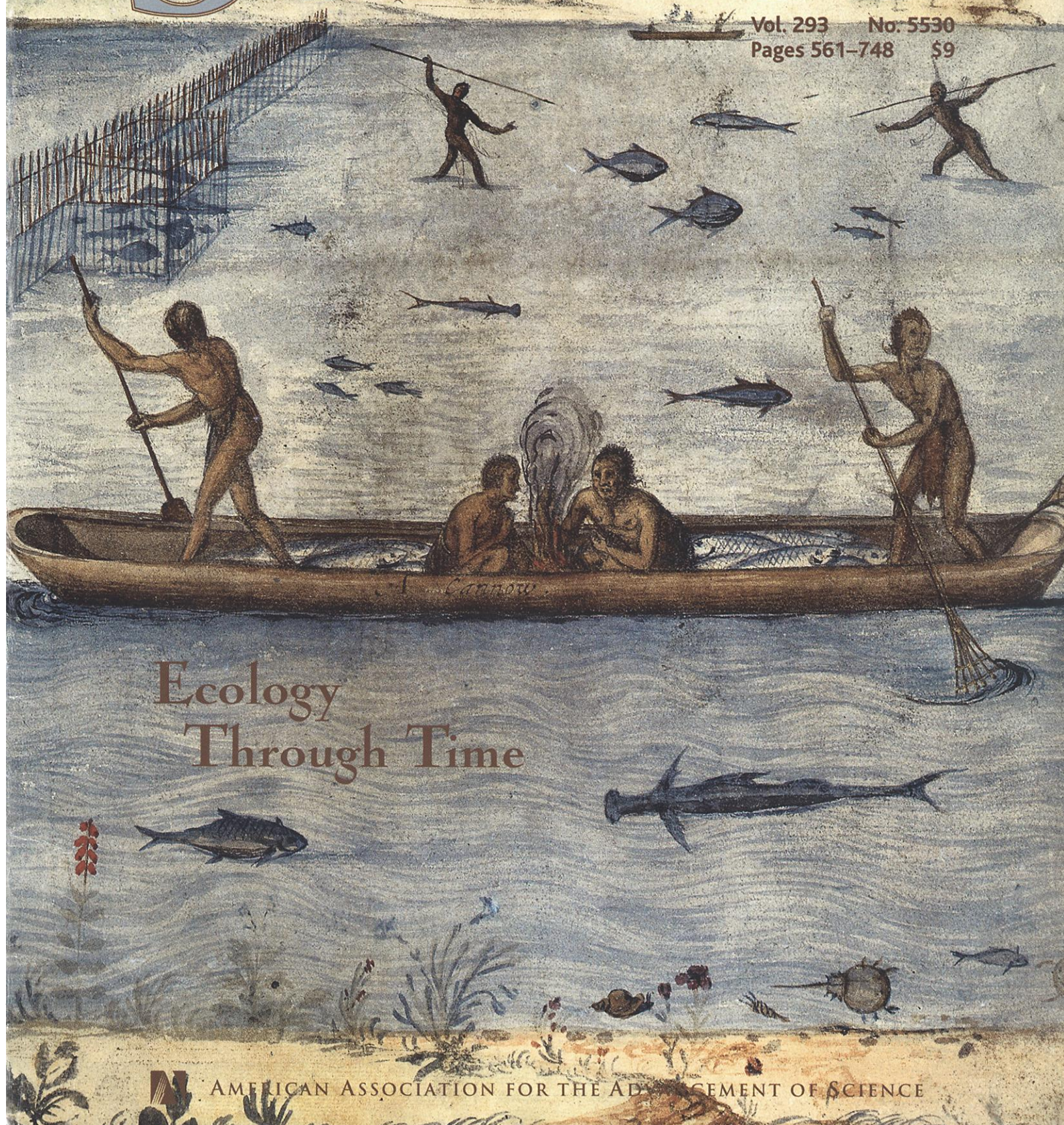


The manner of their fishing.

27 July 2001

Science

Vol. 293 No. 5530
Pages 561-748 \$9



Ecology
Through Time



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

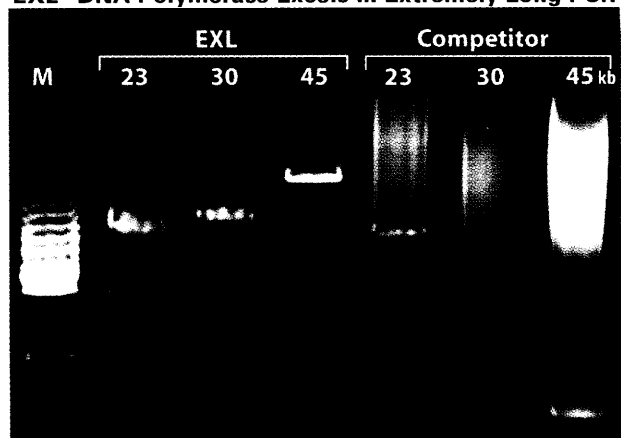
EXL™

DNA POLYMERASE

Excels in Extremely Long PCR

- Ideal for **EXTREMELY LONG TARGETS**
- Easily amplifies **COMPLEX GENOMIC TARGETS**

EXL™ DNA Polymerase Excels in Extremely Long PCR



EXL™ DNA polymerase easily amplified complex targets greater than 20 kb including a 23 kb and a 30 kb genomic target and a 45 kb lambda target. All reactions were performed according to manufacturer recommendations.

