

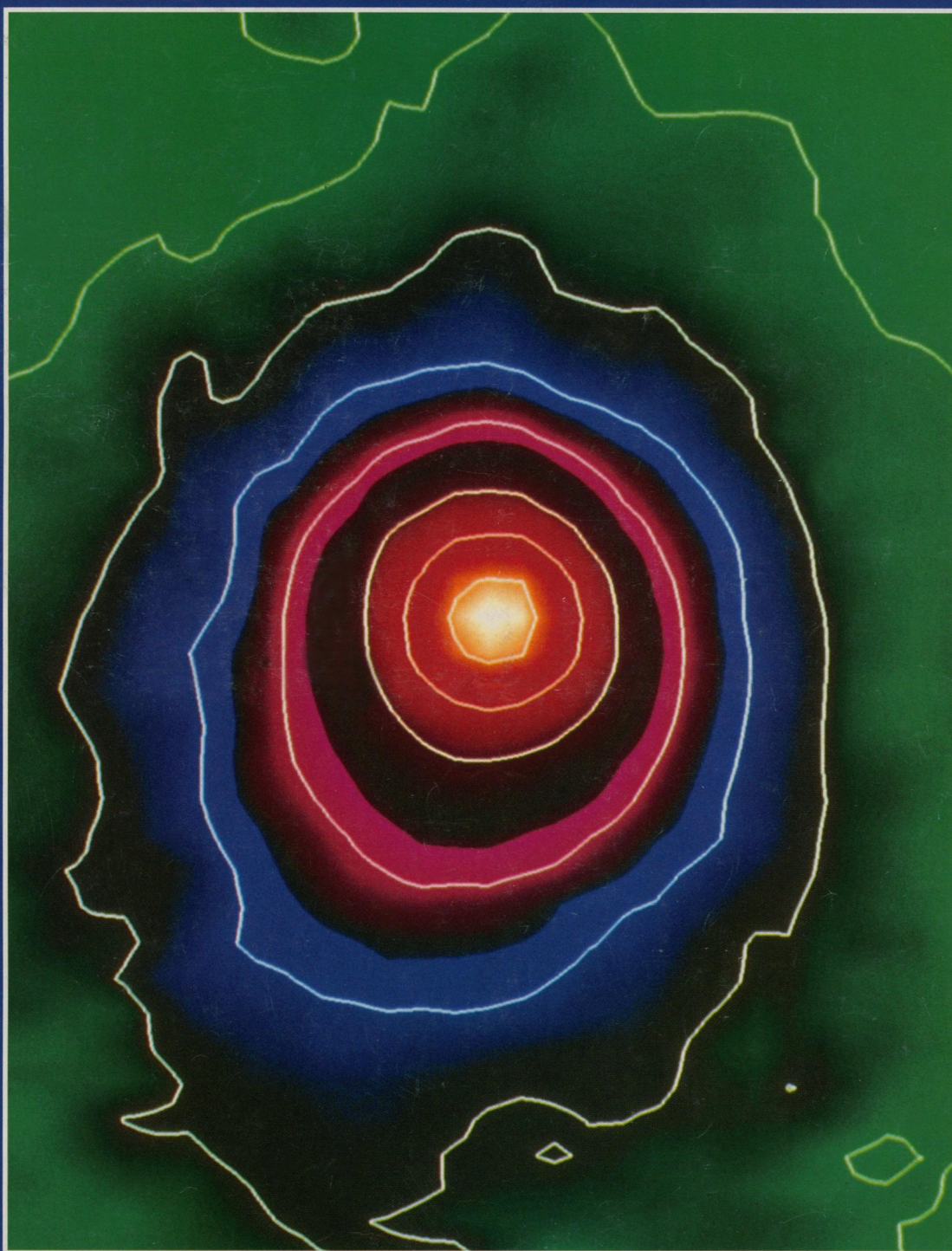
AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

SCIENCE

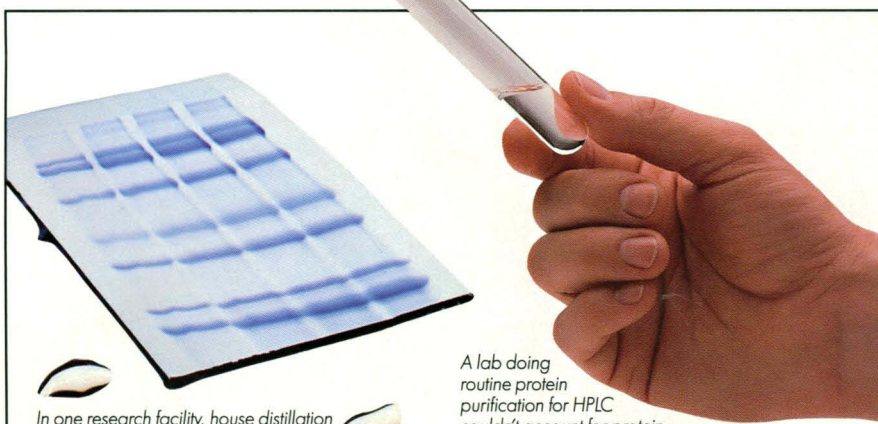
30 AUGUST 1991

\$6.00

VOL. 253 ■ PAGES 941-1064

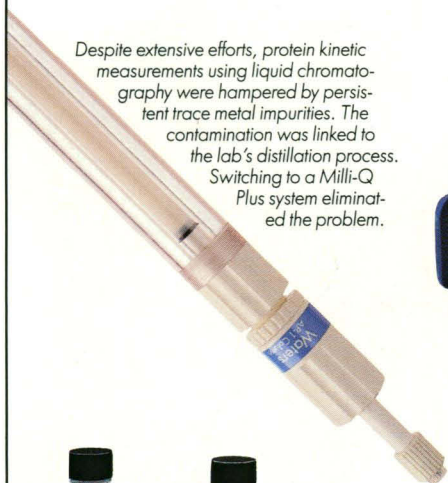


Relying On Distillation Could Leave Your Research Dead In The Water.



