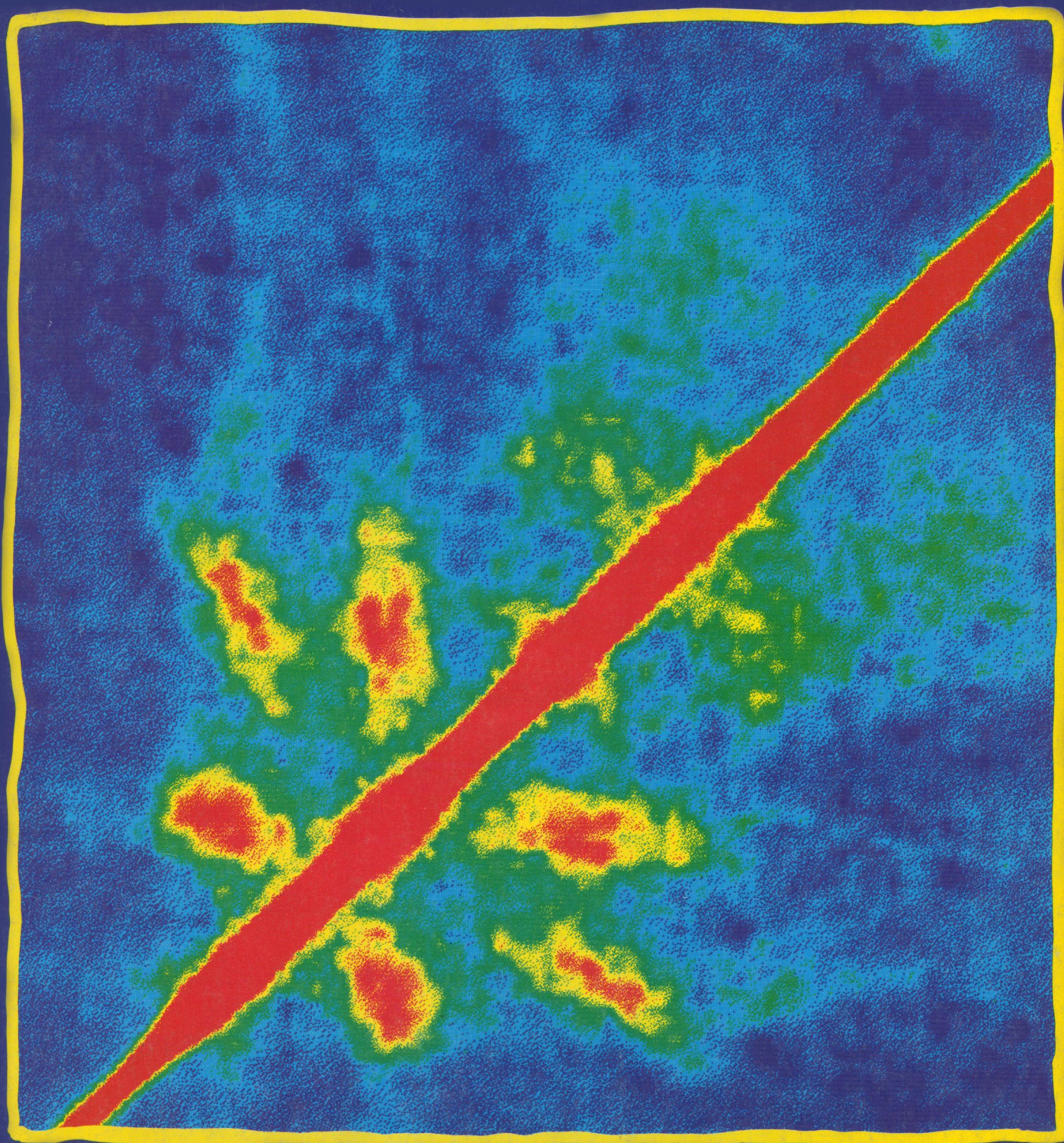


AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

SCIENCE

24 NOVEMBER 1989
VOL. 246 ■ PAGES 973-1088

\$3.50



Beckman Sets the P/ACE for Automated Electrophoretic Separations...

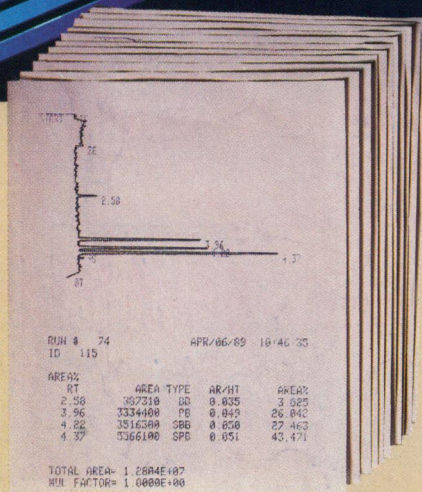
Reproducibility
Nanoliter Samples

Results in Minutes
High Resolution

Femtomole Quantitation



The modular P/ACE™ System 2000 offers optional PC control for record archiving, link-up with mainframe LIMS-type system, and transfer to a program for publication-quality output. System Gold™ Chromatography Software provides easy-to-use data acquisition, integration and manipulation.



Shows 11 injections in 90 min from a total sample of 5 μ L, accomplished with P/ACE™ Migration time CV less than .25%.

The P/ACE™ System 2000 from Beckman is designed for today and tomorrow. A modular system, P/ACE leads the evolution of capillary electrophoresis.

A removable detector allows multiple future detection options. Interchangeable cartridges let you change capillaries in minutes. Temperature control provides unmatched reproducibility. And sealed vials minimize sample evaporation. All unique to P/ACE. Unique too—the surprisingly affordable price.

Keep P/ACE with the latest in electrophoretic separation techniques! And achieve rapid success separating proteins, peptides, synthetic oligonucleotides, DNA fragments, and more. Call 800/742-2345, or write to Beckman Instruments, Inc., Spinco Division, Customer Service Department, 1050 Page Mill Rd., Palo Alto, CA 94304. Offices in major cities worldwide.

BECKMAN

Hi purity lambda DNA

QIAGEN *Hi purity* >lambda< kits will dramatically change the way you isolate lambda DNA.

The QIAGEN >lambda< kit series represents a complete purification system. Lambda kits are available for either Mini, Midi, or Maxi preps of lambda DNA, containing all buffers, reagents, protocols and the QIAGEN mini columns.

