



AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

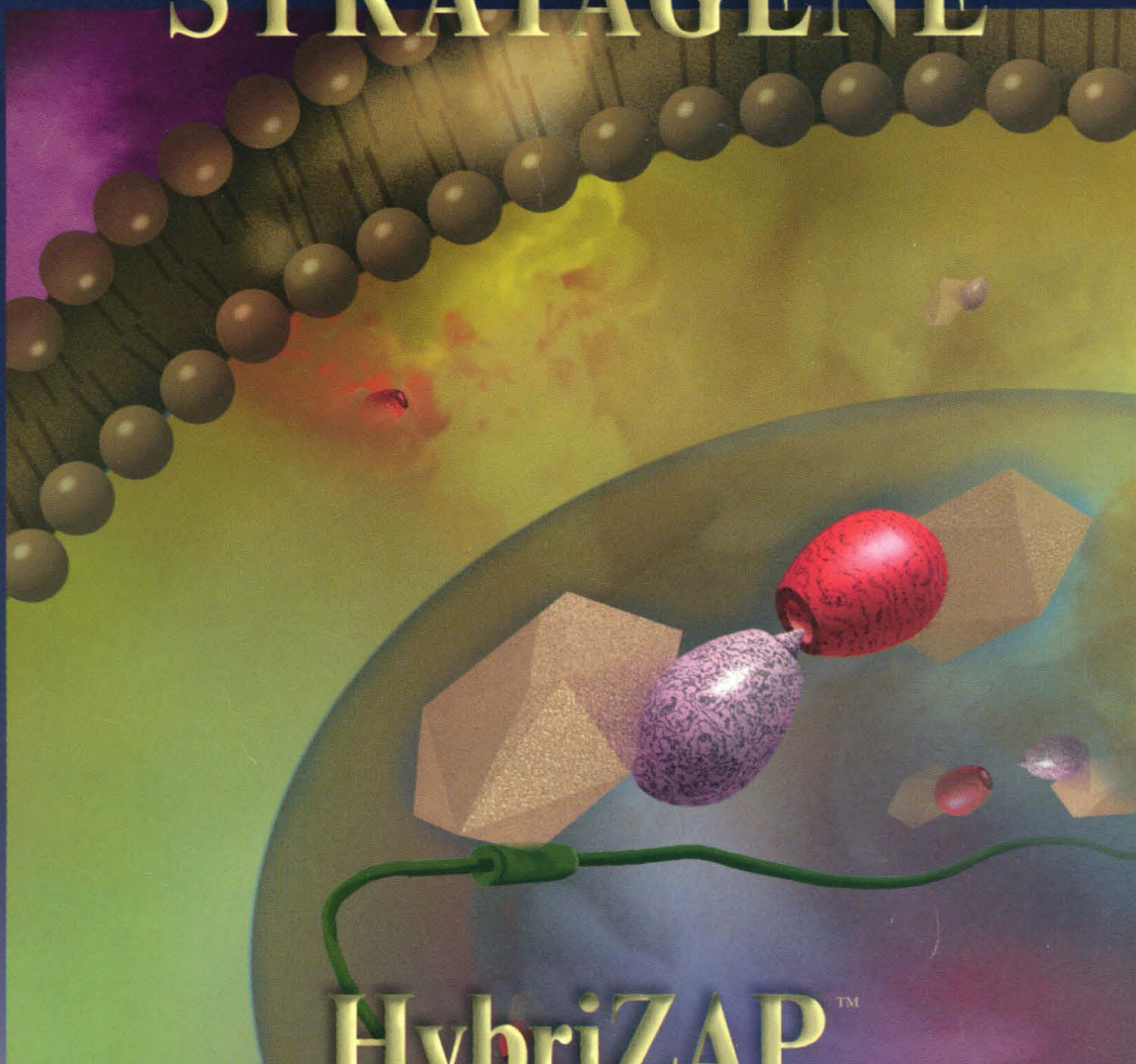
SCIENCE

1 SEPTEMBER 1995
VOL. 269 • PAGES 1189-1312

\$7.00



STRATAGENE

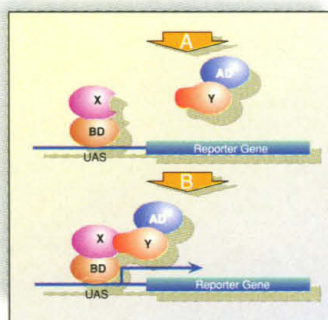


HybriZAP™ TWO-HYBRID SYSTEM

THE BEST WAY YET TO PICK UP CELLULAR MESSAGES

STRATAGENE'S NEW HYBRIZAP™ two-hybrid vector kit. It's the best yeast two-hybrid system* yet. It puts the power of Lambda ZAP® technology into your study of protein-protein interactions and your search for novel proteins. It's sensitive, fast and easy to use. And it integrates everything you need into one powerful package for detecting cellular messages.

* U.S. Patent No. 5,283,173



Detection of Interacting Proteins by Transcription of the Reporter Gene

THE SYSTEM WITH EVERYTHING

- Easy construction of representative libraries
- GAL4-based yeast two-hybrid system
- YRG-2 yeast cells with dual reporters to minimize false positives
- More sensitive than co-immunoprecipitation
- Detects weak or transient interactions
- Premade and custom libraries

Call Stratagene at
1-800-424-5444
for a closer look at the entire
HybriZAP two-hybrid vector system.



Internet Mail
techservices@stratagene.com

USA
Corporate Headquarters
(800) 424-5444
(619) 535-5400
Fax: (619) 535-0045

GERMANY
Stratagene GmbH
Telephone: (06221) 400634
Telefax: (06221) 400639

UNITED KINGDOM
Stratagene Ltd.
Telephone: (01223) 420955
Telefax: (01223) 420234

SWITZERLAND
Stratagene GmbH
Telephone: (01) 3641106
Telefax: (01) 3657707

Circle No. 51 on Readers' Service Card

At Last!

A Robotic Liquid Handler That's Mastered the Art of Change.

New MultiPROBE® VersaTip™ technology automatically adapts pipetting tips to your assay procedures. Disposable tips, fixed washable tips, or both? Microliter or milliliter volumes? Liquid level sensing of ionic or nonionic solutions? Different disposable tip sizes and types? With MultiPROBE, you get it all in one system.

The new VersaTip automatically changes from fixed, washable tips to a variety of disposable tip sizes or types — within the same protocol and without any user-intervention. Now you can minimize consumable costs by using washable tips whenever possible, and at the same time optimize performance by automatically switching from small volume to larger volume disposable tips. In other words, MultiPROBE with VersaTip adapts to your application, instead of your having to adapt the application to it.

Drug Discovery Work

For drug discovery work, VersaTip will sense small sample volumes in microplates, and handle both ionic and nonionic solutions such as DMSO. With four- and eight-tip MultiPROBE systems, you can stop wasting precious compounds for all solubilization, distribution, and screening applications.

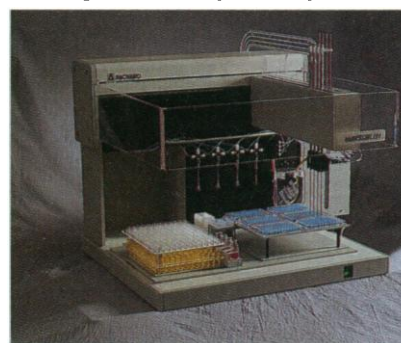
Molecular Biology

For molecular biology applications, VersaTip can automatically pick up micro tips to handle very small volumes, switch to larger

tips when required, or use washable fixed tips whenever possible. Ultra-sensitive liquid level sensing tips further eliminate any risk for DNA cross-contamination.

Clinical Testing

For clinical testing, VersaTip will automatically adapt to the carry-over requirements of your assays. Four-tip systems with Varispan



can switch from disposable to washable tips, and transfer samples from any size test tube or vial, to microplates or other labware — all without user intervention. Combine this versatility with a large deck capacity and a bar code reader that can read 256 tubes in 90

seconds, and you have the most efficient robotic liquid handler your lab can own.

Now, there's no need to compromise. Demand the MultiPROBE with VersaTip — the first robotic liquid handler that adapts to your assays.



PACKARD

A Canberra Company

Packard Instrument Company, 800 Research Parkway, Meriden, CT 06450 U.S.A.
Tel: 203-238-2351 Toll Free: 1-800-323-1891 FAX: 203-639-2172



Packard International Offices:

Australia, Mt Waverley 61-3-543-4266; Austria, Vienna 43-1-2702504; Belgium, Brussels 32-2-4668210; Canada, Ontario 1-800-387-9559; Central Europe, Vienna 43-2230-3263; Denmark, Greve 45-42909023; France, Rungis (33) 1 46 86 27 75; Germany, Dreieich 49 6103 385-0; Italy, Milano 39-2-33910796/7/8; Japan, Tokyo 81-3-3866-5850; Netherlands, Groningen 31-50-413360; Tilburg (013) 423900; Russia, Moscow, 7-095-238-7335; Switzerland, Zurich (01) 481 69 44; United Kingdom, Pangbourne, Berks (44) 0734 844981.

Circle No. 38 on Readers' Service Card

If you want power,



Take a look at our new

The new Bio-Rad MRC-1024 gives you more power, more sensitivity and far more control. With LaserSharp software, it delivers true simultaneous three-channel (24bit) acquisition and display.

The unique 'Methods Mode' – enables new or experienced users to achieve superb images at the touch of a button.

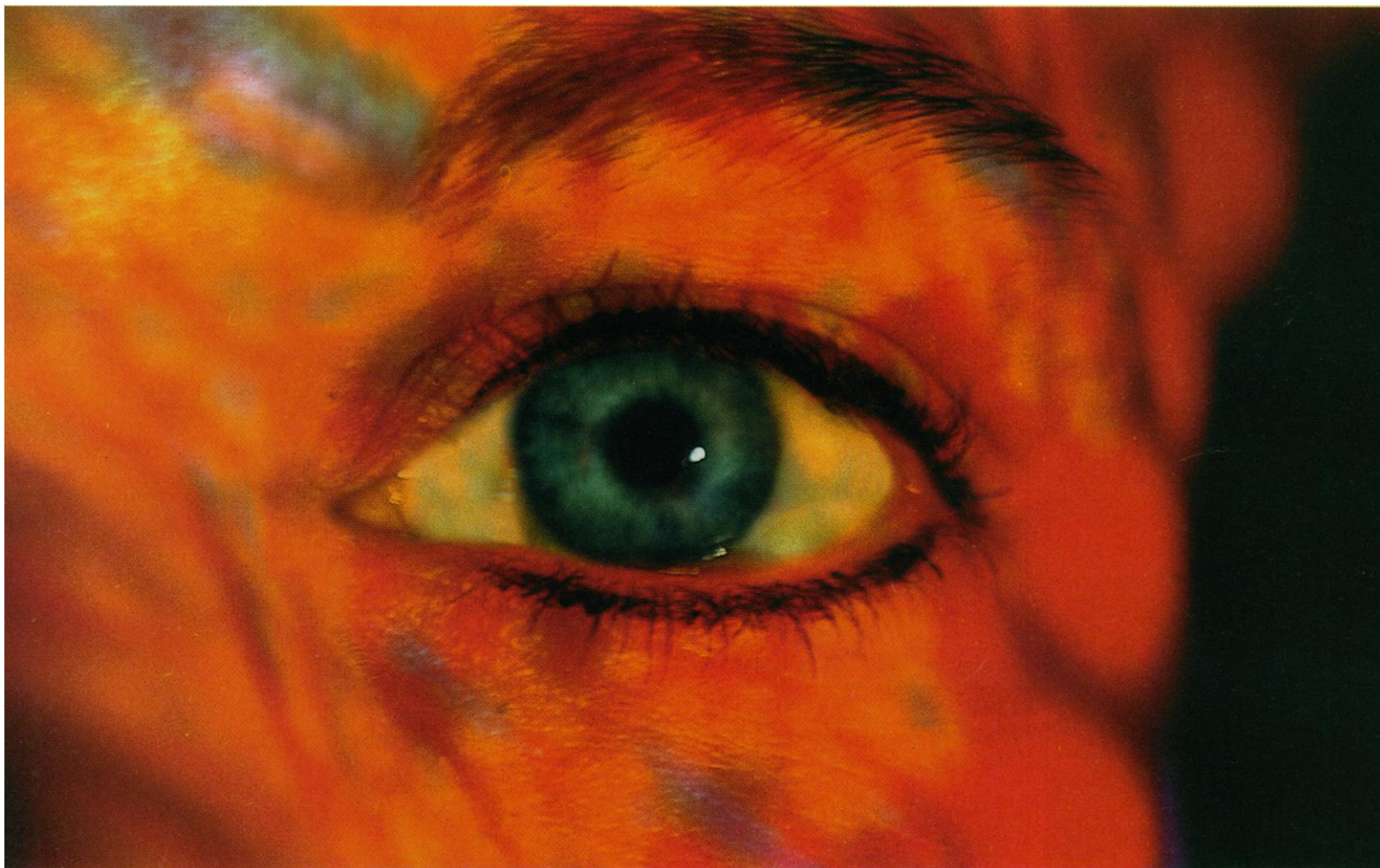
An extensive range of single and dual laser configurations, including a new Ultra-Long Life

Krypton/Argon laser light source, accommodates today's wide variety of multiple labelling techniques.