In one research facility, house distillation lines suffered from lime build-up. Phosphates were used to clean the system and got into the water used to make polyacrylamide gels, preventing the gels from running. The problem was alleviated when the lab switched to a Milli-Q Plus system.

A lab doing routine protein purification for HPLC couldn't account for protein contamination until they checked their double-distilled water. Trace levels of endotoxins were adhering to glassware. They replaced the still with a Milli-Q Plus pyrogen-free system, which solved the problem.



Despite extensive efforts, protein kinetic measurements using liquid chromatography were hampered by persistent trace metal impurities. The contamination was linked to the lab's distillation process. Switching to a Milli-Q Plus system eliminated the problem.

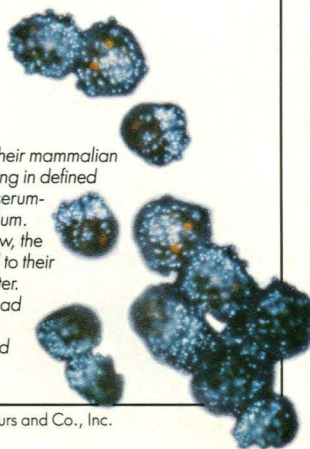


Researchers worried about the water being used in their 5' end-labelling protocols. Any contamination in the buffer, when diluting the DNA, or from freeze-dried Gamma³²P ATP could kill active enzymes in the T4 polynucleotide. A Milli-Q Plus system increased the viability of these enzymes.



Waterborne endotoxins and pyrogens were contaminating reagents manufactured by an in-house supplier. The contaminated reagents, in turn, delayed the work of four research groups who relied on the supplier for reagents and pre-cast gels. A pyrogen-free Milli-Q Plus system got things back on schedule.

Researchers found their mammalian cells stopped growing in defined medium, but not in serum-supplemented medium. After thorough review, the problem was linked to their double-distilled water. Milli-Q Plus water had been used for the serum-supplemented medium.



It's getting so you can't trust distilled water. Parts per thousand contamination levels used to be adequate, but with today's ultra-sensitive equipment, low part per billion levels are almost mandatory.

The Milli-Q[®] Plus system eliminates ions, pyrogens, and organics that even 5x distilled water can't. And it's easier to use.

The new, redesigned all-in-one cartridge pack takes ten seconds to change. Just pop out the pack and pop in a new one. The system even tells you when to do it.

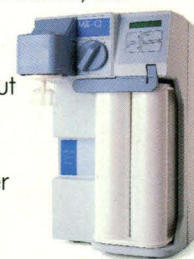
Because there are no bowls, the system has virtually no hold-up volume, resulting in faster flush-ups, reduced extractables and bacterial growth.

The configuration of the system makes it the smallest on the market, so you can save bench space.

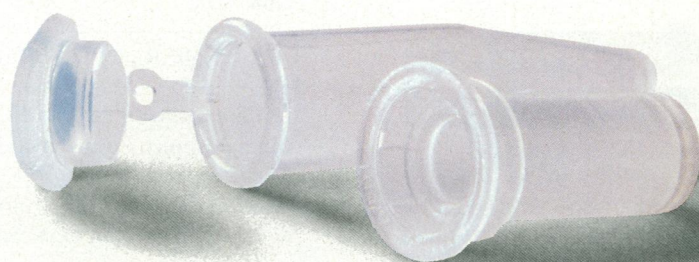
It comes with "on-demand" flow and automatic recirculation, which eliminates storage and degradation problems.

There's also an easy-to-read alphanumeric display, Teflon[®] valves to prevent leaching, and a Millipak[®] 0.22 μ m pharmaceutical grade final filter.

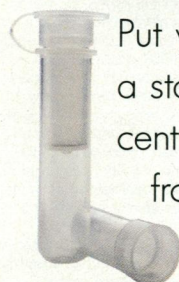
For more information, call 800-225-1380 (in MA: 617-275-9200), and find out why over 9,000 researchers see their Milli-Q water system as a real lifesaver.



MILLIPORE



If You Don't Believe It's The Fastest Sample Prep Device, Take It For A Spin.



Our Ultrafree-CL
device for
2.0 mL volumes.

Put your sample in the Ultrafree®-MC 0.4 mL Filter Unit. The filter unit fits inside a standard 1.5 mL microcentrifuge tube. Put the tube into (what else?) a microcentrifuge. Spin. That's it. A membrane sealed in the filter unit base (choose from 12 microporous and ultrafiltration membranes) helps remove cells or viruses and purify or recover proteins, enzymes and DNA. You can filter and store samples all in one device. All in one step. For a free sample call 1-800-2-FILTER or 617-275-9200.

MILLIPORE

Circle No. 156 on Readers' Service Card

947 This Week in *Science*

Editorial

949 Toxic Chemicals and Toxic Laws

Letters

951 Pedestals and Glass Ceilings: R. HUBBARD; G. A. FULFORD ■ Understanding Evolution: M. J. BEHE ■ Immortal Sequence: J. B. KAPER AND H. L. T. MOBLEY ■ Children and Divorce: M. M. WEISSMAN; D. M. CAPALDI AND G. R. PATTERSON; Response: A. J. CHERLIN ■ Patent Validity: M. BERNINGER

ScienceScope

955 Dragging the Academy into EMF studies; duking it out over fetal tissue research; etc.

News & Comment

956 Is Homosexuality Biological? ■ The Brain as Sexual Organ ■ Is "Gender Gap" Narrowing?
961 Britain's Crop Circles: Reaping by Whirlwind?
963 Budget Boost for Energy Science
Trimming Research Flagship's Sails
964 *Briefings*: Animal Rights Vet Wins a Round ■ EMF and Male Breast Cancer? ■ Touring the Brain ■ Aerosol Gene Therapy ■ Passion-Pop? ■ APA Boycotts DOD ■ Serendipitous Fix ■ Indigo for Computer Graphics Blues

Research News

966 Heeding the Call of the Wild ■ No Easy Lessons in Nature
969 Cognitive Sciences Explored in Chicago: Computer Vision Moving Closer to Reality ■ Computer Learning Gets Mixed Grades
970 Atoms Do the Two-Step on Crystal Dance Floors
971 Taking Stock of Saddam's Fiery Legacy in Kuwait ■ Rainy Forecast for Gulf Area?