QIAGEN means:

- High Purity DNA
- Speed and Convenience
- No Phenol
- No CsCl or Ultracentrifugation

With QIAGEN CsCl purity is equalled:

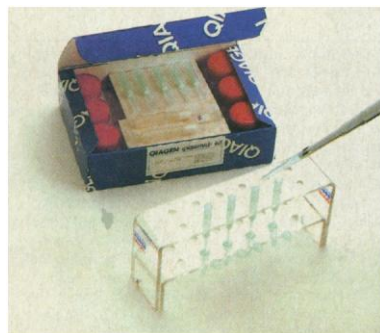
Pure lambda DNA can be isolated rapidly and economically using QIAGEN kits and easy-to-follow protocols. It is ideally suited for:

- Cloning
- Enzymatic processing
- Sequencing

QIAGEN mini columns

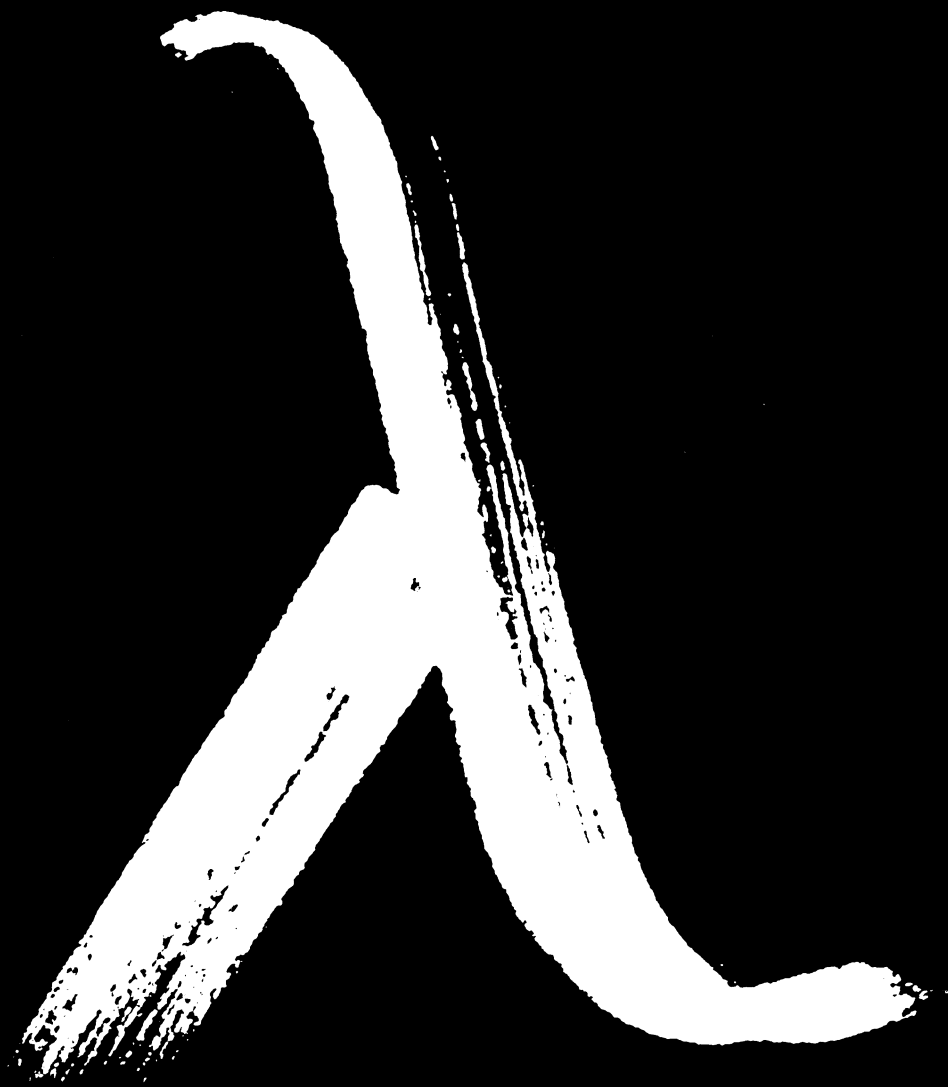
contain our unique-anion-exchange resin QIAGEN that guarantees the selective isolation of different classes of nucleic acids, and the complete removal of proteins, polysaccharides and metabolites.

**QIAGEN kits are
now available for
plasmid DNA
and
lambda DNA**



QIAGEN kits

Now for lambda DNA



Circle No. 157 on Readers' Service Card

GERMANY: QIAGEN GmbH, Niederheider Str. 3, D-4000 Düsseldorf 13, Phone (211) 79 30 37, Fax (211) 79 04 44
USA/CANADA: QIAGEN Inc., Studio City, CA 91604, Phone (800)-426-8157, 818-508-5258, Fax 818-508-5536
DISTRIBUTORS: **AUSTRALIA:** Phoenix Stansens Scient.Div. (3) 544 8022 **AUSTRIA:** Bio-Trade (222) 828 46 94
BENELUX: Westburg B.V. (33) 95 00 94 **FRANCE:** Coges (1) 45 33 67 17 **ISRAEL:** Bio-Lab Laboratories Ltd. (2) 52 44 47
ITALY: Genenco (M-Medical) (55) 67 64 41 **JAPAN:** Funakoshi Pharmaceutical Ltd. (3) 295 5548
PORTUGAL: Izasa Portugal, S.A. (3511) 758 07 40 **SCANDINAVIA:** Kebo Lab: Denmark: (2) 68 18 00, Finland: (0) 437 56 40, Norway: (6)-84 54 10, Sweden: (8) 621 34 00 **SPAIN:** Izasa S.A. (3) 254 81 00
SWITZERLAND: Kontron Instruments AG (1) 435 4111 **UK:** Hybaid Ltd. (1) 977 3266

●●●●●
QIAGEN

979 This Week in *Science*

Editorial

- 981 The Choosing of the NIH Director

Perspective

- 982 Mechanisms of Immunological Tolerance: H. R. MACDONALD
983 Retrovirus Vectors: Promise and Reality: H. M. Temin

Letters

- 984 Soviet-U.S. Seismological Data Exchange: J. R. FILSON AND J. PETERSON ■
BU "Takeover" of Chelsea Schools: B. J. FINE ■ Top Quark Search:
J. PEOPLES ■ RU 486 Development: G. TEUTSCH; P. P. CARBONE ■ UCLA and
Precollege Science: A. A. RUSSELL

News & Comment

- 988 Hard Times at NIH
990 House Trims off Academic Pork
991 Soviet Sociology Makes a Comeback
992 Global Warming: Blaming the Sun
994 Dispute Surfaces Over Paternity of RU 486

Research News

- 995 Playing Three-Dimensional Pool ■ The Shadow Cone Sheds Some Light
997 Galileo (Whew!) Changes Course
Readers Write to Right Wrongs
998 A Passion for the Little Things Among the Planets: The Poor Man's Grand Tour
of the Solar System ■ First Direct View of Solar System Chaos ■ Largest Radar
Detects Dumbbell in Space ■ Which Way Is North? Ask Right-Handed
Astronomers
1000 *Briefings*: Congress to Help Rebuild Mouse Lab ■ Layoffs Begin at Research Labs
■ Misplacing Kabul ■ ACS Weighs in on Science Education ■ Nabisco Chips in
\$30 Million ■ Megaprojects Under Review at OSTP ■ Max Planck Picks a
Lawyer as Leader ■ And Who's Behind That Mask? ■ Bonfire to Save the Rhino
■ Rhino DNA Mix and Match

Articles

- 1002 The Origins of Ceramic Technology at Dolni Věstonice, Czechoslovakia:
P. B. VANDIVER, O. SOFFER, B. KLIMA, J. SVOBODA
1009 Chemical Cartography: Finding the Keys to the Kinetic Labyrinth: G. W. FLYNN
1015 Parasitic Protozoa and Helminths: Biological and Immunological Challenges:
A. F. MAHMOUD

Research Articles

- 1023 Purification, Cloning, and Expression of Ciliary Neurotrophic Factor (CNTF):
L.-F. H. LIN, D. MISMER, J. D. LILE, L. G. ARMES, E. T. BUTLER III,
J. L. VANNICE, F. COLLINS