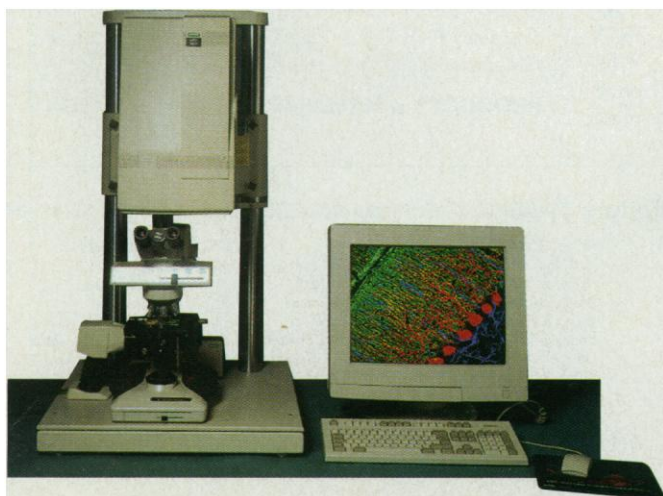
Enhanced sensitivity detectors and leading edge digital signal processing ensure that even the faintest fluorescence can be clearly imaged.

A modern 32bit, multi-tasking operating system, empowers the PC to deliver an impressive performance from the integral 3-D visualisation software.

image and control



confocal microscope



For complete control, superior imaging quality, and real computing power, take a look at the MRC-1024. Call us to see for yourself.

BIO-RAD

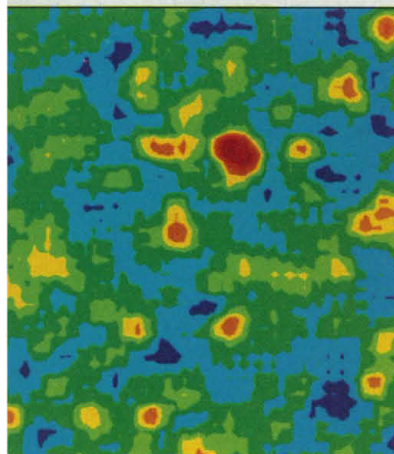
**Bio-Rad
Laboratories**

*Molecular
Bioscience Group*

U.S. (800) 4BIORAD California (510) 741-1000 New York (516) 756-2575
Australia 02-805-5000 Austria (1)-877 89 01 Belgium 09-385 55 11
Canada (905) 712-2771 China (01) 2046622 Denmark 39 17 9947
Finland 90 804 2200 France (1) 49 60 68 34 Germany 089 31884-0
Hong Kong 7893300 India 91-11 461-0103 Italy 02-21609 1 Japan 03-
5811-6270 The Netherlands 08385-40666 New Zealand 09- 443 3099
Singapore (65) 4432 529 Spain (91) 661 70 85 Sweden 46 (0) 8-735 8300
Switzerland 01-809 55 55 United Kingdom 0800 181134 SIG 081995



1214 Self-propelled plates



1245 Universal correlations

NEWS & COMMENT

NASA Mission Gets Down to Earth 1208

Biologist Takes Seat as U.K.'s Top Science Adviser 1211

Endangered Species Act: Incentives Offer Hope for Habitat 1212

Supercomputing: Panel Suggests Fewer NSF Centers 1213

RESEARCH NEWS

Earth's Surface May Move Itself 1214

... But Did Deeper Forces Act to Uplift the Andes? 1215

Cowardly Lions Confound Cooperation Theory 1216

Physicists Polish One Model While Looking to the Next 1218

Can "Resetting" Hormonal Rhythms Treat Illness? 1220

Casting a Wide Net for Cosmic Rays 1221

POLICY FORUM

Building a Scientifically Sound Policy for Protecting Endangered Species 1231
T. Eisner, J. Lubchenco, E. O. Wilson, D. S. Wilcove, M. J. Bean

PERSPECTIVES

Sound and Fury in Jupiter 1233
R. J. Hemley

Glycobiology: More Functions for Oligosaccharides 1234
R. A. Dwek

RESEARCH ARTICLE

The RNA Component of Human Telomerase 1236
J. Feng, W. D. Funk, S.-S. Wang, S. L. Weinrich, A. A. Avilion, C.-P. Chiu, R. R. Adams, E. Chang, R. C. Allsopp, J. Yu, S. Le, M. D. West, C. B. Harley, W. H. Andrews, C. W. Greider, B. Villeponteau

REPORTS

Templating of Mesoporous Molecular Sieves by Nonionic Polyethylene Oxide Surfactants 1242
S. A. Bagshaw, E. Prouzet, T. J. Pinnavaia

DEPARTMENTS

THIS WEEK IN SCIENCE 1197

EDITORIAL 1199
Science and Everyday Life
R. M. May

LETTERS 1201
Ecological Research: A. R. Blaustein; D. Reznick; T. Halliday; D. R. Formanowicz; W. Roush • Dioxin and Advisory Board: R. Clapp, D. Ozonoff, A. Silverstone, B. Weiss • Cancer Risk Assessment: J. A. Cotruvo • Sugar-Coated Stress: K. Bloch

SCIENCESCOPE 1207

RANDOM SAMPLES 1223

BOOK REVIEWS 1290
Solar and Stellar Activity Cycles, reviewed by R. W. Noyes • Other Books of Interest: *Haldane's Daedalus Revisited*, P. Forman; *The Physicists*; *Fifty Years of Antimicrobials* • Vignettes • Books Received

PRODUCTS & MATERIALS 1294

Board of Reviewing Editors

Frederick W. Alt
Don L. Anderson
Michael Ashburner
Stephen J. Benkovic
Alan Bernstein
David E. Bloom
Piet Borst
Henry R. Bourne
Michael S. Brown
James J. Bull
Kathryn Calame

C. Thomas Caskey
Dennis W. Choi
David Clapham
Adrienne E. Clarke
John M. Coffin
F. Fleming Crim
Paul J. Crutzen
James E. Dahlberg
Robert Desimone
Paul T. Englund
Richard G. Fairbanks

Douglas T. Fearon
Harry A. Fozzard
Klaus Friedrich
Roger I. M. Glass
Stephen P. Goff
Peter N. Goodfellow
Corey S. Goodman
Peter Gruss
Ira Herskowitz
Tomas Hökfelt
Susan D. Iversen

Eric F. Johnson
Stephen M. Kosslyn
Michael LaBarbera
Nicole Le Douarin
Charles S. Levings III
Alexander Levitzki
Harvey F. Lodish
Richard Losick
Reinhard Lührmann
Diane Mathis
Anthony R. Means

Shigetada Nakanishi
Kim Nasmyth
Roger A. Nicoll
Staffan Normark
Stuart L. Pimm
Yeshayau Pocker
Dennis A. Powers
Ralph S. Quatrano
Martin Raff
V. Ramanathan
Douglas C. Rees

T. M. Rice
David C. Rubie
Erkki Ruoslahti
Gottfried Schatz
Jozef Schell
Ronald H. Schwartz
Terrence J. Sejnowski
Ellen Solomon
Thomas A. Steitz
Michael P. Stryker
Robert T. N. Tjian

Emil R. Unanue
Geerat J. Vermeij
Bert Vogelstein
Arthur Weiss
Zena Werb
George M. Whitesides
Owen N. Witte
William A. Wulf

COVER

Famous for hunting, rearing cubs, and defending their territory in groups, African lions are less egalitarian than previously assumed. When challenged by simulated intruders, some lions lead the charge while others lag behind. Although leaders recognize that their compan-

ions are lagging, they fail to punish them. Each individual has a particular style of behavior, but the variety of styles is quite broad, which is puzzling to current theories of cooperation. See page 1260 and the related News story on page 1216. [Photo: R. Heinsohn]



Multiscaling Properties of Large-Scale Structure in the Universe 1245

V. J. Martínez, S. Paredes, S. Borgani, P. Coles

Biological Controls on Coral Sr/Ca and $\delta^{18}\text{O}$ Reconstructions of Sea Surface Temperatures 1247

S. de Villiers, B. K. Nelson, A. R. Chivas

Temperature Measurements of Shock-Compressed Liquid Hydrogen: Implications for the Interior of Jupiter 1249

W. J. Nellis, M. Ross, N. C. Holmes

Ab Initio Calculation of the Sound Velocity of Dense Hydrogen: Implications for Models of Jupiter 1252

A. Alavi, M. Parrinello, D. Frenkel

Microlithography by Using Neutral Metastable Atoms and Self-Assembled Monolayers 1255

K. K. Berggren, A. Bard, J. L. Wilbur, J. D. Gillaspay, A. G. Helg, J. J. McClelland, S. L. Rolston, W. D. Phillips, M. Prentiss, G. M. Whitesides

Energetics, Patterns of Interaction Strengths, and Stability in Real Ecosystems 1257

P. C. de Ruiter, A.-M. Neutel, J. C. Moore

Complex Cooperative Strategies in Group-Territorial African Lions 1260

R. Heinsohn and C. Packer

Endoreduplication in Maize Endosperm: Involvement of M Phase-Promoting Factor Inhibition and Induction of S Phase-Related Kinases 1262

G. Grafi and B. A. Larkins

Adaptive Evolution of Color Vision Genes in Higher Primates 1265

S.-K. Shyue, D. Hewett-Emmett, H. G. Sperling, D. M. Hunt, J. K. Bowmaker, J. D. Mollon, W.-H. Li

Functional Characterization and Developmental Regulation of Mouse Telomerase RNA 1267

M. A. Blasco, W. Funk, B. Villeponteau, C. W. Greider

An Essential Role for Rho, Rac, and Cdc42 GTPases in Cell Cycle Progression Through G_1 1270

M. F. Olson, A. Ashworth, A. Hall

Conformation and Function of the N-Linked Glycan in the Adhesion Domain of Human CD2 1273