Perspective

973 Was Wright Right? J. F. CROW

Articles

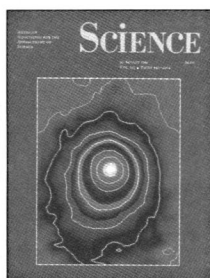
974 Developments in Automatic Text Retrieval: G. SALTON
980 Animal Choice Behavior and the Evolution of Cognitive Architecture: L. A. REAL
986 Mid-Ocean Ridges: Discontinuities, Segments and Giant Cracks: K. C. MACDONALD, D. S. SCHEIRER, S. M. CARBOTTE

Research Articles

995 An Explanation for Neptune's Ring Arcs: C. C. PORCO
1001 Crystal Structure of a CAP-DNA Complex: The DNA Is Bent by 90°: S. C. SCHULTZ, G. C. SHIELDS, T. A. SEITZ

■ **SCIENCE** (ISSN 0036-8075) is published weekly on Friday, except the last week in December, 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 additional mailing offices. Copyright © 1991 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): \$82 (\$47 allocated to subscription). Domestic institutional subscription (51 issues): \$150. Foreign postage extra: Mexico, Caribbean (surface mail) \$50; Other countries (air assist delivery) \$95. First class, airmail, student and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. **Change of address**: allow 6 weeks, giving old and new addresses and 11-digit account number. **Postmaster**: Send change of address to *Science*, P.O. Box 2033, Marion, OH 43305-2033. **Single copy sales**: \$6.00 per issue prepaid includes surface postage; Guide to Biotechnology Products and Instruments, \$20. 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. *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 objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.



COVER This image of the enormous hydrogen coma surrounding Comet Halley was obtained by the Pioneer Venus Orbiter over a 5-day period in early February 1986. The image was constructed from over 9000 data points that were obtained as the spin axis of the rotating spacecraft was held fixed and the comet drifted across the instrument field of view. The false-color image, embellished by white constant-brightness contours, shows the Lyman- α brightness distribution at 1216 angstroms. The spacecraft is now headed toward a fiery death in the upper atmosphere of Venus in the fall of 1992. See page 1008. [Image processing by A. I. F. Stewart and M. R. Combi]

Reports

- 1008 Analysis of the Pioneer-Venus Lyman- α Image of the Hydrogen Coma of Comet P/Halley: W. H. SMYTH, M. R. COMBI, A. I. F. STEWART
- 1010 Allerød—Younger Dryas Lake Temperatures from Midge Fossils in Atlantic Canada: I. R. WALKER, R. J. MOTT, J. P. SMOL
- 1012 Global Text Matching for Information Retrieval: G. SALTON AND C. BUCKLEY
- 1015 Wright's Shifting Balance Theory: An Experimental Study: M. J. WADE AND C. J. GOODNIGHT
- 1019 Medium Effects in Antibody-Catalyzed Reactions: C. LEWIS, T. KRÄMER, S. ROBINSON, D. HILVERT
- 1022 Differential Phosphorylation of the Transcription Factor Oct1 During the Cell Cycle: S. B. ROBERTS, N. SEGIL, N. HEINTZ
- 1026 Induction of Inflammatory Arthropathy Resembling Rheumatoid Arthritis in Mice Transgenic for HTLV-I: Y. IWAKURA, M. TOSU, E. YOSHIDA, M. TAKIGUCHI, K. SATO, I. KITAJIMA, K. NISHIOKA, K. YAMAMOTO *et al.*
- 1028 Identification of a Site in Glutamate Receptor Subunits That Controls Calcium Permeability: R. I. HUME, R. DINGLEDINE, S. F. HEINEMANN
- 1031 HRR25, a Putative Protein Kinase from Budding Yeast: Association with Repair of Damaged DNA: M. F. HOEKSTRA, R. M. LISKAY, A. C. OU, A. J. DEMAGGIO, D. G. BURBEE, F. HEFFRON
- 1034 A Difference in Hypothalamic Structure Between Heterosexual and Homosexual Men: S. LEVAY

Technical Comments

- 1037 Forensic DNA Tests and Hardy-Weinberg Equilibrium: J. E. COHEN, M. LYNCH, C. E. TAYLOR; P. GREEN AND E. S. LANDER; B. DEVLIN, N. RISCH, K. ROEDER

Inside AAAS

- 1042 Expanding Views: The AAAS Minority Scholars Workshop on Ethics in Science ■ Statement Adopted by the Workshop Participants ■ Inner Vision ■ In Memory of Roger Revelle ■ In Brief ■ Gold Rush Revisited

Book Reviews

- 1044 Exploring the Sun, reviewed by J. MEADOWS ■ The Study of Change, J. B. HENDERSON ■ Crustacean Sexual Biology, A. H. HINES AND L. D. SMITH ■ Books Received

Board of Directors

Donald N. Langenberg
*Retiring President,
Chairman*

Leon M. Lederman
President

F. Sherwood Rowland
President-elect

Mary Ellen Avery
Francisco J. Ayala
Eugene H. Cota-Robles
Robert A. Frosch
Joseph G. Gavin, Jr.
Florence P. Haseltine
Jean'ne M. Shreeve
Warren M. Washington

