This technology is employed right now in monochromatic cameras used for critical industrial and scientific work. But just imagine the potential applications. We have. And we're continuing the search for new and exciting developments like this one, backed by an annual research budget of nearly \$1 billion, and motivated by new opportunities we see everywhere. If an exciting environment like this makes you want to know more about what we do and how we do it, drop us a line. Or send a resume to Personnel Resources, Dept. DS12, Eastman Kodak Company, Rochester, NY 14650. An equal opportunity employer.

IMAGINE 6000% MORE DETAIL IN PICTURES BY KODAK.

The new vision of Kodak



Nuclear Arms Control:

Can the U.S. and Soviet Union Trust Each Other?

This question is explored in a new videotape, ***Fear of Cheating, Fear of Spying***, produced by the American Association for the Advancement of Science. The 40-minute program illustrates the wide spectrum of views of leading arms control experts, scientists, and administration officials on the important issue of verification and alleged Soviet cheating.

Some of the issues and arguments presented are: verifiability of arms control agreements, acceptable risks, trust and negotiation, a history of U.S. and Soviet compliance, the current controversy over alleged Soviet violations, the adequacy of technologies for verification, and arms control challenges for the future. Participants include such well known experts as Sidney Drell, Herbert Scoville, Jr., Sidney Graybeal, Colin Gray, and Condoleezza Rice.

The tape is accompanied by a discussion guide containing introductory readings, suggested group discussion questions, and a bibliography. A transcript and glossary are also included.

Fear of Cheating, Fear of Spying is a valuable learning tool for college classes, high school audiences, and any groups interested in promoting citizen awareness and public discussion of nuclear arms control issues. To order this informative program for your institution, just complete and mail the form below.

Produced by the Program on Science, Arms Control, and National Security
American Association for the Advancement of Science

Yes! Please send me the ***Fear of Cheating, Fear of Spying*** videotape, along with the accompanying discussion guide, transcript, and glossary.

Name _____
Institution _____
Address _____
City/State/Zip _____

Please specify:

- ☐ VHS @ \$60
- ☐ Beta @ \$60
- ☐ U-matic @ \$75

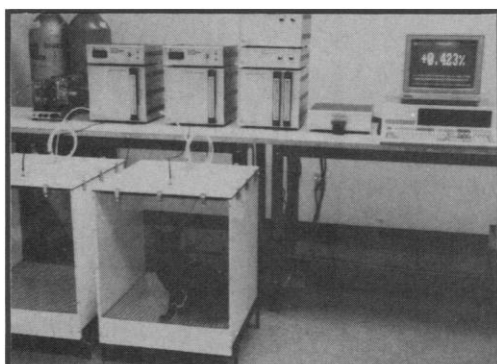
☐ Check enclosed ☐ VISA ☐ MasterCard

Card # _____ Expires _____
Signature _____

Mail to: AAAS Marketing Dept. SB, 1333 H Street, NW, Washington, DC 20005.
(Checks should be made payable to AAAS. Please allow 4-6 weeks for delivery.)

O_2 CONSUMPTION / CO_2 PRODUCTION

COMPUTERIZED SYSTEM FOR MEASURING ANIMAL METABOLISM



"Oxymax" System

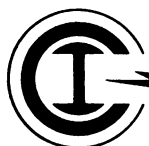
- * Simultaneous measurements in 1 to 4 chambers.
- * Can be used with small or large subjects (mice to pigs).
- * Utilizes IBM-PC/XT compatible etc. as a controller.
- * Open circuit indirect calorimetry method.
- * Prints/stores results in one minute intervals.
- * Allows for simultaneous measurements of O_2/CO_2 consumption/production, respiration rate, respiratory quotient, animal locomotor activity, food consumption, body temperature and heart rate. 24 hour hands-off operation.
- * Variety of sizes of measuring chambers.
- * Animal exercisers available as an option.

Sample of "Oxymax" Printout

Sample #	Cage #	VO_2 ml/Kg/Hr	VCO_2 ml/Kg/Hr	RER	O_2 % O_2	CO_2 % CO_2	Heat Kcal/Hr	Temp degC	Food g	Resp Vol	----- HorzActv	Counter HeartBPM	Interface RespRate	----- BodyTemp	Time hh:mm:ss
1	1	801	638	0.796	-0.399	+0.332	+1.61	+26.1	+0.2	7.70	213	345	187	37	16:23:25
2	1	772	624	0.808	-0.385	+0.324	+1.56	+26.1	+0.0	8.36	210	330	167	37	16:27:25
3	1	783	646	0.825	-0.392	+0.336	+1.59	+26.0	+0.4	9.33	212	398	153	37	16:31:25

Contact us for more information!

COLUMBUS INSTRUMENTS

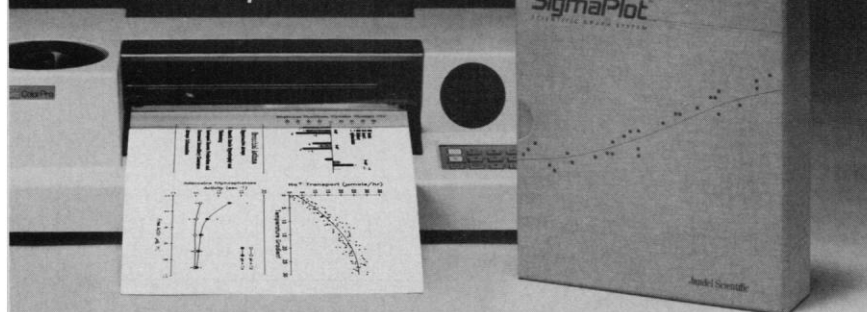


950 N. HAGUE AVE., COLUMBUS, OHIO 43204 U.S.A.
PHONE: (614)488-6176 TELEX: 246514 FAX: (614)276-0529

Circle No. 198 on Readers' Service Card

SigmaPlot™ software
creates publication quality
charts & graphs for
the scientist.