D. F. Wyss, J. S. Choi, J. Li, M. H. Knoppers, K. J. Willis, A. R. N. Arulanandam, A. Smolyar, E. L. Reinherz, G. Wagner

Commitment of CNS Progenitors Along the Dorsoroventral Axis of *Drosophila* Neuroectoderm 1278

G. Udolph, K. Lüer, T. Bossing, G. M. Technau

A p16^{INK4a}-Insensitive CDK4 Mutant Targeted by Cytolytic T Lymphocytes in a Human Melanoma 1281

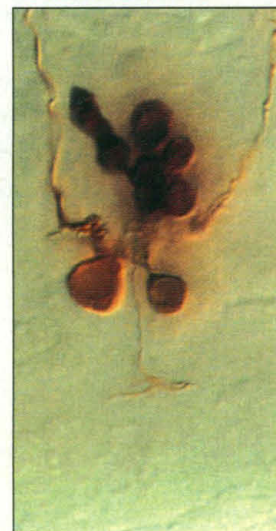
T. Wölfel, M. Hauer, J. Schneider, M. Serrano, C. Wölfel, E. Klehmann-Heib, E. De Plaen, T. Hankeln, K.-H. Meyer zum Büschenfelde, D. Beach

TECHNICAL COMMENTS

Lunar Phase Influence on Global Temperatures 1284

J. C. Dyre; C. V. Voorhies; R. C. Balling Jr. and R. S. Cereveny

1278 Determination of neuronal cell fate



AAAS Board of Directors

Francisco J. Ayala
Retiring President,
Chairman
Rita R. Colwell
President
Jane Lubchenco
President-elect

William A. Lester Jr.
Simon A. Levin
Michael J. Novacek

Anna C. Roosevelt
Alan Schriesheim
Jean E. Taylor
Chang-Lin Tien
Nancy S. Wexler

William T. Golden
Treasurer
Richard S. Nicholson
Executive Officer

■ **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 © 1995 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): \$97 (\$50 allocated to subscription). Domestic institutional subscription (51 issues): \$228. Foreign postage extra: Mexico, Caribbean (surface mail) \$53; other countries (air assist delivery) \$93. First class, airmail, student and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Printed in the U.S.A.

Indicates accompanying feature

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 1811, Danbury, CT 06813-1811. **Single copy sales:** \$7.00 per issue prepaid includes surface postage; 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 \$3.00 per article is paid directly to CCC, 27 Congress Street, Salem, MA 01970. The identification code for *Science* is 0036-8075/95 \$3.00. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

Fluorescent PCR Analysis

Action.

Reaction.



Now you can label PCR products for fluorescent analysis with just one action. Simply add ABI PRISM™ fluorescent dUTPs—[F]dUTPs—to your PCR amplification reaction.

That's all there is to it. During extension, [F]dUTPs are incorporated directly into your PCR product. You don't need a dye-labeled primer. No changes to reaction components or cycling conditions are required. And when the process is complete, your sample is ready for analysis.

You have a choice of three dyes—blue, green or yellow. So you can run products labeled with different colors in a single gel lane. Add in-lane size standards labeled with a fourth color for accurate fragment sizing.

In fact, with [F]dUTPs, you can convert almost any PCR application method to multicolor fluorescence, including microsatellite analysis, long PCR, quantitative PCR, and *in situ* hybridization.

What's more, the cost is surprisingly low. Because incorporation of [F]dUTPs is highly efficient, it takes very little material to produce a strong signal.

[F]dUTPs are part of an expanding line of multicolor labeling products optimized for use with GeneAmp® and

ABI PRISM systems. Other fluorescent products include dye primers, dye phosphoramidites, in-lane size standards, and optimized kits for DNA analysis and sequencing. Through Perkin-Elmer's Applied Biosystems Division, you have access to the most comprehensive range of reagents, systems, and support for automated genetic analysis.

So if you're looking for convenient, cost-effective fluorescent labeling, take direct action. To request information, call 1-800-345-5224. Outside the U.S. and Canada, contact your local Perkin-Elmer representative.

PERKIN ELMER

Europe: Langen, Germany Tel: 49 6103 708 301 Fax: 49 6103 708 310

Japan: Tokyo, Japan Tel: (0473) 80-8500 Fax: (0473) 80-8505

Latin America: Mexico City, Mexico Tel: 52-5-651-7077 Fax: 52-5-593-6223

Australia: Melbourne, Australia Tel: (03) 9212-8585 Fax: (03) 9212-8502

Perkin-Elmer PCR reagents are developed and manufactured by Roche Molecular Systems, Inc., Branchburg, New Jersey, U.S.A.



The GeneAmp PCR process is covered by the U.S. patents owned by Hoffmann-La Roche, Inc. and F. Hoffmann-La Roche Ltd. GeneAmp is a registered trademark of Roche Molecular Systems, Inc. Perkin-Elmer is a registered trademark and ABI PRISM is a trademark of The Perkin-Elmer Corporation.

Circle No. 42 on Readers' Service Card

The ends to growth

Telomerase is an RNA-protein complex that adds small repetitive sequences to the ends of chromosomes, called telomeres, to preserve the integrity of the genome. Feng *et al.* (p. 1236) have now cloned the RNA component of the human telomerase and Blasco *et al.* (p. 1267) have cloned the mouse version. Blocking the human telomerase RNA in an immortal human cell line caused the cells to lose telomeric DNA and begin to die after about 25 population doublings. Telomerase seems critical, therefore, for maintaining unbridled growth.

■

A galactic scale

Distributions of galaxies and galaxy clusters may reveal clues as to how they formed. Two-point correlation functions are often used to describe such distributions, but the power-law shapes of these functions, which describe features such as x-ray clusters and radio galaxies well, do not work as well for optical galaxies. For example, optical galaxies are less correlated than the larger scale galaxy clusters. Martinez *et al.* (p. 1245) found that correlation integrals can be used to describe these distributions in terms of multiscaling, in which the characteristic exponent of the distribution is allowed to slowly change as the overall scale increases.

■

Neutral patterning I

Mesoporous molecular sieves based on silica, which have pore dimensions from 1.5 nanometers, have many potential uses in catalysis and materials science. The formation of these large pores is directed by amine-containing surfactants, com-

Hearing hydrogen

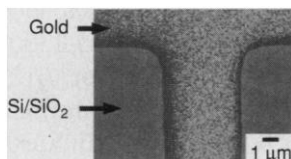
The interior of Jupiter is primarily hydrogen at extreme pressure and temperature. As for the case of seismic waves on Earth, measurements of the global oscillations of Jupiter—reflecting the speed of sound through the planet—provide a clue as to the nature of hydrogen in the interior, but must be compared with experimental measurements. Nellis *et al.* (p. 1249) obtained shock temperature data to derive the equation of the state of hydrogen to 87 gigapascals, and thereby infer the speed of sound through hydrogen plasma. Alavi *et al.* (p. 1252) obtain an independent estimate of sound speed from ab initio calculations. The experimental and theoretical results essentially agree, but yield values considerably less than that predicted from the oscillation data. In a Perspective, Hemley (p. 1233) highlights some of the implications for Jupiter's interior.

pounds that are usually costly and toxic. Bagshaw *et al.* (p. 1242) show that nonionic (neutrally charged) polyethylene oxide surfactants, which are inexpensive and nontoxic, can be used as templates for the synthesis of both silica and alumina mesoporous materials.

■

Neutral patterning II

Microlithography is used to create the circuitry of electronic chips. New methods are being explored to help shrink devices further. Berggren *et al.* (p. 1255) describe a form of lithography



in which neutral atoms, rather than ultraviolet or x-ray photons, are used to pattern a device. Beams of argon atoms were used to create damage patterns on self-assembled monolayers of dodecanethiolate on gold with an edge resolution of <100 nanometers. Ferricyanide etching removed gold from the damaged regions so that further etching could transfer the patterns to an underlying silicon layer.

Getting into the web

Ecological communities can be described in terms of food webs, which model the interrelationships of all of the food chains. Determining the direction and strength of interactions among populations or groups of species is approached differently by theorists and experimentalists: Theorists have often assumed these values, whereas experimentalists have determined them by manipulating species density. De Ruiter *et al.* (p. 1257) have linked these approaches by deriving interaction strengths based on measurements on seven soil food webs from native and farm soils. They find that certain links are more important in stabilizing the food web and also that the amount of energy flowing through a link can be unrelated to its importance in keeping the food web stable.

■

A developing front

The central nervous system of *Drosophila* begins to develop from neuroectodermal and midline cells shortly after gastrulation. Udolph *et al.* (p. 1278) examined the fate of cells after transplantation along the dor-

sal ventral axis during early gastrulation to discern when they are determined to form central nervous system (CNS) lineages. When ventral neuroectodermal cells and midline cells were transplanted dorsally, the transplanted cells migrated ventrally and produced CNS lineages consistent with their site of origin. Dorsal neuroectodermal cells transplanted ventrally however, produced lineages consistent with their new ventral location. These data suggest that the ventral midline and adjacent neuroectoderm may produce signals that provide ventral identities to the ventral CNS precursors.

■

Telltale target

Tumor-specific antigens (TSAs) are molecules that are produced exclusively in tumors and therefore constitute ideal targets for an immunologic response. Wölfele *et al.* (p. 1281) have identified a TSA in a human melanoma as a mutated version of cyclin-dependent kinase 4 (CDK4), a key regulator of cell cycle progression. The altered CDK4 contained a single amino acid change that rendered it insensitive to the CDK inhibitor, p16. Thus, the mutant CDK is not only antigenic but is likely to play a contributory role in tumorigenesis.

■

Endangered act

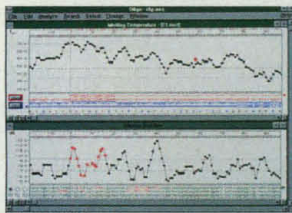
The Endangered Species Act has come under close scrutiny recently as it is up for reauthorization. In a policy forum, Eisner *et al.* (p. 1231) overview the scientific basis for the act and suggest several ways it could be improved. A news story by Stone (p. 1212) scopes out the upcoming congressional debate.

OLIGO 5.0 PCR SOFTWARE. WITH 22 NEW FEATURES, WHO KNOWS WHAT YOU MIGHT COME UP WITH?

It was huge. Some called it colossal.

With the release in 1989 of Oligo Primer Analysis Software, researchers using PCR and DNA sequencing were getting a powerful new tool. Soon it became the standard by which all others were measured.

Now, NBI has ushered in a worthy successor: Oligo 5.0. And all of a sudden, everything else seems prehistoric.

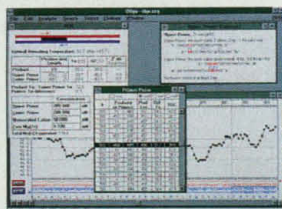


So powerful, yet so easy. Just click on any oligo for instant analysis.

BETTER PCR PRIMERS, BY DESIGN.

If you're big on PCR, here's something you can sink your teeth into. Because with Oligo 5.0, you have the ultimate program for selecting *all* optimal PCR primer pairs from any DNA/RNA sequence file. In seconds.

Its easy-to-use search function selects primers which are not only unique, highly specific, and cross-compatible, they're also free of dimer, hairpin, and sequence repeats. Oligo 5.0 even searches for sequencing primers and hybridization probes. So you can design the best possible primers by simply lifting a finger.



All optimal PCR primer pairs are listed with complete analyses.

What's more, it calculates optimal annealing temperature, PCR product composition, various T_m calculations, and extinction coefficients.

But perhaps most impressive is what we've added: Like LCR analysis, a GC clamp, primer T_m matching, highly accurate false priming checks, and nested primer selection.

THE EVOLUTION OF OLIGO: HIGHER INTELLIGENCE.