- **SCIENCE** is published weekly on Friday, except the last week in December, and with an extra issue in March 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 © 1989 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): \$75. Domestic institutional subscription (51 issues): \$120. Foreign postage extra: Canada \$46, other (surface mail) \$46, air mail via Amsterdam \$85. First class, airmail, school-year, and student rates on request. **Single copy sales:** Current issue, \$3.50; back issues, \$5.00; Biotechnology issue, \$6.00 (for postage and handling, add per copy \$0.50 U.S., \$1.00 all foreign); Guide to Biotechnology Products and Instruments, \$18 (for postage and handling add per copy \$1.00 U.S., \$1.50 Canada, \$2.00 other foreign). Bulk rates on request. **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, 27 Congress Street, Salem, Massachusetts 01970. The identification code for *Science* is 0036-8075/83 \$1 + .10. **Change of address:** allow 6 weeks, giving old and new addresses and 11-digit account number. **Postmaster:** Send Form 3579 to *Science*, P.O. Box 1722, Riverton, NJ 08077. *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 Covariance map of the Coulomb explosions in nitrous oxide after ionization by an intense picosecond laser. The covariance mapping technique gives directly the correlations between the momenta of the various fragment ions and thereby provides detailed information on the structure and fragmentation dynamics of the parent molecule. See page 1029. [Data acquisition and visualization algorithm by L. J. Frasinski, University of Reading, United Kingdom]

Reports

- 1026 Spatially Resolved Organic Analysis of the Allende Meteorite: R. ZENOBI, J.-M. PHILIPPOZ, P. R. BUSECK, R. N. ZARE
- 1029 Covariance Mapping: A Correlation Method Applied to Multiphoton Multiple Ionization: L. J. FRASINSKI, K. CODLING, P. A. HATHERLY
- 1032 Temperature and Sperm Incorporation in Polyploid Salamanders: J. P. BOGART, R. P. ELINSON, L. E. LICHT
- 1034 Similarity Between the Transcriptional Silencer Binding Proteins ABF1 and RAP1: J. F. X. DIFFLEY AND B. STILLMAN
- 1038 A Nondeletional Mechanism of Thymic Self Tolerance: F. RAMSDELL, T. LANTZ, B. J. FOWLKES
- 1041 Failure of T Cell Receptor V β Negative Selection in an Athymic Environment: R. J. HODES, S. O. SHARROW, A. SOLOMON
- 1044 Thymic Requirement for Clonal Deletion During T Cell Development: A. M. FRY, L. A. JONES, A. M. KRUISBEEK, L. A. MATIS
- 1046 DNA Topoisomerase I-Targeted Chemotherapy of Human Colon Cancer in Xenografts: B. C. GIOVANELLA, J. S. STEHLIN, M. E. WALL, M. C. WANI, A. W. NICHOLAS, L. F. LIU, R. SILBER, M. POTMESIL

Technical Comments

- 1049 Is Regulation of a Chloride Channel in Lymphocytes Affected in Cystic Fibrosis?: G. HAGIWARA, M. KROUSE, U. MÜLLER, J. WINE; P. GARDNER ■ Sphingomyelin Synthase and PKC Activation: R. Y. HAMPTON AND O. H. MORAND; Y. A. HANNUN ■ Rab 12 kD: P. PARHAM ■ Malaria Red Cell Cytoadherence: E. ROTH, JR., D. K. KAUL, R. L. NAGEL; C. F. OCKENHOUSE, N. N. TANDON, C. MAGOWAN, G. A. JAMIESON, J. D. CHULAY

AAAS Meetings

- 1052 Annual Meeting: Advance Registration Form; Hotel Registration Form ■ Plenary Lectures ■ Three-Day Seminars ■ Short Courses ■ Symposia, Technical Sessions, and Workshops ■ General Meeting Information

Meetings

- 1060 Gordon Research Conferences ■ 1990 Schedule

Book Reviews

- 1062 The Financing of Biomedical Research, reviewed by R. A. RETTIG ■ Greenhouse Warming, J. FIROR ■ Minorities and Cancer, G. M. SWANSON ■ Mechanistic Principles of Enzyme Activity; Environmental Influences and Recognition in Enzyme Chemistry, R. G. MATTHEWS ■ Order and Chaos in Nonlinear Physical Systems, N. ABRAHAM ■ Books Received

Products & Materials

- 1067 Hydrogen Generator ■ Chemical and Spectra Databases ■ Gel Dryer Produces Clear Bands ■ Laboratory Freezer ■ Protein Sequencing ■ Recombinant DNA Molecule Drawing Software ■ Slide Carousel Carrier ■ Literature

Board of Directors

Walter E. Massey
*Retiring President,
Chairman*

Richard C. Atkinson
President

Donald N. Langenberg
President-elect

Mary Ellen Avery
Francisco J. Ayala
Floyd E. Bloom
Mary E. Clutter
Eugene H. Cota-Robles
Joseph G. Gavin, Jr.
John H. Gibbons
Beatrix A. Hamburg
William T. Golden
Treasurer

Richard S. Nicholson
Executive Officer

Editorial Board

Elizabeth E. Bailey
David Baltimore
William F. Brinkman
E. Margaret Burbidge
Philip E. Converse
Joseph L. Goldstein
Mary L. Good
F. Clark Howell
James D. Idol, Jr.
Leon Knopoff
Oliver E. Nelson
Yasutomi Nishizuka
Helen M. Ranney
David M. Raup
Howard A. Schneiderman
Larry L. Smarr
Robert M. Solow
James D. Watson

Board of Reviewing Editors

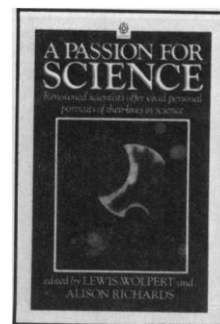
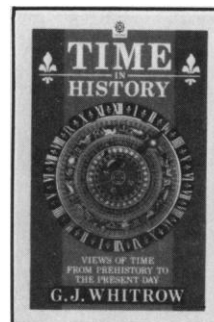
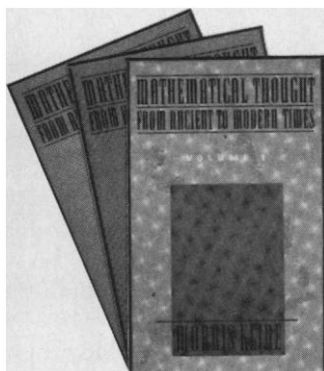
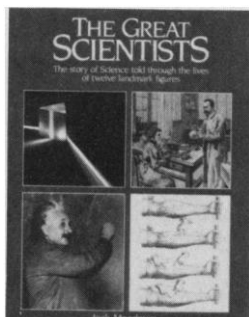
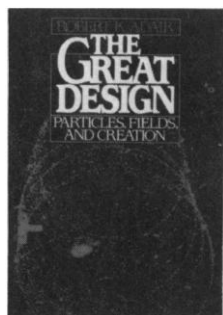
John Abelson
Qais Al-Awqati
Don L. Anderson
Stephen J. Benkovic
Floyd E. Bloom
Henry R. Bourne
James J. Bull
Kathryn Calame
Charles R. Cantor
Ralph J. Ciccone
John M. Coffin
Robert Dorfman
Bruce F. Eldridge
Paul T. Englund
Fredric S. Fay
Theodore H. Geballe

Roger I. M. Glass
Stephen P. Goff
Robert B. Goldberg
Corey S. Goodman
Jack Gorski
Stephen J. Gould
Richard M. Held
Gloria Heppner
Eric F. Johnson
Konrad B. Krauskopf
Charles S. Levings III
Richard Losick
Karl L. Magleby
Philippa Marrack
Joseph B. Martin
John C. McGiff
Mortimer Mishkin
Carl O. Pabo

Yeshayau Pocker
Michael I. Posner
Dennis A. Powers
Russell Ross
James E. Rothman
Erkki Ruoslahti
Ronald H. Schwartz
Vernon L. Smith
Robert T. N. Tjian
Virginia Trimble
Emil R. Unanue
Geerat J. Vermeij
Bert Vogelstein
Harold Weintraub
Irving L. Weissman
George M. Whitesides
Owen N. Witte
William B. Wood



Great minds at work...