William T. Golden
Treasurer

Richard S. Nicholson
Executive Officer

Editorial Board

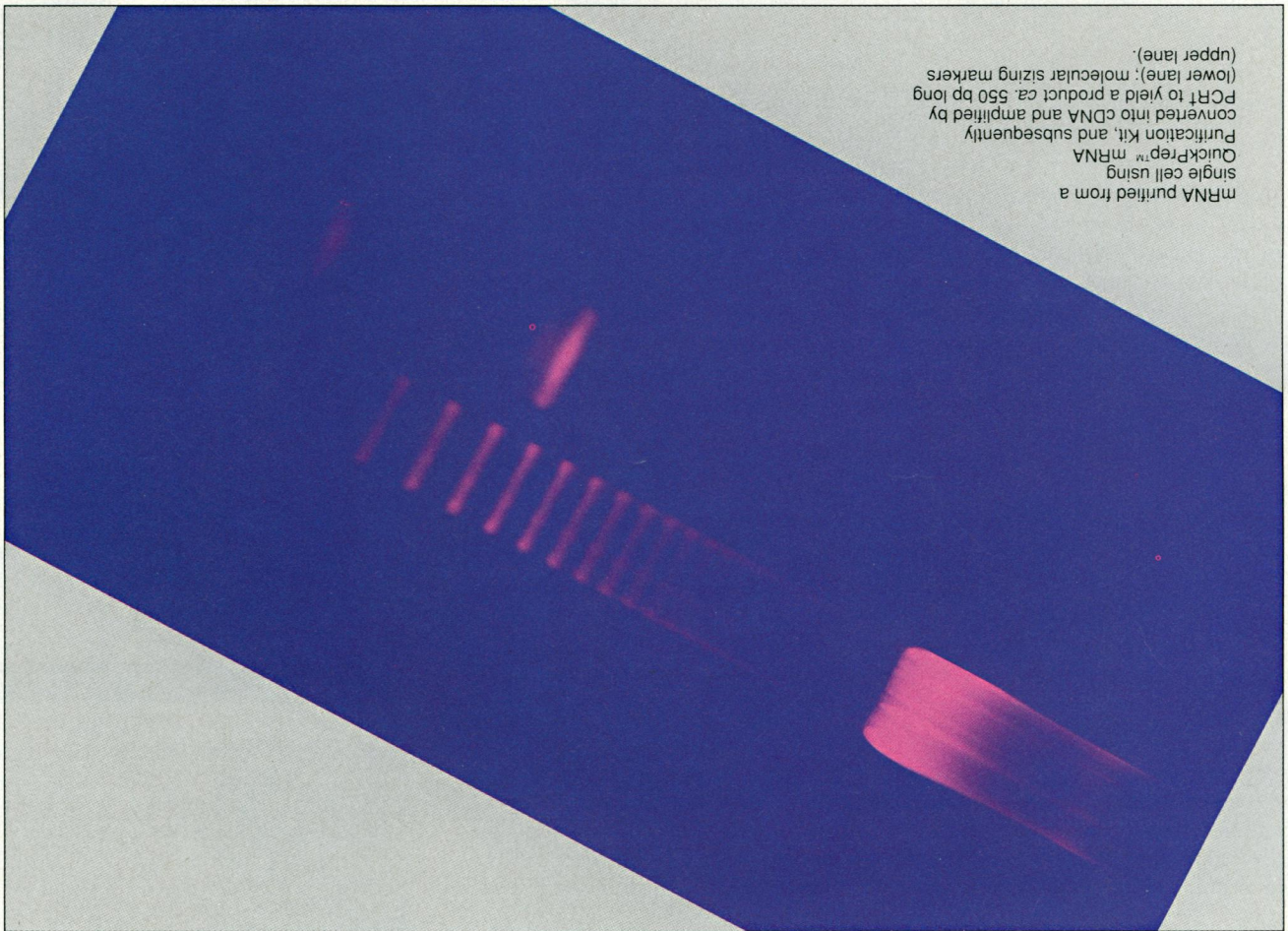
Charles J. Arntzen
Elizabeth E. Bailey
David Baltimore
William F. Brinkman
E. Margaret Burbidge
Pierre-Gilles de Gennes
Joseph L. Goldstein
Mary L. Good
Harry B. Gray
John J. Hopfield
F. Clark Howell
Paul A. Marks
Yasutomi Nishizuka
Helen M. Ranney
Robert M. Solow
Edward C. Stone
James D. Watson

Board of Reviewing Editors

John Abelson
Frederick W. Alt
Don L. Anderson
Stephen J. Benkovic
David E. Bloom
Floyd E. Bloom
Henry R. Bourne
James J. Bull
Kathryn Calame
Charles R. Cantor
C. Thomas Caskey
Dennis W. Choi
Ralph J. Cicerone
John M. Coffin
Bruce F. Eldridge
Paul T. Englund
Fredric S. Fay

Douglas T. Fearon
Harry A. Fozzard
Victor R. Fuchs
Theodore H. Geballe
Margaret J. Geller
Roger I. M. Glass
Stephen P. Goff
Corey S. Goodman
Stephen J. Gould
Ira Herskowitz
Eric F. Johnson
Stephen M. Kosslyn
Konrad B. Krauskopf
Charles S. Levings III
Harvey F. Lodish
Richard Losick
Anthony R. Means
Mortimer Mishkin
Roger A. Nicoll
William H. Orme-Johnson III

Stuart L. Pimm
Yeshayau Pocker
Dennis A. Powers
Ralph S. Quatrano
Erkki Ruoslahti
Thomas W. Schoener
Ronald H. Schwartz
Terrence J. Sejnowski
Thomas A. Steitz
Robert T. N. Tjian
Emil R. Unanue
Geerat J. Vermeij
Bert Vogelstein
Harold Weintraub
Zena Werb
George M. Whitesides
Owen N. Witte
William B. Wood
Keith Yamamoto

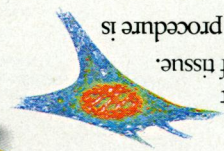


Purify mRNA Directly from Cells in One Hour – Even from A Single Cell!

With our new QuickPrep™ mRNA Purification Kit, you can purify mRNA directly from cells or tissues in just one hour – even if you only have one cell.



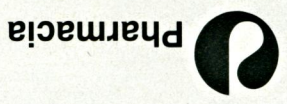
- Prepare high-quality mRNA for direct use in PCR†, cDNA synthesis, "Northern" blots, and *in vitro* translation.
- Purify mRNA from just one cell – or up to 0.5 g of tissue.
- Save valuable time: our procedure is fast – and also reliable.
- Bypass the need for intermediate purification of total RNA.