Oligo 5.0 for Windows works so efficiently, so intelligently,

and so intuitively, it could render all lesser programs extinct. Here are some other notable advancements:

With a new oligo database and order feature, you can download primer selections and user data to an order form. Just print and send it to your synthesis provider.

In addition, hybridization time can now be calculated for any DNA segment. You also gain back-translation capabilities, which no other program offers. Plus a host of other eye-popping enhancements.

SEEING IS BELIEVING.

To fully appreciate the magnitude of Oligo 5.0, ask us for a free demo disk.

In North America and elsewhere, call (800) 747-4362 or (612) 550-2012.

Or fax (612) 550-9625.

In Europe, you can call us at 47 22 20 01 37 or fax 47 22 20 01 89. In Japan, call 0775-43-7231 or fax 0775-43-9254. You may also contact us by E-mail: nbi@biotechnet.com.

With software this powerful, imagine the possibilities. Some could even be gigantic.



Oligo

Primer Analysis Software from
National Biosciences, Inc.

STATISTICA

Windows 3.1
and WINDOWS 95

STATISTICA™ (automatically configures itself for Windows 3.1 or WINDOWS 95) ■ A complete data analysis system with thousands of on-screen customizable, presentation-quality graphs fully integrated with all procedures ■ Comprehensive *Windows™* support, OLE (client and server), DDE, customizable *Auto Task* toolbars, pop-up menus ■ Multiple data-, results-, and graph-windows with *data-graph* links ■ The largest selection of statistics and graphs in a single system; comprehensive implementations of: Exploratory techniques with advanced brushing; multi-way tables with banners (presentation-quality reports); nonparametrics; distribution fitting; multiple regression; general nonlinear estimation; stepwise logit/probit; general ANCOVA/MANCOVA; stepwise discriminant analysis; log-linear analysis; confirmatory/ exploratory factor analysis; cluster analysis; multidimensional scaling; canonical correlation; item analysis/reliability; survival analysis; a large selection of time series modeling/forecasting techniques; structural equation modeling with *Monte Carlo* simulations; and much more ■ On-line *Electronic Manual* with comprehensive introductions to each procedure and examples ■ Hypertext-based Stats Advisor expert system ■ Workbooks with multiple *AutoOpen* documents (e.g., graphs, reports) ■ Extensive data management facilities (fast spreadsheet of unlimited capacity with long formulas, *Drag-and-Drop*, *AutoFill*, *Auto-Recalculate*, split-screen/variable-speed scrolling, advanced Clipboard support, DDE links, hot links to graphs, relational merge, data verification/cleaning) ■ Powerful *STATISTICA BASIC* language (professional development environment) with matrix operations, full graphics support, and interface to external programs (*DLLs*) ■ Batch command language and editable macros, flexible "turn-key" and automation options, custom-designed procedures can be added to floating *Auto Task* toolbars ■ All output displayed in *Scrollsheets™* (dynamic, customizable, presentation-quality tables with instant 2D, 3D, and multiple graphs) or word processor-style report editor (of unlimited capacity) that combines text and graphs ■ Extremely large analysis designs (e.g., correlation matrices up to 32,000x32,000, unlimited ANOVA designs) ■ Megabyte Manager with up to 32,000 variables (8 Mb) per record ■ Unlimited size of files; extended ("quadruple") precision; unmatched speed ■ Exchanges data and graphs with other applications via DDE, OLE, or an extensive selection of file import/export facilities (incl. *ODBC* access to virtually all data bases and mainframe files) ■ Hundreds of types of graphs, incl. categorized multiple 2D and 3D graphs, ternary 2D/3D graphs, matrix plots, icons, and unique multivariate (e.g., 4D) graphs ■ Facilities to custom-design new graph types and add them permanently to menus or toolbars ■ On-screen graph customization with advanced drawing tools (e.g., scrolling and editing of complex objects in 32x real zoom mode), compound (nested) OLE documents, *Multiple-Graph AutoLayout Wizard*, templates, special effects, icons, page layout control for slides and printouts; unmatched speed of graph redraw ■ Interactive rotation, perspective and cross-sections of 3D displays ■ Large selection of tools for graphical exploration of data: extensive brushing tools with animation, fitting, smoothing, overlaying, spectral planes, projections, layered compressions, marked subsets ■ Price \$995.

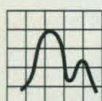
Quick STATISTICA (for Windows) ■ A subset of *STATISTICA*; comprehensive selection of basic statistics and the full analytic and presentation-quality graphics capabilities of *STATISTICA* ■ Price \$495.

STATISTICA/QC - *Industrial statistics add-on package* (requires *STATISTICA* or Quick *STATISTICA* for Windows) ■ The largest selection of industrial statistics in a single package; quality control charts (compatible with real-time data acquisition systems), process capability analysis, R&R, sampling plans, and an extremely comprehensive selection of experimental design (DOE) methods ■ Flexible tools to customize and automate all analyses and reports (incl. "turn-key" system options, and tools to add custom procedures) ■ Price \$495.

STATISTICA/Mac (for Macintosh) ■ Price \$695 (Quick - \$395).

Domestic sh/h \$12 per product; 30-day money back guarantee.

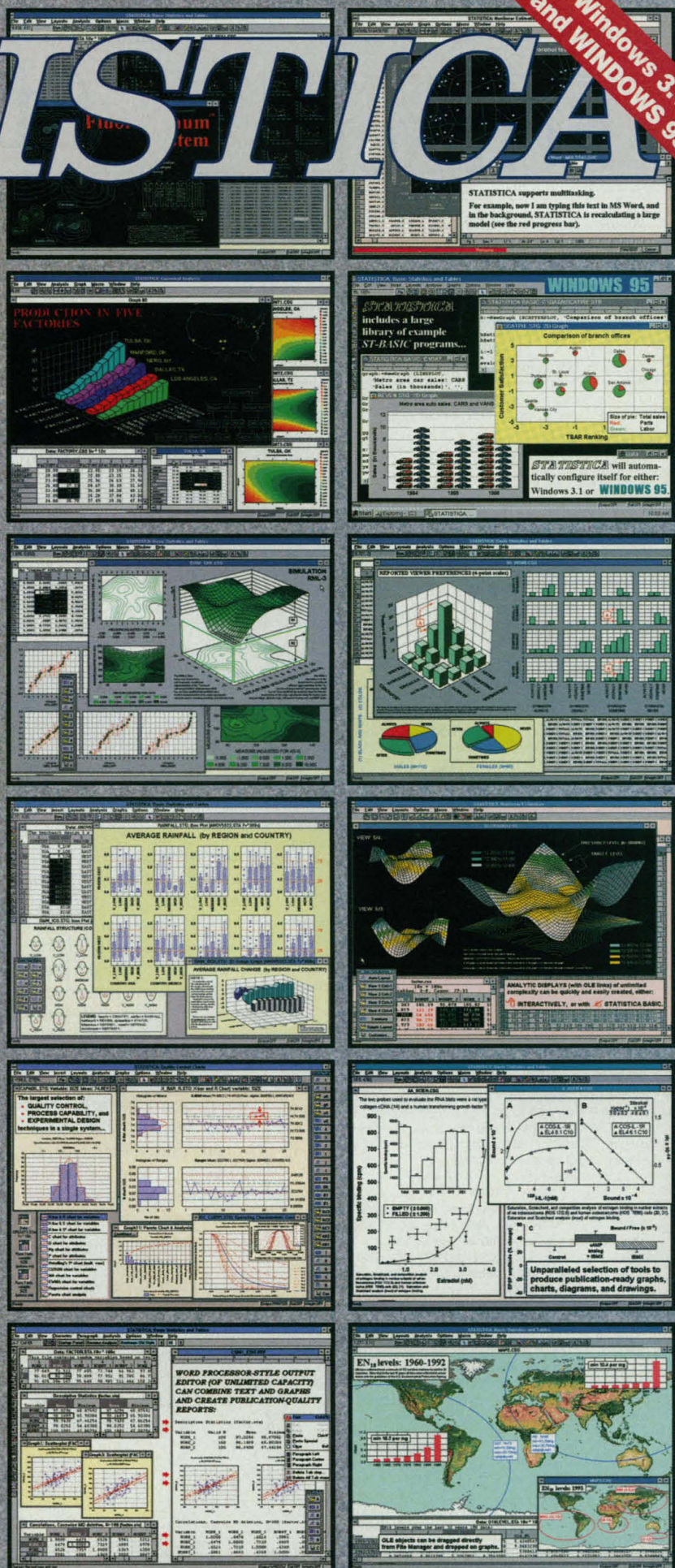
Circle No. 6 on Readers' Service Card



StatSoft®

2325 E. 13th St. • Tulsa, OK 74104 • (918) 583-4149
Fax: (918) 583-4376

Overseas Offices: StatSoft of Europe (Hamburg, FRG), ph: 040/ 4200347, fax: 040/4911310; StatSoft UK (London), ph: 01462/482822/ fax: 01462/482855; StatSoft Pacific (Melbourne, Australia), ph: (03) 663 6580, fax: (03) 663 6117; StatSoft France ph: (1) 45 66 97 00, fax: (1) 45 66 06 51; Available from other Authorized Representatives worldwide: Sweden: AkademiData Scientific ph: 018-210035, fax: 018-210039; Finland: Statcon Oy ph: 24-334678, fax: 24-333667; Belgium: Texma NewTech ph: 010 61 16 28, fax 010 61 69 57; South Africa: Osiris ph: 12-663-4500, fax 12-663-6114; Japan (Macintosh): Three's Company, Inc., ph: 03-3770-7600, fax 03-3770-7784; Japan (Windows): Design Technologies, Inc., ph: 03-3667-1110, fax: 03-3668-3110; Italy: Promot SRL ph: 49-893-3227, fax: 49-893-2897; Poland: Companion Oprogramowanie ph: 12-369680, fax: 12-360791; Taiwan: Intelligent Integration Corp. ph: 2-759-1791, fax: 2-759-1790. StatSoft, the StatSoft logo, STATISTICA, and Scrollsheet are trademarks of StatSoft, Inc.

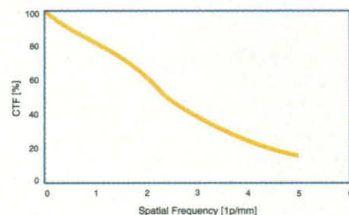


Fujifilm BAS 1500

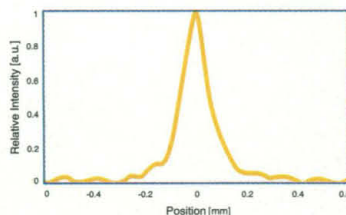


Fujifilm BAS Phosphor Imaging Plate™ Scanners Set the Standard for Autoradiography.

- BAS Systems are the most sensitive; able to detect 0.1 dpm/mm²/h of ³²P and 100 dpm/mm²/h of ³H.
- 10³ X greater sensitivity, 10-100 X faster, 10³ X greater linearity than x-ray film.
- BAS Systems are the most quantitatively accurate with full calibration of linearity, optical uniformity and sensitivity.
- The BAS 1500 has a precision of 0.2%.
- Scan to scan reproducibility is excellent.



Contrast transfer curve shows superior resolution of BAS 1500.



Very low flare required for high resolution is achieved through advanced optical design and proprietary IP technology.

The Fujifilm BAS 1500 Raises the Standard and Lowers the Cost.