The Great Design Particles, Fields, and Creation ROBERT K. ADAIR

"A delicious and, in many ways, a profound popularization of what physics is and how physicists reach and accept conclusions." — *New Technical Books*

"An excellent and often illuminating review of the basic concepts of modern physics." — *American Scientist*

"Adair is on many topics an excellent guide and mentor." — *Nature*

448 pp.; illus. paper \$12.95

Mathematical Thought From Ancient to Modern Times Three-Volume Edition MORRIS KLINE

"The most ambitious and comprehensive history in the English language of mathematics and its relations to science." — Carl Boyer, author of *A History of Mathematics*

"There is no other book from which one can obtain a comparable understanding of the history of mathematics." — *American Scientist*

This three-volume paperback edition of Morris Kline's monumental work presents the major creations in mathematics from its beginnings in Babylonia and Egypt through the first few decades of the twentieth century.

Volume 1: 416 pp.; figures paper \$12.95

Volume 2: 384 pp.; figures paper \$12.95

Volume 3: 448 pp.; figures paper \$12.95



The Great Scientists The Story of Science Told through the Lives of Twelve Landmark Figures JACK MEADOWS

"A museum-in-a-book.... *The Great Scientists* shows science as a process, not just a body of knowledge."

— *The Christian Science Monitor*

"A kaleidoscope of facts, myths, pictures, theories, asides, anecdotes, and the relationship of science with art and literature." — *New Scientist*

256 pp.; 480 illus., 300 in color paper \$18.95

A Passion for Science Edited by LEWIS WOLPERT and ALISON RICHARDS

"A marvelously articulate bunch of scientists.... All in all, an appealing and informative picture of the ways and styles of scientists." — *Kirkus Reviews*

A Passion for Science features thirteen informal conversations with eminent scientists — Abdus Salam, John Maynard Smith, and Stephen Jay Gould among them — who speak with remarkable candor and good humor about the personal side of science.

216 pp.; photos paper \$8.95

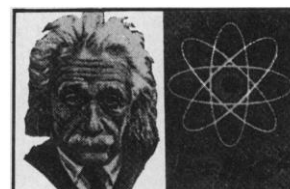
Time in History Views of Time from Prehistory to the Present Day G.J. WHITROW

Written by the distinguished scientist, G.J. Whitrow, this compelling, groundbreaking volume traces the evolution of our general awareness of time and its significance from the dawn of history to the present day.

240 pp. paper \$8.95

...from OXFORD PAPERBACKS

Oxford University Press
200 Madison Avenue
New York, NY 10016



This Week in **SCIENCE**

Paleolithic fireworks

MAMMOTH hunters living in Czechoslovakia some 26,000 years ago fashioned ceramic figurines but then blew them up in kilns, perhaps for ritualistic purposes (page 1002). Ceramics from Dolní Věstonice are the oldest known fired objects in the world; since the 1920s, more than 10,000 ceramic pieces (of which a Venus figurine is the most famous) have been recovered there and at five other Moravian sites. Vandiver *et al.* describe the compositions, forms, and microstructures of recovered fragments and figurines and propose and test a method for their production; they conclude from their studies that the ceramic objects were shaped from local soil (they have the same mineralogy as the local wind-deposited silt-sized material called loess) and that their destruction on firing was intentional. That the firing occurred in kilns that were not especially close to the hunters' settlements is also consistent with the proposed nonutilitarian function of the objects; in fact, utilitarian pottery production on the earth is only documented for peoples who lived some 14,000 years later.

Parasites

HUMAN diseases caused by protozoa and helminths account for tremendous mortality and morbidity worldwide. Yet there is a notable discrepancy between the amount of information that is available about these diseases and the organisms that cause them and about human viral and bacterial diseases. One source of this disparity may be that helminths and protozoa are extraordinarily complex physically and physiologically and can interact with human and intermediate hosts in a number of ways. Another factor may be that most research is done in developed countries where diseases caused by protozoa and helminths are not significant health problems. Mahmoud reviews recent research on protozoa and helminths and the diseases they cause, focusing especially on malaria (a

disease caused by a protozoan parasite) and schistosomiasis (a disease caused by a helminth) (page 1015). Vaccine development and control of parasitic diseases require a fuller understanding of the nature of these organisms, their life cycles, and their complex interactions with hosts.

Allende organics

FIVE tons of meteorite fell and shattered over Mexico in 1969, and today this Allende meteorite is the best studied of the carbon-rich carbonaceous chondritic meteorites. Nevertheless, two decades of research and ample amounts of sample have produced little information regarding the meteorite's organic constituents, which are extremely heterogeneous and present in only trace amounts. Zenobi *et al.* now present a profile of the polycyclic aromatic hydrocarbons (PAHs) in the Allende meteorite (page 1026); these compounds are considered important relics of the events that occurred in the early period of solar system formation billions of years ago. The analysis was carried out with two-step laser desorption/laser multiphoton ionization mass spectrometry of freshly fractured chunks of the material. This procedure does not require extractions, purifications, homogenizations, or pulverizations; it provides direct information about the composition and spatial distribution, with sub-millimeter resolution, of PAHs. The PAHs were found to be heterogeneously distributed in the sample's matrix, were absent from the chondrules (millimeter-sized spheres that characterize chondrites), and were heavily substituted with a variety of side chains.

Self tolerance

THE immune system of an animal does not, under normal circumstances, react against the animal's own tissues; this phenomenon, called self tolerance, is not an innate condition in the animal but develops along with the immune system itself. A perspective

and three reports in this issue discuss some of the factors that bring about self tolerance (pages 982, 1038, 1041, and 1044). Normally, cells of the immune system pass through the thymus during development, and clones of cells with the potential to react against self are eliminated. It has now been conclusively established that, if animals lack a thymus, some self-reactive clones of cells do not get eliminated and are found in the adult animal. Yet, surprisingly, not all animals harboring these cells routinely develop autoimmune diseases (although some do). For those that do not, alternative mechanisms are operating to render unresponsive or "anergic" those self-reactive cells that escaped thymic scrutiny.