■ Preserve the integrity of your mRNA – by denaturing ribonucleases right at the start in our highly chaotropic Extraction Buffer.

To find out more about this Pure Performance™ product from the pioneers in purification technology, call your local Pharmacia LKB representative. Refer to product number 27-9254-01.

† PCR (polymerase chain reaction) is covered by U.S. Patents issued to Cetus Corporation. A license for the use of PCR for research and testing purposes may be obtained by purchase of Perkin-Elmer Cetus GenAmp™ PCR Reagent Kits. Nothing in this advertisement should be construed as an authorization or implicit license to practice PCR under any patents held by Cetus Corporation.



Advancing The New Biology

Head office Sweden Tel 46* (018) 16 30 00. Australia Tel (02) 888 36 22. Austria Tel (0222) 66 66 250. Belgium Tel (02) 242 4660. Brazil Tel (11) 288 9122. Canada Tel (514) 457 6661. Denmark Tel (045) 26 52 00. Federal Republic of Germany Tel (0761) 490 30. Finland Tel (0) 502 1077. France Tel (01) 30 64 34 00. Great Britain Tel (0908) 66 11 01. Hong Kong Tel (5) 814 8421. Holland Tel (034) 80 779 11. India Tel (812) 296 34. Italy Tel (02) 27 32 21. Japan Tel (3) 492 9481. Korea Tel (02) 511 0801. Norway Tel (02) 54 90 95. People's Republic of China Tel (201) 457 8000. East Europe Tel 43* (0222) 92 16 07. Middle East Tel 30* (1) 96 29 963. Spain Tel (03) 675 44 11. Sweden Tel (08) 623 8500. Switzerland Tel (01) 821 18 16. Taiwan Tel (2) 831 6021. United States Tel (201) 457 8000. Far East Tel 852* (5) 814 84 21. Other countries Tel 46* (08) 799 80 00. *International Country Access Code (9007 2MB).

Circle No. 174 on Readers' Service Card

This Week in **SCIENCE**

Fractured sea floor

The longest chain of mountains and the most active network of volcanoes in the solar system are found beneath the sea on the ridges that separate Earth's crustal plates. Geologic observations reviewed by MacDonald *et al.* (p. 986) reveal a hierarchy of segmentation and cracking along the ridges, from large long-lasting fractures to small transient discontinuities. Molten rock rising along the ridge system creates new ocean floor and promotes the formation of cracks and segments. The cracks, in turn, influence undersea volcanic activity. Although the data are from diverse sources, researchers are beginning to reach agreement on a unified picture of the life cycle of these mid-ocean ridges.

Gravity's ring arcs

Among the more striking images returned by the Voyager spacecraft were those of Neptune's ring arcs. How these objects formed has been a puzzle, with many theories offered but none chosen. In a re-analysis of the Voyager data (p. 995), Porco finds that Neptune's innermost moon Galatea may act as a shepherd to sequester the ring particles into arcs. The model provides an explanation for several of the arcs' properties; moreover, re-examination of the data revealed new arcs that lend support to Porco's explanation.

Right-angle DNA bend

The catabolite gene activator protein, or CAP, bends DNA by 90°. Schultz *et al.* (p. 1001) report the results of a high-resolution crystal structure of CAP complexed with a 30-base pair DNA sequence. The bend results from two 40° kinks, one on each side of the dyad axis. The authors propose a possible mechanism in which CAP may activate transcription by producing upstream contacts with RNA polymerase.

Halley hydrogen

During its last visit, Comet Halley came close enough to Venus to have its picture taken in ultraviolet light by instruments aboard the Pioneer-Venus spacecraft (cover). Energetic hydrogen atoms, produced by dissociation of water vapor from Halley's nucleus, emit light at the Lyman alpha wavelength of 1216 ångströms. Smyth *et al.* took more than 9000 data points from the Pioneer spectra and constructed an image of Halley's hydrogen coma (p. 1008). The image was compared with a physical model of the comet's hydrogen cloud, from which the authors conclude that emission of water vapor from the core may be 30% higher than previously thought.

Midge thermometer

The distributions of fossil midges has been used to investigate the course of climatic events at the end of the last deglaciation in Atlantic Canada. The relatively warm Allerød event (before 11,000 years ago) was interrupted for about 1,000 years by the cooler Younger Dryas event. This climatic reversion is well documented in Europe, but more evidence has been needed to verify whether these events occurred in Atlantic Canada. The temperature record constructed by Walker *et al.* (p. 1010) based on the distribution of cold-water and temperate-water midges confirms the inference from pollen studies that these paleoclimate events occurred on both sides of the Atlantic.

Text retrieval

Electronic versions of large texts such as encyclopedias, newspapers, and instruction manuals are of little use without efficient ways to search and retrieve them. Salton (p. 974) reviews the technology of automatic text storage, manipulation, and retrieval. In addition to advances in

text-matching methods, the author discusses new approaches to automatic indexing and text analysis as well as methods drawn from linguistics and artificial intelligence. In a companion report, Salton and Buckley (p. 1012) consider the performance of "flexible text matching" for searching large text collections.

The Wright shift

One of the most comprehensive theories of adaptive evolution, Wright's shifting balance theory, has been demonstrated experimentally. In the early 1930s Wright proposed how a well-adapted species could move to an even better adapted state even if that process required passing through a less fit intermediate. He argued that when partially isolated subpopulations are present, favorable gene combinations may arise in one of them that could then spread through the entire population. Wade and Goodnight (p. 1015) used the number of progeny as a measure of average fitness in subpopulations of flour beetles; the more fit progeny contributed more members to the next breeding generation. After 24 generations, mean productivity had increased significantly compared with control populations. Crow (p. 973) discusses the implications of this demonstration that the Wright process can indeed work.