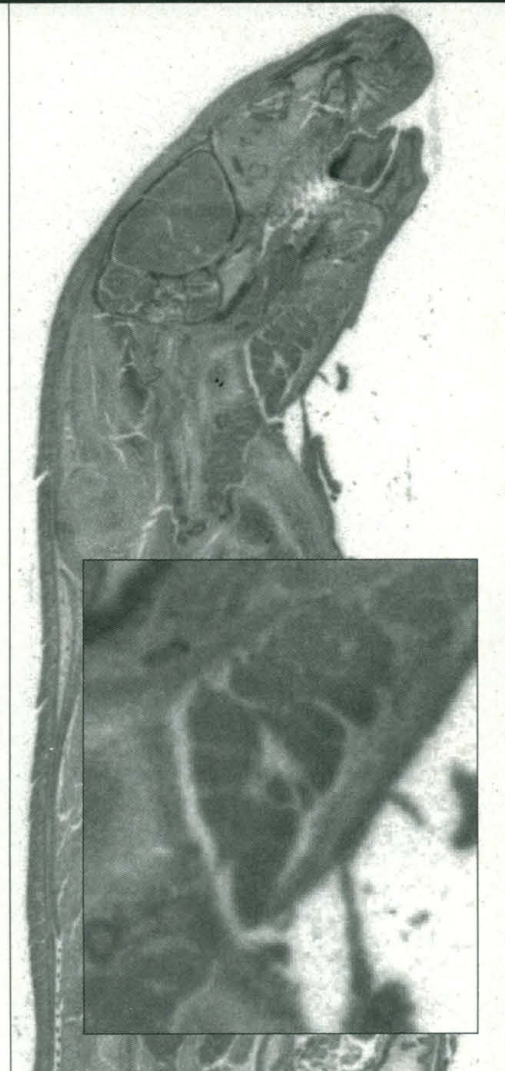
- Data analysis software for PC, Macintosh or UNIX platforms that is powerful, easy to use and fully network compatible.
- BAS systems are easy to use without sacrificing analytical power.
- Fuji offers the only true publication quality printer, and it can be used for a wide variety of graphics applications.
- BAS systems are highly reliable and are backed by an extensive field service team.

Fujifilm BAS 1500 – High Spatial Resolution, Superior Image Quality.

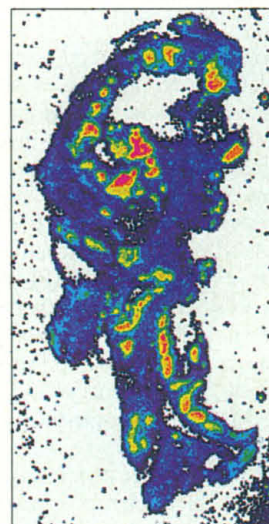
- Highly focused laser beam size minimizes flare without any loss of sensitivity.
- Fuji's patented Light Guide collects more emitted light, increasing sensitivity.
- High color center density of BaFBr:Eu²⁺ crystals delivered by Fujifilm's proprietary emulsion chemistry results in the most sensitive, highest resolution IPs available.



Designed for analysis of full-length DNA sequencing gels.



Above: BAS 1500 scan of Rat Whole Body Phosphor Autoradiogram at 40% actual size and (inset) 120%.



Measurement on a Fujifilm BAS System of ³³P labeled HIV antisense riboprobe hybridized in-situ in the germinal centers of parotid gland.



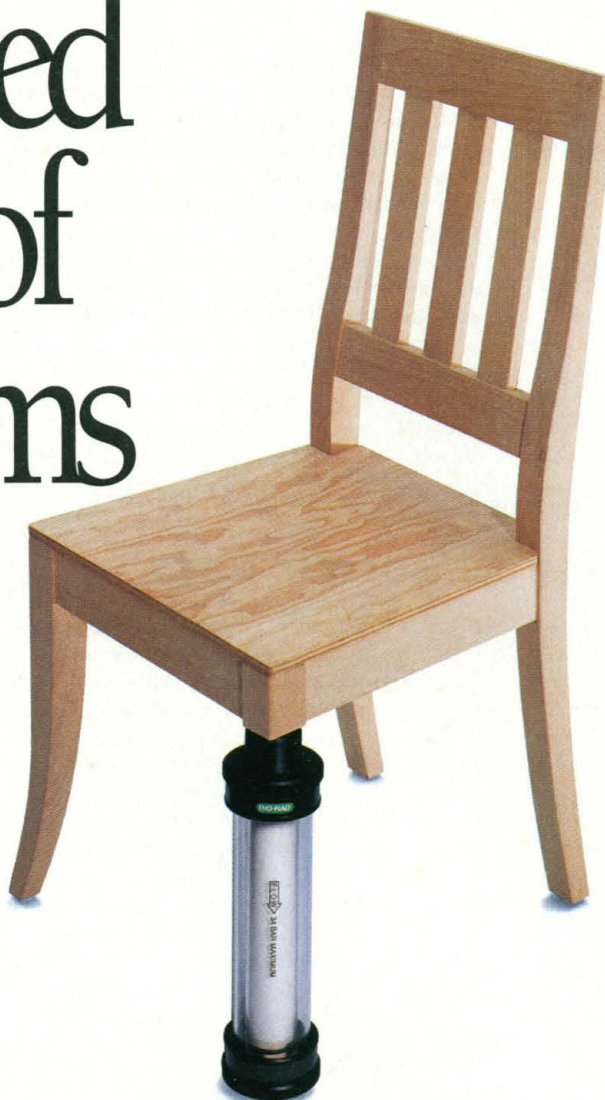
See your data in a whole new light.

Fuji Photo Film Co., Ltd. 26-30, Nishiazabu 2-Chome, Minato-ku, Tokyo 106, Japan, Tel: +81-3-3406-2201 Telex: J24306, J24240 Fax: +81-3-3406-2158 • Fuji Medical Systems U.S.A., Inc. Tel: +1-203-353-0300 Fax: +1-203-327-6485 • Europe: Fuji Photo Film (Europe) GmbH Tel: +49-211-5089-174 Fax: +49-211-5089-344 • Fuji Photo Film (U.K.) Ltd. Tel: +44-71-586-9351 Fax: +44-71-483-1264 Sweden: Fuji Film Sverige AB Tel: +46-8-729-1400 Fax: +46-8-33-7129 • Fuji Medical Systems France Tel: +33-1-47155515 Fax: +33-1-47316200 • Spain: Fuji Film España S.A. Tel: +34-3-4511515 Fax: +34-3-4515900 • Berthold Australia Pty Ltd. Tel: +61-3-467-6277 Fax: +61-3-467-749 • Israel: Dinco Ltd. Tel: +972-4-527324 Fax: +972-4-522376 • Taiwan: Hung Chong Corp. Tel: +886-2-794-7189 Fax: +886-2-794-2248 • Korea: Shin Ki Commercial Co., Ltd. Tel: +82-2-573-8778 Fax: +82-2-573-7370 • Hong Kong/China: Fuji Photo Products Co., Ltd. Tel: +852-2-4088663 Fax: +852-2-4075811

Excel is a trademark of Microsoft. Photoshop is a trademark of Adobe Systems, Inc.

Circle No. 47 on Readers' Service Card

It's Solved a Lot of Problems



WHEN THE SOLUTION SEEMS ELUSIVE, CERAMIC HYDROXYAPATITE SUPPORTS MAY BE THE ANSWER

Macro-Prep® ceramic hydroxyapatite (CHT), a new chromatography support, offers unsurpassed performance. This new material combines the exceptional selectivity of crystalline hydroxyapatite, a proven solution for thousands of published applications, with the stability of ceramic. These properties make the Macro-Prep CHT particularly efficient for difficult separations.

**Analytical and
Preparative
Grades**

**High
Chemical
Stability**



**High
Physical
Stability**

**Unique
Selectivity**

**Complete
Scalability**

Spherical, chemically pure, and extremely stable Macro-Prep CHT is ideal for rapid purification of proteins, peptides, and polynucleotides. In addition, Macro-Prep CHT delivers superior reproducibility and high flow rates for both analytical and preparative chromatography.

For more information about applications, scale-up, and method optimization, call 1-800-4BIORAD or contact your local Bio-Rad representative.

BIO-RAD

**Bio-Rad
Laboratories**

Life Science Group

U.S. (800) 4BIORAD California (510) 741-1000 New York (516) 756-2575 Australia 02-805-5000 Austria (1) 877 89 01 Belgium 09-385 55 11 Canada (905) 712-2771 China (01) 2046622 Denmark 39 17 9947
Finland 90 804 2200 France (1) 49 60 68 34 Germany 089 31884-0 Hong Kong 7893300 India 91-11-461-0103 Italy 02-21609 1 Japan 03-3534-7665 The Netherlands 06385-40666 New Zealand
09-443 3099 Singapore (65) 4432529 Spain (91) 661 70 85 Sweden 46 (0) 8-735 63 00 Switzerland 01-809 55 55 United Kingdom 0800 181134

SIG 020295

Circle No. 26 on Readers' Service Card

HPLC? I'VE HEARD IT ALL.



SENSITIVE RELIABLE REPRODUCIBLE COST-EFFECTIVE MODULAR

FLEXIBLE COMPACT SENSITIVE ACCURATE SPACE-SAVING FLEXIBLE

PROVE SYSTEM GOLD® *Nouveau* IS DIFFERENT.








Being different. That's hard to do in HPLC. Everybody claims to be reliable, reproducible and state-of-the-art.

The System Gold *Nouveau* difference is a rethinking of what exists in HPLC, to make it more of what you wanted all along.



SO WHAT IS THE DIFFERENCE?

-  Peak purity displayed in real-time and automated solvent changeover between methods – for faster method development.
-  Solvent modules that deliver constant flow even if air bubbles are present – for increased confidence during unattended operation.
-  Single-point control from front panel or PC workstation.
-  Optional total PEEK flow path.
-  Wide dynamic flow range – microbore to semipreparative.

All of this makes for an uncompromised and versatile system at a reasonable price. And each configuration comes with a full year in-lab warranty and a qualified Beckman representative to handle installation.