Colon cancer chemotherapy

FOUR percent of Americans develop colon cancer. Often the disease is quite advanced at the time of detection; then the prognosis is generally poor because only marginally effective chemotherapy is currently available. In a study described by Giovanella *et al.*, the possibility has been raised that analogs of the drug camptothecin would be effective chemotherapeutic agents against colon cancer (page 1046). Human colon tumors were grafted into immunodeficient mice; the tumors disappeared completely in animals treated with camptothecin analogs, and negative side effects from the drug were minimal. The only known target of camptothecin is DNA topoisomerase I, an enzyme that has been shown to be elevated in advanced colon cancer. The enzyme normally facilitates the breaking and rejoining of molecules of DNA; it is thus instrumental in maintaining normal DNA conformations. Thus, if camptothecin analogs interact with DNA topoisomerase I in vivo, the blocked enzyme activities could disrupt normal processes in cells, reducing tumor (as well as normal) cell viability; these actions and their sequelae could account for the drug's apparent tumor-suppressing effects.

■ RUTH LEVY GUYER

From the World's Premier Supplier for Microphysiology

IMMEDIATE DELIVERY

Diamond General
manufactures and
inventories
products for
immediate shipment

World's smallest pH
Needle Electrode

Combination pH Needle
Electrode with blunt end.

Combination O₂ Needle
Electrode

COMPLETE SOURCE

Full line of
Microphysiology
Equipment



Clark-style O₂ Microelectrode
for Marine Biology.

Combination O₂/pH Needle
Electrode for tissue measurement

Send for
FREE
Catalogs

Diamond General corp.



3965 Research Park Drive
Ann Arbor, MI 48108 USA
1-800-678-9856

Circle No. 182 on Readers' Service Card

POSTER YOUR WALLS WITH SCIENCE

SCIENCE cover posters are once again available. These beautiful, full-color reproductions are suitable for framing, and the sturdy mailing tube keeps them crease-free during shipment. Only \$7.95, U.S. postage paid.

MARK quantity in box.

☐ #01 **LOCOMOTIVE IN CHINA**
9 February 1979 (18 x 24)

☐ #02 **LIGHTNING OVER ST. LOUIS**
27 July 1979 (20 x 28)

☐ #03 **CHEETAH AND CUB**
29 July 1983 (20 x 28)

☐ #04 **SNOWSHOE HARE**
2 December 1983 (20 x 28)

☐ #05 **CATHEDRAL WINDOW/DNA
MOLECULE**
23 December 1983 (20 x 28)

☐ #06 **NEURONS IN MOTOR CORTEX**
26 September 1986 (18 x 24)

☐ #07 **BYRD GLACIER, ANTARCTICA**
28 November 1986 (18 x 24)

☐ #08 **COMBINATION OF SPACE
COVERS IN SCROLL FORMAT**
1 June 1979, 23 November 1979,
10 April 1981 (12 x 37)

☐ #09 **MOONS OF URANUS**
9 September 1988 (18 x 24)

☐ #10 **CATERPILLAR/YOU ARE WHAT
YOU EAT**
3 February 1989 (18 x 24)

☐ #11 **ATMOSPHERIC LAYERING ON
EARTH'S EDGE**
10 February 1989 (18 x 24)

_____ Total number ordered @ \$7.95

\$ _____ Subtotal

\$ _____ For shipment to California, add
applicable sales tax.

\$ _____ Total

Name _____

Address _____

City _____

State/Zip _____

MAIL TO:

AAAS Books, Dept. 8
P.O. Box 753
Waldorf, MD 20604

☐ Check enclosed Please charge my:

☐ Mastercard ☐ Visa

Card # _____ Exp. _____

**Order
yours now,
while supplies last!**

**Pipetting?
Single-Shot Microliter
Dispensing?**

**Try the
all-new
FMI
micro π -petter!**



It provides a simple, low-cost means of dispensing very small amounts of fluids for applications such as pipetting, reagent preparation, syringing, precision sampling, repetitive and volumetric dispensing. The variable displacement, valveless RR piston design makes it possible to dispense volumes of 2 to 100 μ l per shot with incremental adjustment of less than 0.5 μ l. PIP units are also reversible for aspirating fluids or back-flushing the system.

A simple, sealed pushbutton hand/foot pendant switch makes a momentary contact for one dispense per push when the mode switch is in the down (Singles) position, or it may be held down for purging or reagent rinsing when the mode switch is in the up (Repeat) position. Using a combination of forward and reverse modes makes dilutions especially easy. Wetted surfaces of ceramic and fluorocarbon provide for maximum chemical compatibility. A three-speed 110 VAC 60 Hz synchronous motor provides three shot velocities to meet your fluid and vessel requirements.

Two standard models are available at a price of \$525 each
F.O.B. FMI: Model PIP0CKC-0 to 50 μ l;
Model PIP1CKC-0 to 100 μ l.

**CALL TOLL FREE
800-223-3388
IN NY 516-922-6050**



FLUID METERING, INC.

29 ORCHARD STREET, P.O. BOX 179, OYSTER BAY, NY 11771
TELEX 5101001281 • FAX 516-624-6261

Circle No. 200 on Readers' Service Card

EndNote®

BIBLIOGRAPHIES ON THE APPLE MACINTOSH

Maintains a database of up to 32,000 references and builds bibliographies automatically in the style you choose. Works with Microsoft Word, MacWrite, WriteNow, and WordPerfect on the Macintosh. \$129.

Reviews: MacUser, Feb 1989. MacWorld, Feb 1989.

EndLink is a companion product that allows importing references downloaded from online services like DIALOG or BRS Colleague into EndNote. \$99.

Grant Manager

FOR IBM PC OR THE APPLE MACINTOSH

Maintains grant balances to prevent overspending or underspending. Prints orders on your forms and updates grant balances automatically. In use in more than 1000 university departments. \$425.

Reviews: Nature, June 16, 1988. MacGuide, Summer 1988.

Personnel Manager is a companion program that finds the optimal allocation of people to grants over time and posts charges to Grant Manager. \$425. (IBM PC)

30-Day Money Back Guarantee.

Call (415) 655-6666 for a free brochure.



Niles & Associates, Inc.
2000 Hearst Street
Berkeley, CA 94709

For Endnote Circle Reader Service No. 43
For Grant Manager or Personnel, Circle Reader Service No. 44

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: Richard S. Nicholson

Editor: Daniel E. Koshland, Jr.

News Editor: Ellis Rubinstein

Managing Editor: Patricia A. Morgan

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

EDITORIAL STAFF

Assistant Managing Editor: Monica M. Bradford

Senior Editor: Eleanor Butz

Associate Editors: Keith W. Brocklehurst, Martha Coleman, R. Brooks Hanson, Barbara Jasny, Katrina L. Kelner, Edith Meyers, Linda J. Miller, Phillip D. Szurumi, David F. Voss

Letters Editor: Christine Gilbert

Book Reviews: Katherine Livingston, *editor*; Susan Milius

Contributing Editor: Lawrence I. Grossman

Chief Production Editor: Ellen E. Murphy

Editing Department: Lois Schmitt, *head*; Mary McDaniel,

Patricia L. Moe, Barbara P. Ordway

Copy Desk: Joi S. Granger, Margaret E. Gray, MaryBeth

Shartle, Beverly Shields

Production Manager: James Landry

Assistant Production Manager: Kathleen C. Fishback

Art Director: Yolanda M. Rook

Graphics and Production: Holly Bishop, Julie Cherry,

Catherine S. Siskos

Systems Analyst: William Carter

NEWS STAFF

Correspondent-at-Large: Barbara J. Culliton

Deputy News Editors: Jean L. Marx, Colin Norman

News and Comment/Research News: Mark H. Crawford, Constance Holden, Richard A. Kerr, Eliot Marshall, Joseph Palca, Robert Pool, Leslie Roberts, Marjorie Sun, M. Mitchell Waldrop

European Correspondent: Jeremy Cherfas

West Coast Correspondent: Marcia Barinaga

BUSINESS STAFF

Circulation Director: John G. Colson

Fulfillment Manager: Marlene Zendell

Business Staff Manager: Deborah Rivera-Wienhold

Single Copies Manager: Ann Ragland

Classified Advertising Supervisor: Amie Charlene King

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

Employment Sales Manager: Edward C. Keller

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 60914: Jack Ryan, 525 W. Higgins Rd. (312-885-8675); San Jose, CA 95112: Bob Brindley, 310 S. 16th St. (408-998-4690); Dorset, VT 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581); Damascus, MD 20872: Rick Sommer, 11318 Kings Valley Dr. (301-972-9270); U.K., Europe: Nick Jones, +44(0647)52918; Telex 42513; FAX (0647) 52053.