Calcium control

A single amino acid site in subunits of glutamate receptors can control the flow of calcium ions through the receptor. Hume *et al.* (p. 1028) cloned a family of genes encoding the non-NMDA (*N*-methyl-D-aspartate) glutamate receptors. Some combinations of subunits showed high calcium permeability while others did not. Mutation of a particular glutamine to arginine, or vice versa, altered the rectifying properties and calcium permeability of these receptors.

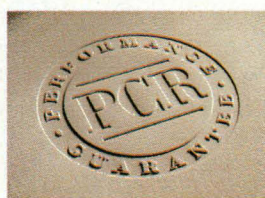
■ PHILLIP SZUROMI AND DAVID VOSS

Cycle to Cycle. Sample to Sample. Guaranteed PCR Performance.

INTRODUCING THE DNA THERMAL CYCLER 480.

More efficient amplification in less time and with less reagents.

The new DNA Thermal Cyclers 480 System, with our GeneAmp® Reagents and optimized two-temperature PCR protocol, gives you enhanced performance every day, on every sample. All backed by the Perkin-Elmer Cetus PCR Performance Guarantee. A commitment that brings you the expertise and resources of the industry leader.



The DNA Thermal Cyclers 480. Continuing the DNA Thermal Cyclers' standards of quality and excellence. For technical information and to order either system in the U.S., contact your local Perkin-Elmer sales representative or call 1-800-762-4001. For literature in the U.S., call 1-800-762-4000. Outside the U.S., contact your local Perkin-Elmer sales representative.

PERKIN ELMER CETUS

Europe Vaterstetten, Germany Tel: 49-8106-381-112 Fax: 49-8106-6697
Canada Montreal, Canada Tel: 514-737-7575 Fax: 514-737-9726
Far East Melbourne, Australia Tel: 61-3-560-4566 Fax: 61-3-560-3231
Latin America Mexico City, Mexico Tel: 52-5-651-7077 Fax: 52-5-593-6223

GeneAmp is a registered trademark of Cetus Corporation.
The PCR process is covered by U.S. patents issued to Cetus Corporation.

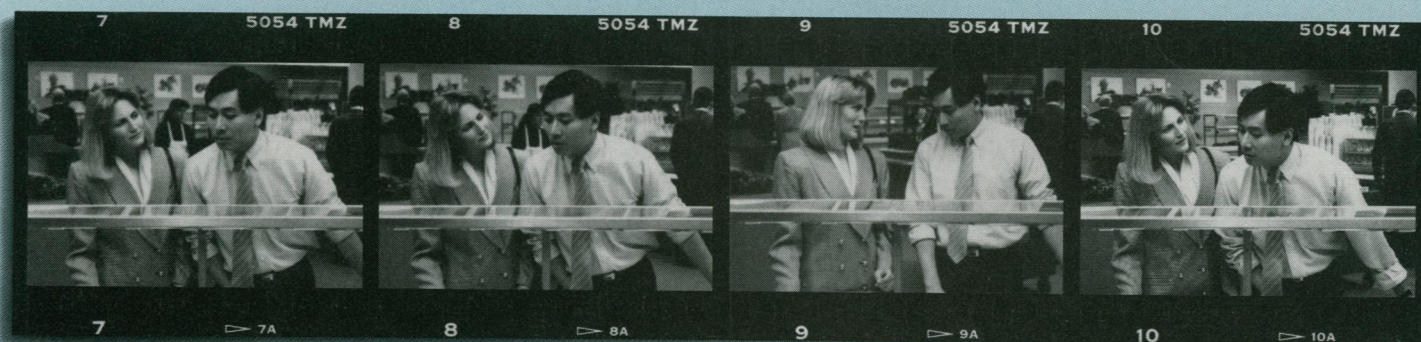
Circle No. 133 on Readers' Service Card



"I hear your new product is ready."

"Yep. Mmm, the lasagne looks tasty."

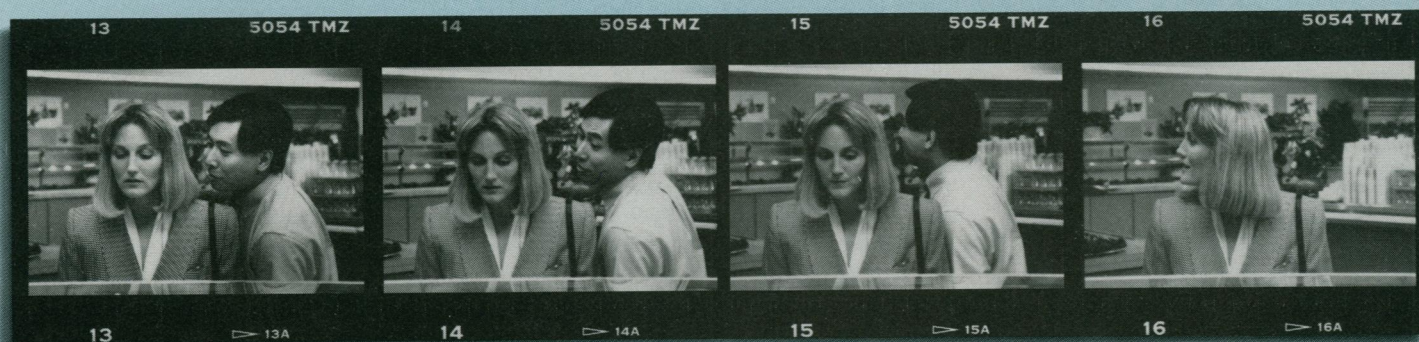
"Patents checked?"



"Wouldn't have tested otherwise."

"And regulatory compliance?"

"It checks out..."



...which is more than I can say about that meatloaf."

"Hey, where're you getting so much help?"

The answer is in Dialog.

Information—complete, precise, up-to-the minute. It's your most powerful research tool. Find exactly what you need to know fast in Dialog, the world's first and largest electronic library. We offer over 400 diverse, detailed databases readily accessible online via computer and modem, many even

on compact disc. You probably won't have to look anywhere else. See your Information Specialist about Dialog. Or call for a free kit on Dialog information for your industry.

1-800-3-DIALOG

Outside U.S., 415-858-3785. Fax 415-858-7069.