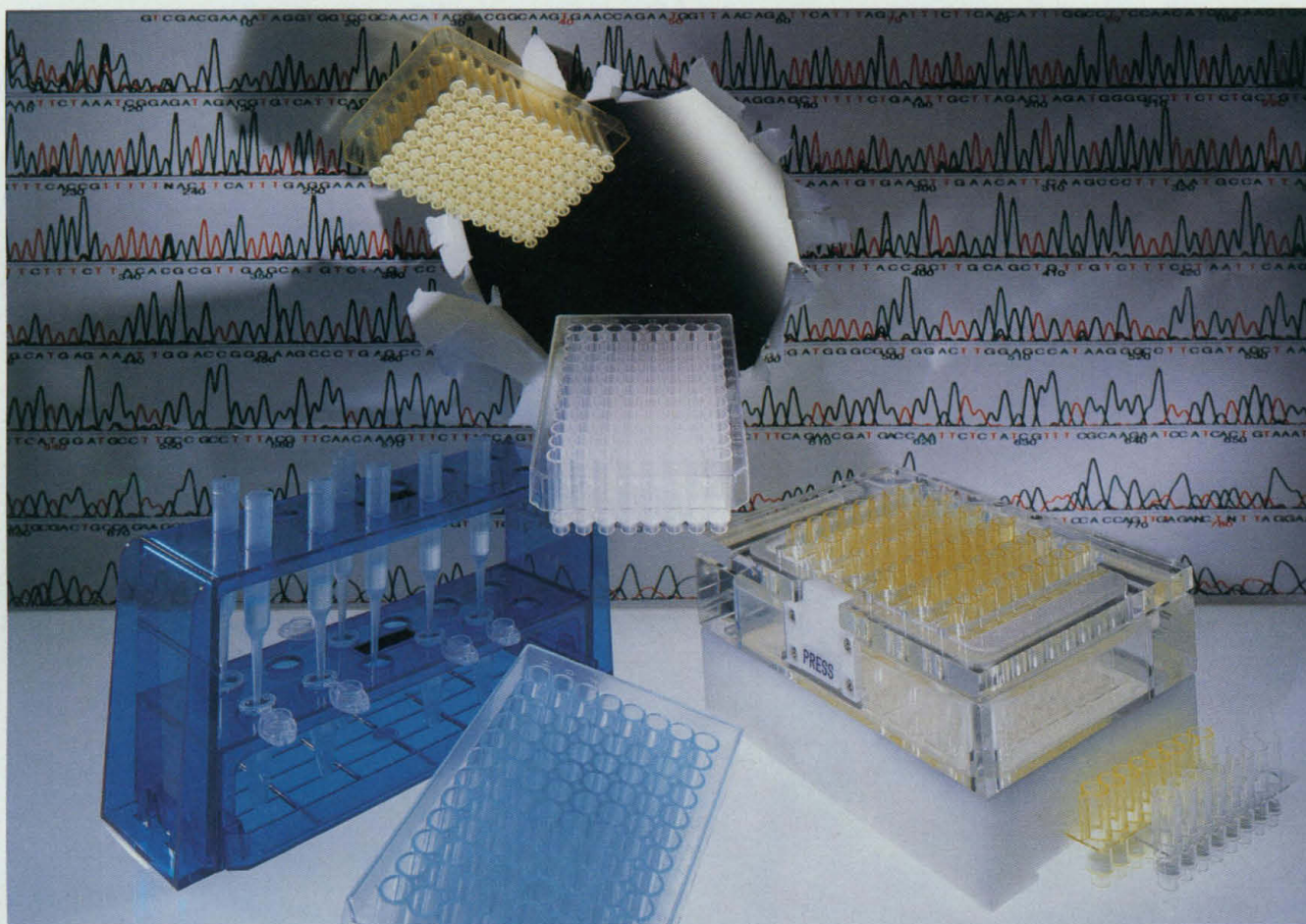
System Gold *Nouveau* can make a difference in your research. For more information about the configuration that's right for you, contact your local Beckman office or reach us through the internet at <http://WWW.BECKMAN.COM>.

BECKMAN

Worldwide Offices: Africa, Middle East, Eastern Europe (Switzerland) (41) 22 994 07 07. Australia (61) 02 816-5288. Austria (2243) 7292164. Canada (800) 387-6799. China (861) 5051241-2. France (33) 1 43 01 70 00. Germany (49) 89-358700. Hong Kong (852) 814 7431. Italy (39) 2-953921. Japan 3-5352-2825. Mexico (525) 5-59-16-35. Netherlands 02979-85651. Poland (48) 22 408822, 408833. Singapore (65) 339 3633. South Africa (27) 11-805-2014/5. Spain (1) 358-0051. Sweden (8) 98-5320. Switzerland (41) 22 994 07 07. Taiwan (886) 02 378-3456. U.K. (01494) 441181. U.S.A. 1-800-742-2345.

©1995 Beckman Instruments, Inc.

Circle No. 33 on Readers' Service Card



Break Through...

...to Better Minipreps for Sequencing

New advances in sequencing technology allow longer reads and higher through-put, but poor quality template can hold you back. QIAGEN Anion-Exchange Resin gives you the template quality you want, in a format to suit your needs.

Unambiguous Results

QIAGEN anion-exchange technology provides the high quality template DNA essential for optimal automated sequencing — free of contaminants that can reduce accuracy, reproducibility (figure) and read length even at low levels.

Proven Performance

QIAGEN Plasmid Mini Kits offer consistently high yields of ultrapure DNA from convenient gravity flow columns. Each column is packed with QIAGEN Anion-Exchange Resin, the most widely used plasmid purification resin in the world.

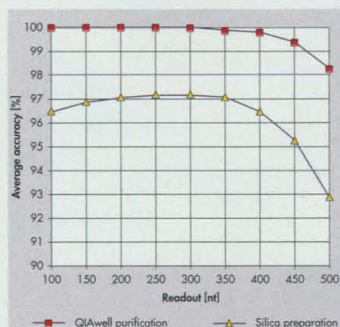
High Throughput

For larger sample numbers, the QIAwell system combines QIAGEN Anion-Exchange Resin with Empore® membrane from 3M. Convenient microtiter 8-well strips and 96-well plates provide in-line filtration, purification, desalting and concentration on the QIAvac Manifold.

Maximum Convenience

QIAwell Ultra Plasmid Kits purify up to 48 ultrapure minipreps in just 1 hour, and 96 in just 2 hours. For even greater convenience, the QIAwell system can be used on the QIAGEN BioRobot 9600 automated workstation.

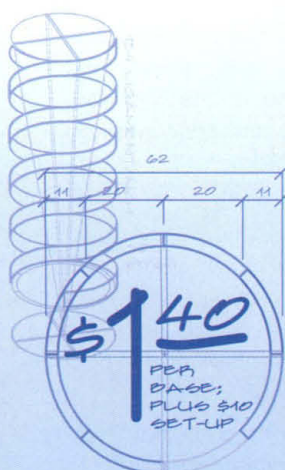
Don't let template purification hold you back from long reads and high throughput. Upgrade to ultrapure mini-preps from QIAGEN — the leaders in nucleic acid purification.



QIAGEN GmbH: Max-Planck-Straße 4, 40724 Hilden, Germany, Orders (0)2103-892-230, Fax (0)2103-892-222, Technical Service (0)2103-892-240
QIAGEN Inc.: 9600 De Soto Avenue, Chatsworth, CA 91311, USA, Orders 800-426-8157, Fax 800-718-2056, Technical Service 800-DNA-PREP (800-362-7737)
QIAGEN Ltd.: Unit 1, Tillingbourne Ct., Dorking Business Park, Dorking, Surrey RH4 1HJ, UK, Orders (01306) 740 444, Fax (01306) 875 885, Technical Service (01306) 740 325
QIAGEN AG: Auf dem Wolf 4, 4052 Basel, Switzerland, Orders (0) 61 317 9420, Fax (0) 61 317 9422, Technical Service (0) 61 317 9420
DISTRIBUTORS: **AUSTRALIA:** BRESATEC Ltd. (08)-234 2644 **AUSTRIA:** BIO-TRADE (1)-889 18 19 **BELGIUM / LUXEMBOURG:** Westburg b.v. 0800-1-9815 (toll free)
CZECH REPUBLIC: BIO-CONSULT (02) 49 53 77 **DENMARK:** Struers KEBO Lab A/S (43)-86 87 88 **FINLAND:** KEBO Lab Oy (0)-804 551 **FRANCE:** Coges (1)-45-32-35-17
GREECE: BIOANALYTICA S.A. (01)-6436138 **INDIA:** Genetix: (11)-546 7637 **ISRAEL:** BIO-LAB Laboratories Ltd. (02)-6524447 **ITALY:** Genetica (M-Medical srl) (055) 5001871
JAPAN: FUNAKOSHI Co., Ltd. (03)-5684-1620 **KOREA:** LRS Laboratories, Inc. (02) 924-8697 **THE NETHERLANDS:** Westburg b.v. (033)-495 00 94 **NORWAY:** KEBO Lab AS (47)-22 90 00 00 **PORTUGAL:** IZASA PORTUGAL, LDA. (1)-7570740 **RSA:** WHITEHEAD SCIENTIFIC SUPPLIES (021) 981 1560 **SINGAPORE:** Research Biolabs Pte Ltd (65) 445 7927 **SPAIN:** IZASA S.A. (91)-663-05-00 **SWEDEN:** KEBO Lab (08) 621 34 00 **TAIWAN:** Formo Industrial Co., Ltd. (02)-736-7125



Oligos Custom-Built to Your Blueprints



Visit our World Wide Web Site
<http://www.genosys.com>



Whether you need a refrigerator full of primers and probes, or an exotic, one-of-a-kind modified oligo, Genosys is always ready to "build to suit."

Unlike many other suppliers, we actually welcome your special requirements. For example, labeled oligos for non-isotopic detection. Our "assorted flavors" include biotin, fluorescein, alkaline phosphatase, digoxigenin,[†] ABI dyes, Texas red and rhodamine. All routine at Genosys.

S-oligos for antisense studies? Large scale synthesis? Custom libraries? Arbitrary 10-mers? Custom genes? Talk to us; you won't be disappointed.

Of course you'll also want the highest quality. So you'll be pleased to learn that Genosys delivers every oligo with its own Quality Assurance Certificate, including digitized PAGE analysis, quantitated yield, melting temperature, MW and $\mu\text{g}/\text{OD}$. As for delivery, standard orders are shipped within 24 hours; can anyone beat that?

If you have particular requirements for research-ready DNA—or if you're just very particular about the DNA used in your research—call, fax or e-mail for our latest catalog. Maybe we can build something together.

Genosys Biotechnologies, Inc.

The Woodlands, TX U.S.A.
 Phone: (800) 853-3385 or (713) 363-3693
 Fax: (713) 363-2212
 eMail: genosys@main.com

Europe:

Genosys Biotechnologies, Inc.
 Cambridge, UK
 Phone: (+44) (0) 1223 425622
 Fax: (+44) (0) 1223 425966
 eMail: genosys@genosys.co.uk

Australia: AMRAD Pharmacia Biotech
 Phone: 008-252-265

Canada: Bio/Can Scientific
 Phone: 800-387-8125

Japan: Kurabo Industries Ltd.,
 Biomedical Dept. (Osaka, Japan)
 Phone: 0720-20-4504

Mexico: Biosolec, S. De R. L.M.I.
 Phone: 341-77-64

New Zealand: AMRAD Pharmacia Biotech
 Phone: 0800-733-893

Norway: MedProbe
 Phone: 47 2220 01 37

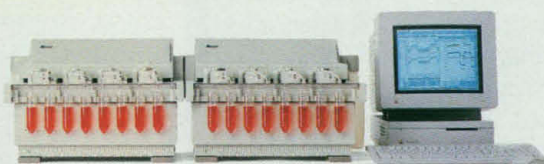
Taiwan: Cashmere Scientific Company
 Phone: 866-2-821-3004

GENOSYS

CYTOSENSOR™
MICROPHYSIOMETER

The Only Comprehensive Assay System for Receptor Signaling.

Congratulations!
To Dr. John M. Arthur at Duke University Medical Center
for receiving the Henry Christian Award for Excellence in Research
from the American Federation for Clinical Research for his work involving orphan receptor detection using the Cytosensor® Microphysiometer.



The **Cytosensor Microphysiometer System** is the latest tool used for drug discovery and signal transduction research.¹ Using a patented biosensor, the system can monitor the receptor-mediated responses from living cells in minutes, producing functional dose responses in just a few hours. Because of the unique biosensor, receptor activation can be studied even without previous knowledge of the signal transduction pathway. Thus, a single assay system can be used to evaluate a variety of receptor families. Previously time-consuming experiments can be performed quickly and easily, making it possible to obtain EC₅₀ and IC₅₀ values in just 4-7 hours;² without radioactivity. And novel receptor responses, not seen with other methods, have been observed.

1. Science 257, 1906-1912, (1992) 2. J. NIH Research 5, 69, (1993)

Call us for an evaluation of your cells and effector agents or for a detailed list of scientific references.