Information for contributors appears on page XI of the 29 September 1989 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, New York, NY 10036. Telephone 212-730-1050 or WU Telex 968082 SCHERAGO, or FAX 212-382-3725.

The Choosing of the NIH Director

The appointment of a new director of the National Institutes of Health has been in limbo for some time, held up by the inappropriate politicization of the position. Recent news indicates that the Secretary of Health and Human Services, Louis Sullivan, and the President's science adviser, D. Allan Bromley, personally intervened with the President to keep the appointment from being based on a political litmus test, specifically the candidate's position on abortion.

Requiring these candidates to respond to questions on such controversial subjects as abortion should never have been considered, because using such an issue instead of actual qualifications for selection could only hurt both the director of NIH and the President. Then, if the candidate agreed with the political viewpoints of the President, he or she would be viewed in the scientific community as having been appointed because of sycophancy, rather than because of professional ability. If, on the other hand, the candidate disagreed with the President, his or her positions on topics in which scientific expertise was essential might be compromised. It was crucial for the President to affirm that the NIH director will be chosen solely on the basis of scientific competence.

The director must make some policy decisions, and there are those who will argue that any limitation on the scope of those decisions would be a detriment to biological science. Policy decisions, such as the distribution of contracts and grants, the objectivity and the operation of study sections, the need to fund young investigators and so forth, are so vital to the successful pursuit of research that the director should be unincumbered with extraneous political baggage while taking leadership in those areas that allow science to function efficiently. Some issues would more appropriately be decided at other levels, keeping the NIH director, the National Science Foundation director, and other technical policy-makers apart from the political spoils system. The trade-off may be less scope in a general area for more power within the defined area.

The abortion question would be irrelevant to NIH were it not for fetal research. The use of fetal tissue has great promise not only in brain research, in AIDS research, and in the understanding of development in general, but also in the very survival of fetuses (see J. T. Hanzen and J. R. Sladek, Jr., *Science*, 10 Nov., p. 775). Some argue that research using aborted fetuses encourages abortions. Others argue that the ethical concerns about the use of aborted fetuses are the same as those debated about the use of organs for transplant. The NIH director must obey the law of the land and the policy set by the government; his private opinions need not enter into the abortion debate. The director of NIH, however, can and should be asked to evaluate professionally what the advantages and limitations of fetal research are and the ethical ways in which such research can be performed. A scientifically objective analysis may be important to reveal to other policy-makers what benefits would be abandoned by a ban on fetal research.

That the abortion issue has become so visible in our pluralistic society is perhaps inevitable. To some, life begins at fertilization and therefore abortion is immoral. Others are opposed to the birth of a child destined for a life of pain and misery. In a more homogeneous society, a mutually agreed upon moral code might be possible. In a melting pot society, a restrictive code can only be divisive. Some question who should bear financial responsibility for infants whose future was destined to be bleak. Others clamor to make abortion illegal under all circumstances. A compromise in which each group can follow its own moral code seems most appropriate, but the argument that fetal research should be held hostage to the debate about abortion makes little sense. The development of organ transplants does not mean that scientists are in favor of motor accidents. The same argument is true in the case of fetal research.

The important feature of the present situation is that a director for NIH will be chosen on the basis of scientific competence. Because of the publicity surrounding this appointment, the individual chosen will be scrutinized from all sides for his or her professionalism. It will serve everyone well to be able to say that the President never asked the candidates political questions, but only questions dealing with scientific competence and judgment. By stating those conditions well in advance, a great deal of difficulty and embarrassment will be averted, and this major research post can be filled by an individual whom all can respect.

—DANIEL E. KOSHLAND, JR.

mistakable in proton-antiproton collisions.

In short, I agree with Cherfas that physicists of Fermilab know where to look for the top quark—in proton-antiproton collisions at the Tevatron!

JOHN PEOPLES
Director, Fermilab,
Post Office Box 500,
Batavia, IL 60510

RU 486 Development

I read with great interest the series of articles related to the "contragestive pill" RU 486 (News & Comment, 22 Sept., p. 1319). It is not my intention to minimize the leading role of Etienne-Emile Baulieu in the clinical development and promotion in the media of this compound, as RU 486 would probably never have reached its present status without the stern determination of the INSERM biologist. However, I feel it my duty, on the grounds of simple scientific ethics, to add the following comments to the report by Jeremy Cherfas (p. 1323).

1) I was not the "chief chemist at Roussel"—this would be unfair to my colleagues; nor was I the chief of chemists, being in charge of only a small group of co-workers.

2) RU 486 was synthesized in April

1980, so it could not have been tested in 1978.

3) The story of "how" RU 486 was designed does not fit the facts as I recall them as a member of the Roussel research team, which was fully responsible for this discovery.

GEORGES TEUTSCH
Departement Endocrinologie,
Recherches Santé,
Roussel UCLAF,
102, 111 Route de Noisy,
F 93230 Romainville,
France

I congratulate Jeremy Cherfas on his excellent article about the important work of Emile-Etienne Baulieu, who has been duly recognized for his efforts by being awarded the Lasker Prize for 1989. Baulieu points out appropriately the importance of the discovery of monohydroxytamoxifen's high binding affinity for the estrogen receptor in his own work. However, in the article that discovery is attributed to Robert Sutherland, who was a postdoctoral student in Baulieu's laboratory.

It should be noted out that the relevant papers from Baulieu's lab (1) both refer to earlier studies done by V. Craig Jordan (2).

This in no way detracts from Baulieu's efforts in capitalizing on this fact to develop RU 486 and from appropriate recognition of his accomplishment.