Dialog Tools for Chemistry: Research and industry news, plus chemical substructures and properties, patent, trademark, safety, regulatory, environmental, and competitive data. Full text and/or abstracts from newspapers, newsletters, journals, conference proceedings, citations, handbooks, encyclopedias. Some sources updated as often as daily, even continuously.

DIALOG INFORMATION SERVICES, INC.
A KNIGHT-RIDDER COMPANY

© 1991 Dialog Information Services, Inc., 3460 Hillview Avenue, Palo Alto, California 94304. All rights reserved. DIALOG is a servicemark of Dialog Information Services, Inc., Registered U.S. Patent and Trademark Office.

H385

Circle No. 113 on Readers' Service Card

R & D

A New Twist

In the scientific world, "R & D" stands for Research and Development. It's an important part of your professional life. But when it comes to your personal life, "R & D" could stand for *Responsibilities and Dreams*. And in this day and age, it takes a lot of both to see a family through.

That's why the American Association for the Advancement of Science makes the AAAS Term Life Insurance Plan available to you. It's an easy and affordable way to protect your family's future. The Plan provides benefits that can be used to help with basic living expenses and can enable your family to follow through with the plans you made together. You can request up to \$240,000 of coverage for yourself. And generous protection is available for your family too.

Don't experiment with your family's financial security! Contact the Administrator of the AAAS Term Life Insurance Plan today. We'll send a brochure and application right away.

Administrator
AAAS Group Insurance Program
1255 23rd Street, N.W., Suite 300
Washington, D.C. 20037
Toll-Free: 1 800 424-9883
Wash., D.C.: (202) 457-6820

THE ROBERT A. WELCH FOUNDATION CONFERENCE ON CHEMICAL RESEARCH XXXV CHEMISTRY AT THE FRONTIERS OF MEDICINE

OCTOBER 28-29, 1991
 THE WESTIN OAKS HOTEL, HOUSTON, TEXAS

PROGRAM
 Monday, October 28, 1991

SESSION I

E. J. COREY, Presiding Scientific Advisory Board Member

E. L. WEHNER, Welcoming of Guests

E. J. COREY, Introductory Remarks

ARACHIDONIC ACID METABOLISM: FROM CHEMISTRY TO HEALTH CARE
BENGT SAMUELSSON

NEW OPPORTUNITIES AT THE INTERFACE OF CHEMISTRY AND BIOLOGY
PETER G. SCHULTZ

SESSION II

WILLIAM N. LIPSCOMB, Presiding Chairman

INTUITIVE AND COMPUTER-ASSISTED APPROACHES TO THE DESIGN
 OF CONFORMATIONALLY RESTRAINED PEPTIDES AND THEIR MIMICS
PAUL A. BARTLETT

INHIBITOR COMPLEXES OF HIV PROTEASE-TARGET FOR DRUG DESIGN
ALEXANDER WLODAWER

IMMUNOPHILIN-LIGAND COMPLEXES AS PROBES OF THE BLACK BOX
 OF SIGNAL TRANSDUCTION
STUART L. SCHREIBER

Tuesday, October 29, 1991

SESSION III

PETER G. SCHULTZ, Presiding Chairman

THE PHOSPHORYLATION AND DEPHOSPHORYLATION OF PROTEINS:
 A KEY PROCESS IN BIOLOGICAL SIGNALING
EDWIN G. KREBS

MAN-DESIGNED BLEOMYCINS BASED ON THE ANTICANCER MECHANISM OF
 NATURAL BLEOMYCINS
MASAJI OHNO

DESIGN, SYNTHESIS AND EVALUATION OF FUNCTIONAL ANALOGS OF CC-1065
 AND DUOCARMYCIN A
DALE L. BOGER

SESSION IV

PAUL A. BARTLETT, Presiding Chairman

PRINCIPLES OF ENZYME REGULATION DERIVED FROM STUDIES ON GLUTAMINE
 SYNTHETASE
EARL R. STADTMAN

STUDIES ON CARBOHYDRATE METABOLISM: A MULTIDISCIPLINARY APPROACH
BRUCE GANEM

MOLECULAR PROBES FOR STEROID RECEPTORS
JOHN A. KATZENELLENBOGEN

ADVANCE REGISTRATION FORM

(There is no registration fee)

_____ I will attend the conference.

(PLEASE PRINT OR TYPE)

Dr. Mr.

Mrs. Ms.

(LAST)

(FIRST)

(MIDDLE)

Position _____

Organization _____

Department _____

Address _____

Advance registration will be acknowledged and accepted in order of their receipt, to within the capacity of the available space.

Make your hotel reservations directly with The Westin Oaks Hotel, Telephone No. 1-800-228-3000 or 713-960-8100 x6990, prior to October 11, 1991.

Please return by October 11 to: **Kimberly Nelson**

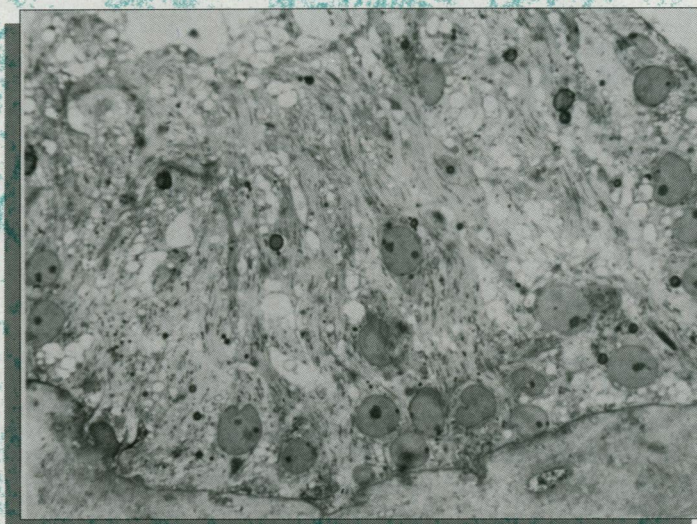
The Robert A. Welch Foundation

4605 Post Oak Place, Suite 200, Houston, Texas 77027

BioCoatTM Cultureware

Adds a New Dimension to your cell cultures...