IBM PC and Compatibles



Create professional graphs for scientific publications, poster sessions, or lectures. Unlike business software, Sigma-Plot contains essential scientific features.

- Automatic error bars
- Multiple graphs per page
- 65,000 points per dataset

- Greek and math symbols
 - Polynomial curve fitting, and more...
- Accepts ASCII and DIF data files from Lotus, dBase, or your own programs. Support for Hewlett-Packard and compatible plotters, HP Laserjets, and selected dot matrix printers. Money-back guarantee.

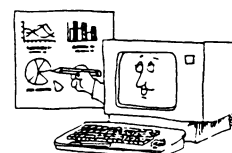
Free brochure 800-874-1888
In CA 415-924-8640
FAX: 415-924-2850 / Telex: 4931977
In Europe: R.J.A. Handers, Germany
Ph #02101/666268

Jandel
SCIENTIFIC

"Microcomputer Tools
for the Scientist"

65 Koch Road ■ Corte Madera, CA 94925

PlotIT®



Interactive Graphics & Statistics

Create graphs the way you want them. 35 graph types can be used to create numerous renditions. Make posters and flow charts—with full screen editing of text.

- Vary character font, size, position, color
- Stack and overlay graphs
- 3-Dimensional graphs: fishnet & contour
- Linear & Non-Linear Regression
- Stochastic Distribution
- Independence Testing
- Descriptive Statistics

Contact: Scientific Programming Enterprises, P.O. Box 669, Haslett, MI 48840 (517) 339-9859

Circle No. 21 on Readers' Service Card

Circle No. 202 on Readers' Service Card

The care to meet to know, to understand.

Ares-Serono Symposia is an independent foundation, created in 1971, to promote scientific research in all disciplines which contribute towards improving human health. This aim is pursued by means of congresses, courses, seminars and specialized studies.

Some of the international meetings scheduled for 1988 are:

5th European Workshop on the Molecular and Cellular Endocrinology of the Testis

Brighton, UK / April 13-16
Scientific Organization: B.A. Cooke (UK)

Endocrinology Under 35

Florence, Italy / May 23-25
Scientific Organization: M. Maggi (I) and C.J. Johnston (USA)

Platelets and Vascular Occlusion

Rome, Italy / June 1-3
Scientific Organization: G.A. FitzGerald (USA) and C. Patrono (I)

Advances in Biotechnology of Membrane Ion Transport

L'Aquila, Italy / September 19-20
Scientific Organization: R. Verna (I), P.L. Jørgensen (DK) and R.P. Garay (F)

Third Conference on Differentiation Therapy

Villasimius (CA), Sardinia/September 6-9
Scientific Organization: G.B. Rossi (I), F. Takaku (J) and S. Waxman (USA)

The Adrenal and Hypertension: From Cloning to Clinic

Tokyo, Japan / July 25-26
Scientific Organization: E.G. Biglieri (USA), J. Funder (AUS), F. Mantero (I) and R. Takeda (J)

No form of advertising or promotional activity by any pharmaceutical company is allowed at Ares-Serono Symposia Congresses.



ARES
SERONO
SYMPOSIA

Do you know all the advantages that the Ares-Serono Symposia Congress Card offers?
Please fill in this form and mail to Ares-Serono Symposia for information.

CONGRESS
CARD
1988



ARES
SERONO
SYMPOSIA

swissair  Official Carrier

I would like to receive information about:

- ☐ Ares-Serono Symposia Congress Card
☐ All the above Congresses
☐ In particular the Congress on

.....

☐ Ares-Serono Symposia Publications

Name

Address

Institution

Please send to Ares-Serono Symposia,
Via Ravenna 8 - 00161 Rome - Italy

sintesi informazione - roma

WHEN YOU HAVE THE MOST SOUGHT AFTER BIOMEDICAL INFORMATION, HOW DO YOU GET MORE PEOPLE TO USE IT?

By making our online biomedical information easier to use, we've opened the door for more users.

You, for instance.

If you're a physician or researcher in a medical, clinical, university, or scientific environment, our new Dialog Medical ConnectionSM could very well be the research tool you've been looking for.

Dialog is already the choice of the majority of information specialists.

So you'll be using the most sought after information available.

Now it's easy to have fast access to the major biomedical databases like MEDLINE.

Or BIOSIS PREVIEWS, giving you world wide coverage of research in the life sciences.

Or NEWSEARCH, one of many general reference databases providing a daily index of articles and book reviews from over 1700 of the most important newspapers, magazines and periodicals.

So it's easy to stay well informed on virtually any topic that's important.

Best of all, you don't have to be an online professional to use Dialog Medical Connection. Because it offers an easy to follow menu for new users and a command mode for more experienced searchers.

There's no reason not to have instant access to information you need when you need it. All you need is a personal com-

puter, a modem, and Dialog Medical Connection.

Call Dialog today and ask about our special incentives for first-time users including \$100 free time.

1-800-3-DIALOG. Or write Dialog Marketing, 3460 Hillview Avenue, Palo Alto, CA 94304.

SIMPLE.



D I A L O G
MEDICAL CONNECTIONSM

Part of the world's largest online knowledgebank.

1-800-3-DIALOG