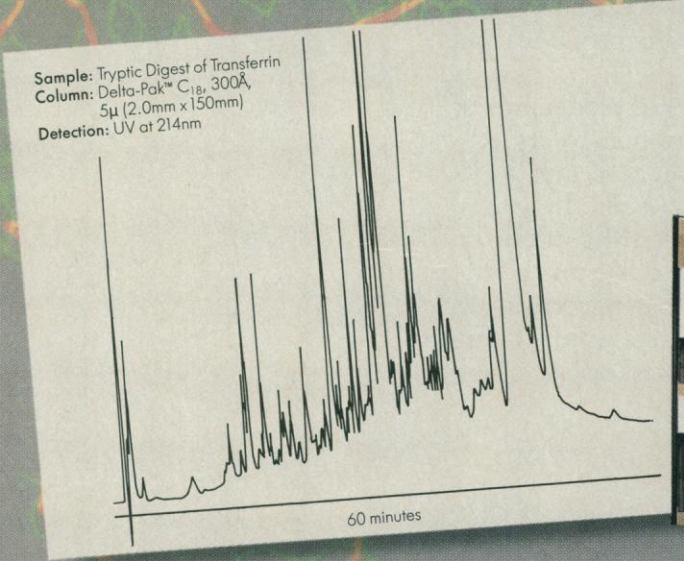
PAUL P. CARBONE
Department of Human Oncology,
Clinical Cancer Center,
University of Wisconsin,
600 Highland Avenue, Madison, WI 53792

REFERENCES

1. M. Binart *et al.*, *Biochem. Biophys. Res. Commun.* **91**, 812 (1979); J. Mester *et al.*, *J. Steroid Biochem.* **11**, 307 (1979).
2. V. C. Jordan *et al.*, *J. Toxicol. Environ. Health*, **4** 363 (1978); V. C. Jordan *et al.*, *J. Endocrinol.* **78**, 71 (1978).

UCLA and Precollege Science

Bassam Shakashiri, head of the National Science Foundation's education program, appears to be saying (News & Comment, 20 Oct., p. 317) that the faculty at the University of California, Los Angeles (UCLA) are not concerned with improving precollege science. He is misinformed; the UCLA faculty have been involved with this endeavor for almost a decade. For example, Doing Chemistry (1), a multiyear project funded by the NSF Education Directorate, began at



Essentials in peptide mapping.

Waters new 625 non-metallic, low dispersion LC system with microbore Delta-Pak™ reverse phase columns are essentials for high resolution peptide mapping. Isolate tens of picomoles of peptides in fraction volumes of less than 100µl prior to sequencing or compositional analysis. Use high resolution peptide maps to fingerprint complex samples. A choice of high sensitivity UV/Vis or photodiode array detectors plus the convenience of PowerLine™ single-point system control and unique 625 system features designed specifically for the biochemist provide LC performance never before available.

Only Waters provides all the essentials necessary for your bioresearch. Ask for our complete bioseparations catalogue of instrumentation, chemistries and applications. Circle the reply number or call us at (508) 478-2000, ext. 2777.

Instrumentation,
Chemistries, and
Expertise for
Bioseparations

Waters. The absolute essential
in bioresearch.

Waters
Division of MILLIPORE

“We’re
used to
being
quoted.”

When scientists gather to talk science, they very often end up talking SCIENCE.

With a circulation almost 500% larger than the second-ranked journal, SCIENCE gets into more conversations because it gets into more hands, reaching more doctoral scientists in R&D, more NIH Grant recipients, more science policy-makers than any other publication in the field.

Just as the elite readership of SCIENCE responds to its editorial content, it responds to its advertising as well. If you’re involved in scientific products or recruitment advertising, the best place for that advertising is SCIENCE. You’ll enjoy being quoted. And acted upon.

THE GLOBAL WEEKLY OF RESEARCH
SCIENCE

ADVERTISING REPRESENTATIVES
SCHERAGO ASSOCIATES, INC.
1515 Broadway, New York, N.Y. 10036 • (212) 730-1050

UCLA in a 1983 summer workshop with Los Angeles area teachers and school districts. The dissemination phase of this project was delayed 14 months while a parade of NSF program officers were assigned to the project. More recently, UCLA faculty submitted a proposal to this directorate's solicitation for Projects to Promote the Effective Use of Technology in the Teaching of Science and Mathematics. The proposal, aimed specifically at middle and secondary school science, focused on the needs of teachers and students in urban, minority schools. The NSF Education Directorate assigned the proposal to evaluators so unfamiliar with technology that the reviewers did not appear to know the word "hardware." If Shakashiri wishes research universities to support the Education Directorate's goals, he will have to ensure efficient program management and competent peer review—long tenets of the research programs of NSF.

ARLENE A. RUSSELL
Department of Chemistry and Biochemistry,
University of California,
405 Hilgarde Avenue,
Los Angeles, CA 90024

REFERENCES

1. D. W. Brooks *et al.*, *J. Chem. Ed.* **66**, 425 (1989).

Correction

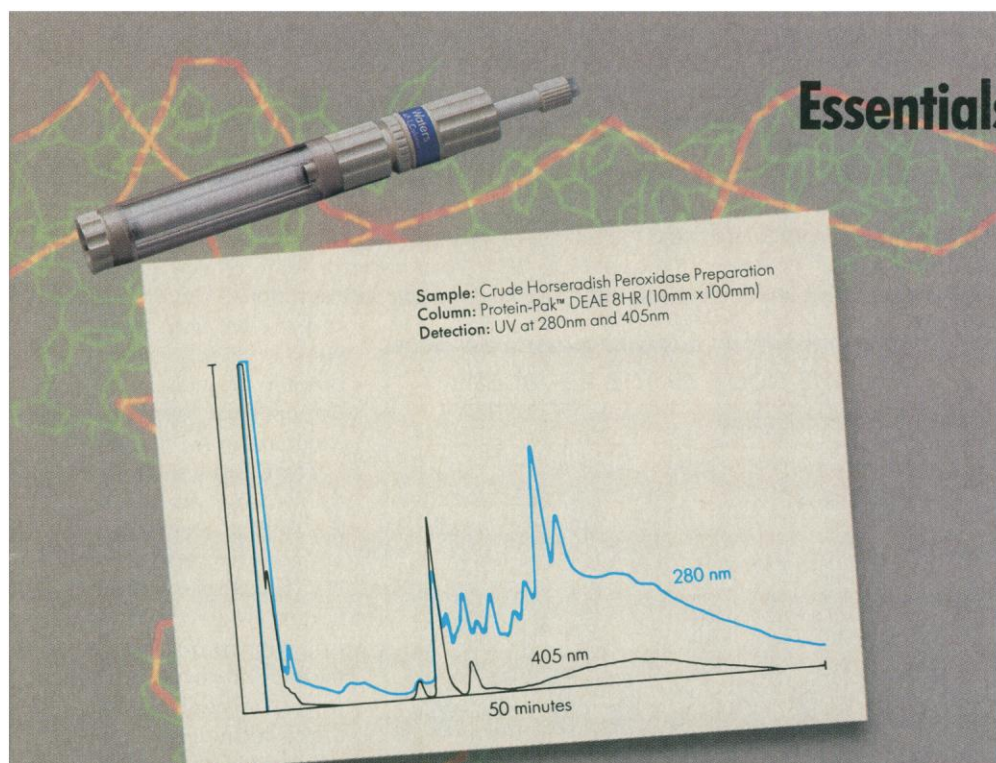
After our characterization of cDNA encoding a 47-kD neutrophil cytosol oxidase factor was published (1), a second group published characterizations of similar cDNA clones (2). On the basis of an exchange of primary sequence data and resequencing, we have identified minor errors in both published sequences and have agreed on a corrected sequence. In the original numbering of our published sequence (1), an extra "C" should be added after base pair 900, a "GCC" should be inserted after base pair 1008, and base pairs 1013 and 1014 should be "GC." These changes alter the carboxyl terminus of the predicted protein beginning at amino acid 301 and ending at 390: RRS-SIRNAHS IHQRSRKRLS QDAYRRNS-VR FLQRRRRQAR PGPQSPGSPL EEERQTQRSK PQPAVPPRPS AD-LILNRCSE STKRKLASAV. The new predicted protein sequence is 17 amino acids longer. The region of similarity to p21-ras-GAP is unaffected, and the carboxyl terminus remains very arginine- and serine-rich with several potential sites of phosphorylation by protein kinase C. Thus, all of the general statements made about the protein in our original paper still apply.