G PROTEIN-LINKED RECEPTORS



TYROSINE KINASE RECEPTORS



LIGAND-GATED ION CHANNELS



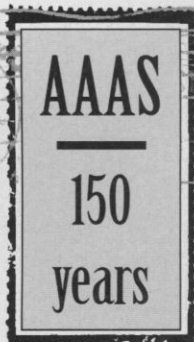
HEMATOPOIETIC RECEPTORS

Circle No. 27 on Readers' Service Card



U.S.A. 1-800-400-9060 (FAX USA: 408-747-3602)
Germany: 49-898-54-5050 (FAX: 49-898-54-2238)
United Kingdom: 44-293-619579 (FAX: 44-293-619586)

Celebrate
150 years
of Scientific Advancement



In 1998, the American Association for the Advancement of Science (AAAS) will celebrate the 150th anniversary of its founding. A commemorative postage stamp would be a fitting tribute to the Association's historic efforts to promote the progress of science and engineering in the service of humankind.

BUT YOUR HELP IS ESSENTIAL.

We need letters expressing support for a AAAS commemorative stamp as well as ideas for the stamp's theme and design.

Please write promptly to:

The AAAS Commemorative
Postage Stamp Committee
Office of Communications
Room 801
1333 H Street, NW
Washington, DC 20005
or call: 202-326-6440



*Working with
Congress: A
Practical Guide
for Scientists
and Engineers*

WILLIAM G. WELLS, JR.

"Anyone interested in participating in government can benefit from reading this clear-cut manual, which begins with an overview of how Congress works, opportunities for constituents to have an impact on Congress, seventeen cardinal rules for working with Congress, and procedures for hearings and preparing testimony. It also contains an invaluable appendix of names, addresses, telephone numbers, and congressional logistics."

Science News

1992; 153 pages; index; softcover;
\$12.95 (AAAS member price \$10.35)

FREE bonus with order

*Guide to the Science
and Technology
Committees of the
104th Congress*

A new publication from the
AAAS Center for Science,
Technology, and Congress.

Purchase & handling per order \$4.00

Mail your order to:

AAAS Distribution Center, PO Box 52,
Annapolis Junction, MD 20701

If you prefer to order by phone

(VISA/MasterCard only), call

1-800-222-7809 (8:30am - 5:00pm ET).

Fax orders to 301-206-9789.

**Boehringer Mannheim
Worldwide
Representatives**

Australia
Tel.: (02) 899 7999

Austria
Tel.: (0222) 277 87
DW 420 to 423

Belgium
Tel.: (02) 247 4930

Brazil
Tel.: 55 11 66 3565

Canada
Tel.: (514) 686 7050

Central/Eastern Europe
Tel.: (0222) 277 87

China
Tel.: (852) 2485 7596

Czech Republic
Tel.: (0324) 45 54, 58 71-2

Denmark
Tel.: 49 13 83 42

Finland
Tel.: (90) 429 2342

France
Tel.: 76 76 30 86

Germany
Tel.: 0621 759 8568

Greece
Tel.: (01) 64 96 683-6

Hong Kong, see China

India
Tel.: (22) 837 0794

Indonesia, see Singapore

Ireland
Tel.: 1 800 409 041

Israel
Tel.: (03) 493111

Italy
Tel.: (02) 270 96209

Japan
Tel.: (03) 3432 3155

Malaysia, see Singapore

Mexico
Tel.: (5) 227 8967

Netherlands
Tel.: (036) 539 4911

New Zealand
Tel.: (09) 276 4157

Norway
Tel.: 22 07 65 00

Philippines, see Singapore

Poland
Tel./Fax: (022) 37 42 35
Tel./Fax: (026) 62 63 03

Portugal
Tel.: (01) 417 1717

Singapore
Tel.: 65 479 4111

South Africa
Tel.: (011) 886 2400

South Korea
Tel.: 02 569 6902

(5 lines)
02 562 9947

Spain
Tel.: (93) 201 4411

Sweden
Tel.: 08 98 8150

Switzerland
Tel.: 042 65 4242

Taiwan
Tel.: (02) 736 7125

Thailand, see Singapore

Turkey
Tel.: 1 349 8176, -77, -78, -79

United Kingdom
Tel.: 0800 521578

USA
Tel.: 800 428 5433



Unmatched Expertise in Apoptosis

Using its powerful legs, the basilisk lizard generates enough speed to allow this expert escape artist to actually "walk on water." A similar expertise is required when studying the delicate balance between cell death and proliferation. An expertise that Boehringer Mannheim provides.

More ways to quantify apoptosis without radioactivity

With two ELISAs and three *in situ* kits, Boehringer Mannheim has expanded the array of tools available for specific, reproducible detection of cell death:

- Cell Death Detection ELISA (Fig. 1)
- Cellular DNA Fragmentation ELISA
- Qualitative TUNEL assay kits (Fig. 2).

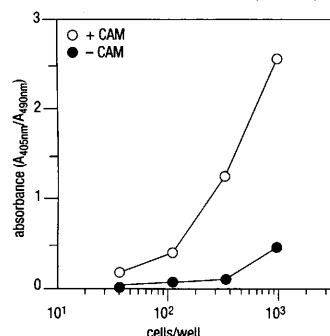


Figure 1. Sensitive detection of nucleosomes in cytoplasmic fractions at different cell concentrations using the Cell Death Detection ELISA. HL-60 cells were cultured at different cell concentrations with or without CAM (campothecin) at 2 µg/ml for 4 hr at 37°C. Cell lysates were prediluted 1:10 and tested in the immunoassay with a 10 minute substrate reaction.

The most extensive line of products
Boehringer Mannheim offers more kits and reagents for accurate, nonradioactive measurement of proliferation than any other supplier:

- Qualitative flow cytometry or immunohistology kits
- Quantitative ELISAs that measure DNA synthesis or metabolic activity.

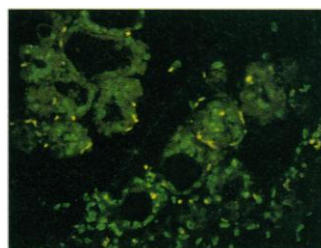


Figure 2. Detection of apoptotic cells (green) in involuting mouse mammary glands by fluorescence microscopy. Formalin-fixed, paraffin-embedded tissue sections were dewaxed and stained using the *In Situ* Cell Death Detection Kit, Fluorescein, to show apoptosis occurring in involuting mouse mammary glands after 3 days. Erythrocytes appear yellow due to autofluorescence (data kindly provided by R. Friis, University of Bern, Switzerland).

Unmatched technical resources to guide your research

We offer the most technical information on cell death and cell proliferation available. We can answer your most challenging apoptosis research questions. Call us today, and see why Boehringer Mannheim is the leading expert in cell death and cell proliferation research.



Biochemicals

Picture Perfect



KODAK Products and Techware — the perfect match for scientific imaging.



When it comes to your biological imaging and analysis product needs, there's no better choice than KODAK products from Sigma-Aldrich Techware.

A single phone call is all it takes to gain immediate access to the complete KODAK Scientific Imaging Systems product line...as well as over 10,000 other brand name laboratory equipment and supply products.

In addition to a wide selection of top quality laboratory products, Sigma-Aldrich Techware backs each

purchase with unequalled service and support, including:

- Same day shipping
- Comprehensive technical support
- Competitive pricing



If your research calls for biological imaging and analysis products that are picture perfect, choose KODAK products from Sigma-Aldrich Techware—your single, most convenient source for brand name laboratory equipment and supplies.



SIGMA[®]

Where Science and Service Come Together.

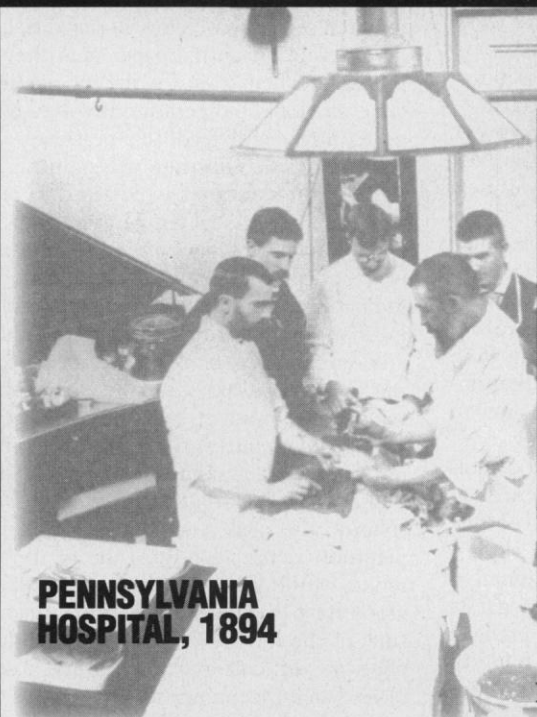
Call collect: 314-771-5750,
800-325-3010,
or contact your local Sigma office.

AUSTRALIA AUSTRIA BELGIUM BRAZIL CZECH REPUBLIC FRANCE GERMANY HUNGARY INDIA ITALY JAPAN
KOREA MEXICO NETHERLANDS POLAND SPAIN SWEDEN SWITZERLAND UNITED KINGDOM UNITED STATES

A Sigma-Aldrich Company

Circle No. 15 on Readers' Service Card

Great Moments in Clinical Research...



**PENNSYLVANIA
HOSPITAL, 1894**

CURRENT CLINICAL TRIALS in your office, 1996

Guidon: Current Clinical Trials - [Breast Cancer Screening in Younger Women]

File Edit Tools Services View Options Window Help

Citation

SECTION WITHIN DOCUMENT SEARCH YEARS FIGURES TABLES PRINT BACK NEWS RELEASE

The Online Journal of
CURRENT CLINICAL TRIALS
PROUDLY ANNOUNCES NEW EDITORIAL BOARD

CO-EDITORS:
Henry Sacks, M.D., Mt. Sinai Medical Center, New York
Salim Yusuf, M.D., Hamilton General Hospital, Ontario, Canada
Douglas Zipes, M.D., Indiana University School of Medicine, Indianapolis

DEPUTY EDITORS:
Thomas Chalmers, M.D., Metaworks, Boston
Jesse Berlin, Sc.D., University of Pennsylvania
School of Medicine, Philadelphia

Founding Editor: **Ed Huth**, *Annals of Internal Medicine*

Articles selected for inclusion by **INDEX MEDICUS** and
Biosis Winner of the 1992 Database Magazine Product of the Year Award

Access the Future of Medical Research with CCT

Providing immediate access to critical information, **CCT** includes:

• original articles • meta analyses • research reports • review articles • clinical alerts • Morbidity and Mortality Weekly Reports (MMW) • NIH consensus documents • Fast and tightly focused searches for specific data • A cumulative print version at the end of the cycle • Immediate Hypertext links to abstracts of articles cited in MEDLINE

Plug into **CCT** for 1996 and experience GUIDON 3.0 software, access to the journal via WORLDWIDE WEB, a MAC version, and much more. **CCT** Hardware requirements: a PC with 80386 (required) or 80406 (recommended) microprocessor • 4MB of RAM (required) 8MB for (color images) • 9600 baud or higher modem • Mouse • truetype fonts enabled • Laser printer with 1.5MB of memory • **ACCESS VIA INTERNET:** Use any WINSOCK compliant package TCIP/IP package (such as Chameleon, PCTCP, etc.)

The Online Journal of CURRENT CLINICAL TRIALS

is distributed through the Online Computer Library Center's (OCLC) Electronic Journals online service.
For technical support, call 1-800-848-5878.

For fastest subscription access, call 1-800-783-4903.

The Online Journal of
CURRENT CLINICAL TRIALS
ISSN 1059-2725

Please enter my 1996 subscription to CCT
(Runs 1/96 through 12/96. Annual CD-ROM available):

- ☐ **Personal Rate: \$120.00**
☐ **Student Rate: \$49.00** (must include ID)
☐ **Institutional Rate: \$220.00**
☐ **Network Rate: \$3,000.00** (unlimited access)
☐ Send me a demo disk.
☐ Send me author's instructions.