With BioCoat,
In Vitro cell cultures
look like this...



Cultured on MATRIGELTM, Sertoli cells are similar in appearance to Sertoli cells *In Vivo*, forming polarized monolayers about 40-60 μ m in height with oval basal nuclei.

...instead of like this



Sertoli cells cultured on top of **uncoated plastic** are very low and squamous, about 2 μ m in height with flattened nuclei.

BioCoat, the unique, ECM-coated cultureware from Collaborative, can significantly broaden the scope of your In Vitro cell studies. With BioCoat:

- Cells attach and grow more efficiently
- Cells polarize readily into apical and basolateral regions
- Cells differentiate and exhibit true physiologic function

A variety of extracellular matrix proteins (MatrigelTM, Laminin, Fibronectin and Collagens), pre-coated on tissue culture



BioCoatTM Matrix-Coated Cultureware
exclusively from Collaborative Research

plates, membrane inserts and coverslips, offer the researcher a convenient, reliable, ready-to-use means of accurately simulating *In Vivo* cell environments.

Correlation and reproducibility of results are enhanced by the consistency and uniformity of the coatings, which are applied by a specially-developed, proprietary process.

Collaborative's BioCoat can add new dimensions to your work in:

- Cell Differentiation
- Cell-Matrix Interaction
- *In Vitro* Toxicology
- *In Vitro* Carcinogenesis
- Primary Cell Culture
- Neural Cell Culture
- Tumor Invasion
- Polarization Studies
- Gene Expression

**Exclusively from Collaborative Research Incorporated.
Your Source of Innovative Cell Culture Products.**

Write or call today for complete information on Collaborative Research BioCoat Cultureware.

Biomedical Products Division



Circle No. 128 on Readers' Service Card

2 Oak Park, Bedford, MA 01730 • (617) 275-0004 • (800) 343-2035

**ANOVA?
ANCOVA?
MANOVA?
MANCOVA?**

SuperANOVA for the Macintosh!

If you analyze data using general linear models, shouldn't you be using the best? SuperANOVA™ is a revolutionary approach to data analysis, combining powerful GLM techniques (ANOVA, ANCOVA, MANOVA, MANCOVA repeated measures, regression, and more), full presentation graphing features, and a remarkably user-friendly interface.

Need a second opinion? Critics are unanimous in their praise for SuperANOVA. *Macworld* magazine says "if you work with statistics professionally, buy this program." *MacUser* magazine writes "the interface is as elegant and intuitive as I have ever seen in a program of this complexity," and awarded SuperANOVA the Editors' Choice Award for Best New Data Analysis Product.

Need a third opinion? Chances are many of your colleagues are already using SuperANOVA. Ask them to show you what it can do. Or ask us. Call us at 1-800-666-STAT, ext. 301 to learn more about SuperANOVA.

ABACUS
CONCEPTS

1984 Bonita Avenue
Berkeley, CA 94704-1038
(415) 540-1949

© 1991 Abacus Concepts, Inc. SuperANOVA is a trademark of Abacus Concepts, Inc. All other brands are trademarks or registered trademarks of their respective holders

Circle No. 189 on Readers' Service Card

DNA by Operon.

**Right Price.
Right Now.** **\$3.60**
per base

Now the world's leading supplier of synthetic DNA is also the price leader. Operon's custom DNA is now \$3.60 per base with a \$20.00 set-up fee per sequence, and free domestic delivery. Same outstanding customer service. Same high product quality. New low price. Call for your free researcher kit.

1-800-688-2248

OPERON

OPERON TECHNOLOGIES, INC.

1000 Atlantic Ave., Suite 108 · Alameda CA 94501
Tel. (415) 865-8644 · Fax. (415) 865-5255—NIHBPA 263-00033233

WORLD'S LEADING SUPPLIER OF SYNTHETIC DNA.

Circle No. 193 on Readers' Service Card

DISCOVER!

1991/92

ANTARCTICA



Call Today for Travel in 1991/92!
(800) 252-4910

Travels with AAAS

For the Inquisitive Traveler

NEW in 1991!

- **Ancient Anasazi & Southwest**, Aug. 31–Sept. 9. Explore Chaco Canyon, Santa Fe, Mesa Verde, Hopi & Navajo lands. \$2,290
- **Thailand & Hong Kong**, Nov. 8–24. Bangkok & Chiang Mai cultural treasures, Surin elephant roundup, Khao Yai & Phi Phi Island. \$3,490 (plus air)
- **Amazon & Brazil: Wildlife**, Sept. 11–26. From golden lion tamarins to the rainforest of Amazonia, Manaus, Brasilia, the Pantanal, Emas, and Rio. \$3,490 (plus air)
- **Tahiti with S/V Wind Song**, Sept. 27–Oct. 7. Paradise! Papeete, Raiatea, Bora Bora, and Moorea. \$2,195 (plus air)
- **Voyage to the Sea of Cortez**, Dec. 21–28. For your Christmas holiday! \$2,000+ (plus air)

- **Australia**, Oct. 7–18. Koalas, kangaroos, Great Barrier Reef, Sydney and Melbourne. **New Zealand Extension** to Oct. 25. The wonders of Milford Sound and Mt. Cook. \$2,390+ (plus air)

And Coming in 1992:

- **Antarctica**, Jan. 6–20, 1992. Explore the "Great White Continent" aboard *Society Explorer*. See penguins, seals, seabirds, scientific research stations, and the vast spectacle of Antarctica! \$5,950+ (plus air)
- **Galapagos for Budget Travelers**, January 20–29, 1992. On board 10-passenger yachts, 8 glorious days in the Galapagos. \$2,495 including air fare from Miami.
- **Costa Rica**, March 10–22, 1992
- **Belize & Guatemala**, April 1–11, 1992



For Members & Friends of AAAS by
BETCHART EXPEDITIONS INC. • 21601 Stevens Creek Blvd. • Cupertino, CA 95014 • (800) 252-4910