In addition to the three polymorphic base pair variants we reported in our original paper, four additional base pair polymorphisms have been identified, none of which affects encoded amino acids. In the original numbering (1), these are base pair 387 "G" or "A," base pair 825 "C" or "T," base pair 849 "A" or "G," and base pair 935 "C" or "T." These changes have been sent to GenBank and entered under accession number M25665. Readers may also request from us the complete corrected sequence.

KAREN J. LOMAX
THOMAS L. LETO
HIROYUKI NUNOI
JOHN I. GALLIN
HARRY L. MALECH
Bacterial Diseases Section,
Laboratory of Clinical Investigation,
National Institute of Allergy and
Infectious Diseases,
National Institutes of Health,
Bethesda, MD 20892

REFERENCES

1. K. J. Lomax, T. L. Leto, H. Nunoi, J. I. Gallin, H. L. Malech, *Science* **245**, 409 (1989).
2. B. D. Volpp, W. M. Nauseef, J. E. Donelson, D. R. Moser, R. A. Clark, *Proc. Natl. Acad. Sci. U.S.A.* **86**, 7195 (1989).



Sample: Crude Horseradish Peroxidase Preparation
Column: Protein-Pak® DEAE 8HR (10mm x 100mm)
Detection: UV at 280nm and 405nm

280 nm
405 nm
50 minutes

Essentials in protein purification.

Waters new expanded line of bio-chemistries combined with the 650 Advanced Protein Purification System provide unmatched resolution and recovery of macromolecules. Now you can select from a variety of separation techniques—gel filtration, hydrophobic interaction and ion exchange, including Waters new Protein-Pak® HR ion exchange resins in scalable glass columns. Combine the chemistry of choice with the convenience and power of the 650 system and get unmatched separation capability for any step of your purification process.

Only Waters provides all the essentials necessary for your bioresearch. Ask for our complete bioseparations catalogue of instrumentation, chemistries and applications. Circle the reply number or call us at (508) 478-2000, ext. 2777.

**Instrumentation,
Chemistries, and
Expertise for
Bioseparations**

**Waters. The absolute essential
in bioresearch.**

Waters

Division of MILLIPORE

Advance Registration Form

1990 AAAS Annual Meeting ♦ New Orleans
15 - 20 February

Please print

Name of registrant _____
(last name first)

Institution/Company _____

Mailing address _____
(number / street)

(city / state / zip / country)

Daytime telephone number _____

Name of spouse registrant _____
(if attending meeting)

Convention address _____
(hotel or phone number)

Circle days you will attend Meeting: Thu Fri Sat Sun Mon Tue

☐ Check here if you need special services due to a handicap.

[1] **12 January deadline:** Advance registrations received after this date cannot be processed. On-site registration begins 15 February at the New Orleans Hilton. On-site rates: regular member, \$120; regular nonmember, \$160; all others, same as advance rates.

[2] **Refund requests** must be made in writing to the address below by **6 February** and will be honored after the meeting. **No refunds will be made for cancellations received after this date.**

[3] Fees for seminars, short courses, and spouse registration are **in addition to** (not in lieu of) the meeting registration fee.

[4] Nonmember 6-day (not 1-day) registration fee includes a 6-month membership with 25 issues of *Science*.

Advance Registration Deadline: 12 JANUARY 1990

Mail top portion (registration form) to:

AAAS Annual Meeting Registration
P.O. Box 23320
Alexandria, VA 22304-9330

OFFICE USE ONLY	
AMT PD	_____
CHECK #	_____
DEP. DATE	_____
SOURCE	S2

I. Advance Registration Fees ¹

Category	Six-day	One-day	Amount
Regular member.....	☐ \$95	☐ \$45	\$ _____
Regular nonmember.....	☐ \$135 ⁴	☐ \$55	\$ _____
Student member.....	☐ \$30	☐ \$15	\$ _____
Student nonmember.....	☐ \$50 ⁴	☐ \$20	\$ _____
Postdoctoral member.....	☐ \$35	☐ \$15	\$ _____
Postdoctoral nonmember...	☐ \$60 ⁴	☐ \$20	\$ _____
HS teacher or Retired.....	☐ \$45	☐ \$20	\$ _____

One-day registrants circle one: Thu Fri Sat Sun Mon Tue

II. Additional Fees ³

	Six-day	One-day	
Spouse Registration	☐ \$35	☐ \$20	\$ _____

SEMINARS (3-day) & SHORT COURSES (1-day)

Category	Seminar	Short Course	
Regular.....	☐ \$100	☐ \$40	\$ _____
Grad. student or postdoc....	☐ \$35	☐ \$20	\$ _____

Seminar registrants check one only:

☐ Protein Folding ☐ Biology of Parasitism

Short course registrants check one only:

☐ Computer Simulation for Biomedical Scientists
☐ Chaotic Dynamic Systems

III. Payment ²

TOTAL AMOUNT: \$ _____

☐ check enclosed ☐ VISA ☐ MasterCard
☐ original institutional purchase order attached

Card No. _____ Expires _____

Signature _____

AAAS Hotel Reservation Form

AAAS Annual Meeting ♦ New Orleans ♦ 15-20 February 1990

Send confirmation to:

Name _____
(last name first)

Mailing address _____
(number / street)

(city / state / zip) _____ (phone number) _____

Other occupants(s) of room _____
(names)

Indicate special needs due to a handicap: ☐ Wheelchair-accessible room

Other _____

Charge my major credit card. Card name _____

Card number _____ Expires _____

Signature _____

■ Reservations must be received at either hotel by 13 January 1990. Reservation requests received after this cut-off date are conditional on room availability.

■ All reservation forms must be accompanied by a desposit of one night's room rate plus tax; check or major credit card accepted.

■ If the room rate requested is no longer available, the next available higher rate will be confirmed.

■ Reservation changes and cancellations must be sent directly to the hotel.

■ Rollaway beds or additional adult in room: Hilton, \$22; Holiday Inn, \$15.

■ Children under age 18 stay free of charge in same room with parents if no extra bed is required.

Hotel Rates: Check boxes for your choice of hotel and room. Add 11% sales tax and \$2.00 occupancy tax to the rates shown. **Mail this hotel reservation form to the hotel of your choice (addresses below),** together with a deposit equal to the room rate plus taxes for one night.

☐ New Orleans Hilton Reservations,

2 Poydras Street, New Orleans, LA 70140

	single	double	suites
Main Bldg.	☐ \$ 90	☐ \$115	☐ \$390 & up
Riverside	☐ \$100	☐ \$125	☐ \$950 & up
Towers	☐ \$115	☐ \$145	☐ \$575 & up

☐ Holiday Inn Crowne Plaza Reservations,

333 Poydras Street, New Orleans, LA 70130

	single	double	suites
	☐ \$89	☐ \$104	☐ \$283 & up

Please list definite arrival and departure dates and times:

Arrival date _____ Time _____

Departure date _____ Time _____