Please return this order form to:



Journals Marketing Department
CHAPMAN & HALL
Attn: Jennifer Borgen
115 Fifth Avenue, New York, NY 10003
Tel: (212)780-6235 or Fax: (212)260-1363
e-mail: borgen@chaphall.com

☐ I have enclosed a check/money order made payable to
Chapman & Hall Journals

Please charge my credit card

☐ MasterCard ☐ VISA ☐ American Express

Card No. _____

Signature _____ Exp. Date _____

Name _____

Address _____

City/State/Zip _____

Personal subscriptions must be prepaid. If paying by credit card, please use billing address. Must have signature if paying by credit card. Prices are subject to change without notice. Personal subscriptions must be paid by personal check or charge card. Telecommunications charges are not included in subscription price. (No charges if accessed via the INTERNET). We will send you a subscriber agreement, GUIDON software, a user ID & password and full documentation upon payment.

2SCI

BIOTINYRATE VIRTUALLY ANY OLIGO IN <1 HOUR

Introducing the new Rad-Free® Universal Oligo Labeling Kit

Fast, efficient labeling of oligonucleotides

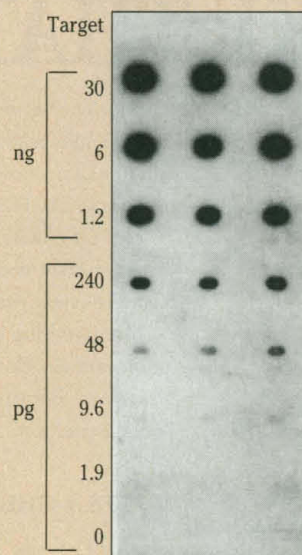
Schleicher & Schuell now offers the Rad-Free Universal Oligo Labeling Kit, which can be used to biotinylate virtually any oligonucleotide (e.g. 14-, 17-, 20-mer) within an hour. This kit is ideal for Southern, colony/plaque and high density screening applications. With chemiluminescent detection, the resulting probe yields results comparable to those obtained with ³²P.

Non-enzymatic, predictable

The non-enzymatic labeling procedure of the Rad-Free Oligo Labeling Kit is based on our unique psoralen biotin reagent which provides nucleic acid specific, covalent labeling. Problems associated with enzymatic labeling procedures are eliminated. Now, there is no need to order a biotinylated synthesis to get consistent, predictable results.

Superior Sensitivity for Oligo Labeling

LOW PICOGRAM SENSITIVITY
ACHIEVED WITH RAD-FREE-LABELED
20-MER OLIGO PROBE



Triplicate five-fold serial dilutions of EcoRI-digested pUC19 plasmid DNA (30 ng - 1.9 pg) were dot-blotted onto a 0.2 µm Nytran® nylon membrane and UV-crosslinked. A psoralen biotin-labeled 20-mer oligonucleotide probe was hybridized to the immobilized target DNA. Following incubation with streptavidin-alkaline phosphatase conjugate, chemiluminescent detection was performed with Rad-Free Substrate Sheets for 3 hr at 37°C.

Sensitive chemiluminescent detection

Alkaline phosphatase detection is performed using the unique patented Rad-Free Lumi-Phos® Chemiluminescent Substrate Sheets which allow low picogram sensitivity.

The S&S Nytran® neutral nylon membrane ensures maximum sensitivity and high signal-to-noise ratios, and is optimized for use in chemiluminescent detection systems.

The new non-isotopic standard

Inevitably, every lab will need to make a decision about radioisotope use. Choose the S&S Rad-Free System — the new standard for sensitive detection of nucleic acids and proteins without radioactivity.

For more information on the complete line of Rad-Free non-isotopic products and accessories, contact an S&S technical service representative today!



1-800-245-4024

8 am - 8 pm Eastern Time

Outside U.S. and Canada, fax:

49-5561-791536

Schleicher & Schuell

United States: Keene, NH, USA 03431 • Tel 800/245-4024 • 603/352-3810 • Fax 603/357-7700
Germany: P.O. Box 4, D-37582 Dassel, Germany • Tel (05561-7910) • Fax (05561-791 536)



† Psoralen-based probes are covered by US Patent Number 4,599,303 licensed from Naxcor, Menlo Park, CA.

‡ US Patent Number 5,382,516.

Lumi-Phos® is a registered trademark of Lumigen, Inc.

Circle No. 24 on Readers' Service Card

RECENTLY, MORNINGSTAR CALLED US CHEAP. IT'S NOT EVERY DAY YOU GET A COMPLIMENT LIKE THAT.

All financial companies charge operating fees and expenses—some more than others. Of course, the lower the expenses you pay, the better. That way more of your money goes where it should—towards building a comfortable future.

We make low expenses a high priority.

Because of our size and our exclusive focus on serving the needs of educational and research communities, TIAA-CREF's costs are among the lowest in the insurance and mutual fund industries.¹

In fact, Morningstar, Inc.—one of the nation's leading sources of variable annuity and mutual fund information—says, "Size isn't a constraint; it...enables CREF to realize a remarkable economy of scale."² According to Morningstar's data, CREF's "minuscule" 0.31% average fund expense charge was less than half that charged by comparable funds.³

TIAA's traditional annuity also charges no fees

aside from a very modest operating expense of 1/4 of 1% of annuity assets. Interest and dividends are reported after all operating costs have been deducted. Standard & Poor's calls TIAA's costs "exceptionally low."⁴

Of course, expenses are only one factor to consider when you make an investment decision. While we're committed to keeping our expenses down, we spare nothing in striving to provide top-quality investment choices, financial expertise, and personal service. Because that can make a difference in the long run, too.

TIAA-CREF seeks performance, not profit.

At TIAA-CREF, we believe people would like to spend more on retirement, not on their retirement company. If you'd like to see how our approach can help keep more of your money working for you, call us at 1 800 842-2776 (8 a.m. to 11 p.m. ET, weekdays). We'd consider it a compliment.



**Ensuring the future
for those who shape it.SM**

1. *Standard & Poor's Insurance Rating Analysis*, 1995; Lipper Analytical Services, Inc., *Lipper-Directors' Analytical Data*, 1995 (Quarterly).

2. Source: Morningstar, *Variable Annuities/Life* 4/12/95. 3. Of the 2,208 variable annuity funds tracked by Morningstar, the average fund had annual expenses of 0.78% plus an insurance expense of 1.25%. Source: Morningstar, Inc., for periods ending June 30, 1995. 4. *Standard & Poor's Insurance Rating Analysis*, 1995.

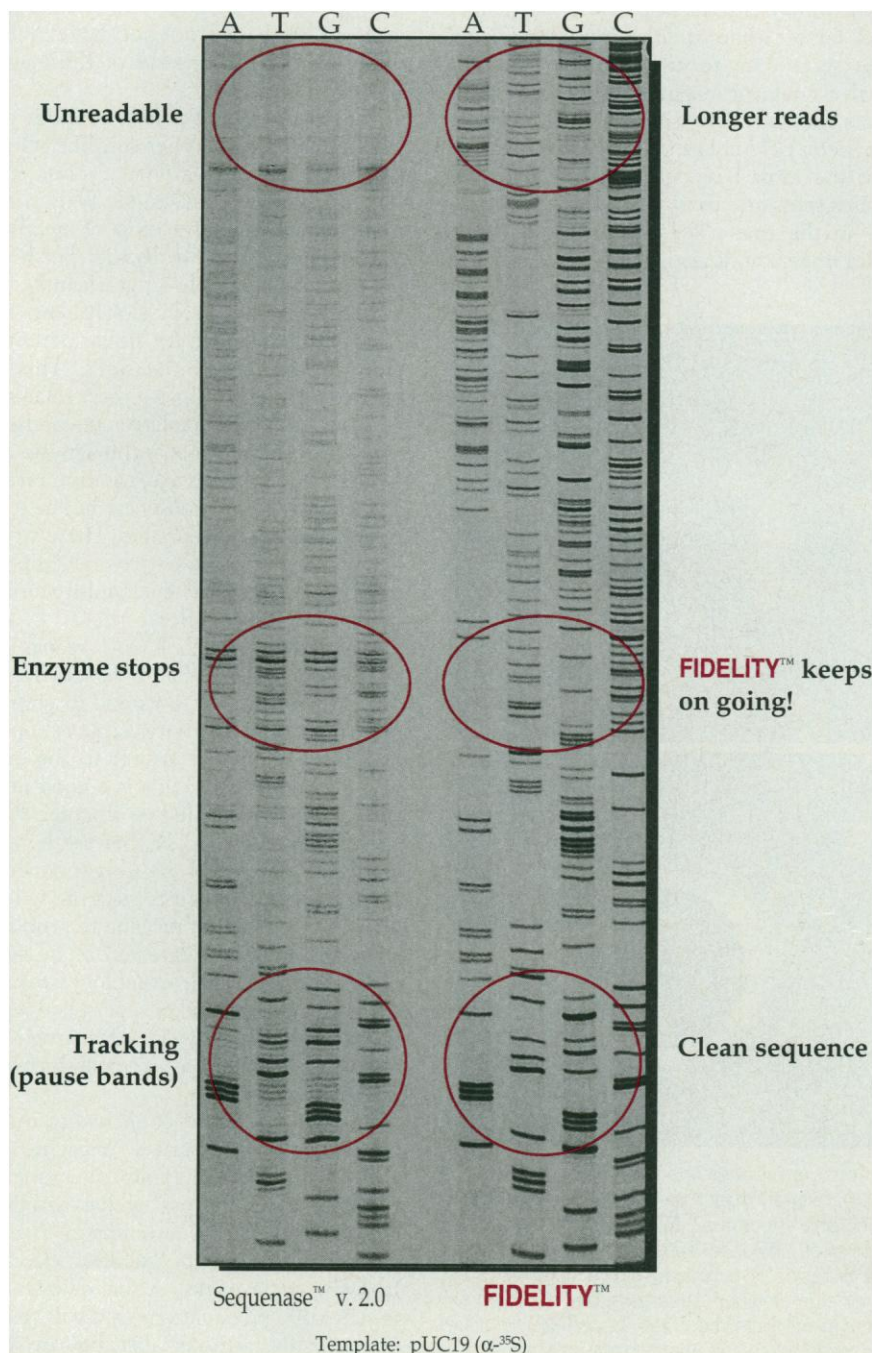
TIAA-CREF expenses are subject to change and are not guaranteed for the future. CREF is a variable annuity and its returns are not guaranteed.

The value of your investment can go up or down, no matter what expense levels are. CREF certificates are distributed by TIAA-CREF Individual and Institutional Services. For more complete information, including charges and expenses, call 1 800 842-2773, extension 5509, for a prospectus. Read the prospectus carefully before you invest or send money. Date of first use: 7/95.

FIDELITY™
DNA Sequencing System

Simply Better.

Now, You Have A Real Alternative.



Introducing the
Oncor **FIDELITY™**
DNA Sequencing
System, with better
resolution on
double-stranded
DNA.

See how much better
manual sequencing
can be.

Call Oncor today at
1-800-776-6267.



GLOBAL SOURCES
PERSONAL SOLUTIONS

oncor

209 Perry Parkway
Gaithersburg,
MD 20877

1-800-77-ONCOR
301-963-3500
Fax: 301-926-6129

<http://www.oncorinc.com/home>
techsvc@oncor.com
custsvc@oncor.com

For Research Use Only. Not for use in diagnostic procedures. FIDELITY is a trademark of Oncor, Inc.
Sequenase is a trademark of United States Biochemical Corporation.

Circle No. 44 on Readers' Service Card