EXL™ DNA polymerase*† is a specialized DNA polymerase formulation specifically designed to excel in amplifying extra long targets with robust yield and higher fidelity than *Taq*-based products. EXL DNA polymerase is provided with special reagents to boost performance with extremely long targets.

STRATAGENE USA and CANADA
ORDER: (800) 424-5444 x3
TECHNICAL SERVICES: 800-894-1304

STRATAGENE EUROPE
Belgium, France, Germany,
The Netherlands, Switzerland,
United Kingdom
European Toll-Free Numbers
ORDER: 00800 7003 7000
TECHNICAL SERVICES: 00800 7400 7400
Austria
0800 312 526

www.stratagene.com

*Let EXL™ DNA polymerase stretch
your research potential*

* U.S. Patent No. 5,545,552, 5,556,772, 5,866,395, 5,948,663 and 6,183,997 and patents pending.
† Purchase of these products is accompanied by a license to use them in the Polymerase Chain Reaction (PCR) process in conjunction with an authorized thermal cycler. Stratagene's PCR products are sold under licensing arrangements with Roche Molecular Systems, Inc., F. Hoffmann-La Roche and Applied Biosystems.

www.stratagene.com
Circle No. 15 on Readers' Service Card



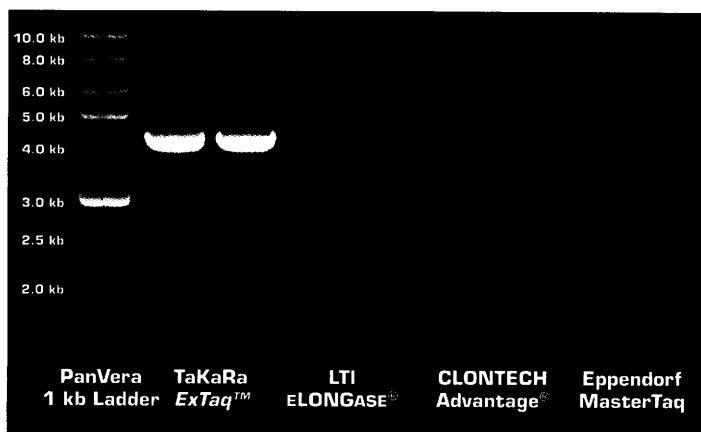
EXL™ DNA Polymerase 100U 600340

STRATAGENE®



PCR That Works!

Takara *Ex Taq*TM
DNA Polymerase



- **Excellent Sensitivity**
- **Robust Signal Intensity**
- **High Fidelity**
- **Longer Amplifications**
- **Reliable Results**

PROVE IT TO YOURSELF

Call us or visit our website for your free sample
of *Ex Taq* or **Hot Start** *Ex Taq* today!



The Protein CompanyTM

Circle No. 88 on Readers' Service Card

Takara PCR-related products are sold under licensing arrangements with Roche Molecular Systems and E. Hoffmann-LaRoche Ltd. and The Perkin-Elmer Corporation. Purchase of these products is accompanied by a license to use them in the Polymerase Chain Reaction (PCR) process for research in conjunction with a thermal cycler whose use in the automated performance of the PCR process is covered by the up-front license fee, either by payment to Perkin-Elmer or as purchase, i.e., an authorized thermal cycler.

Ex Taq is a trademark of Takara Shuzo Co., Ltd.
"The Protein Company" is a trademark of PanVera Corporation.

PanVera Corporation • Madison WI 53711
Phone: 608.233.9450 • Fax: 608.233.3007
E-Mail: info@panvera.com

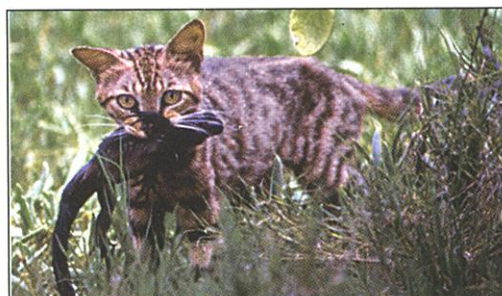
800.791.1400
In the USA and Canada

www.panvera.com
© 2001 PanVera Corporation. All rights reserved.
Lit. #L05265 Rev. 6/01

NEWS

590

Feral felines
disrupt
diversity



NEWS OF THE WEEK

- 582 **HIGH-ENERGY PHYSICS:** Plans for Next Big Collider Reach Critical Mass at Snowmass
- 583 **GLOBAL WARMING:** World Starts Taming the Greenhouse
- 583 **GENOME RESEARCH:** Map of the Human Genome 3.0
- 585 **GENOME RESEARCH:** DNA Sequencers to Go Bananas?
- 585 **SCIENCESCOPE**
- 586 **NEW FACILITIES:** Funding Backlog at NSF Sets Off Free-for-All

- 587 **CLINICAL RESEARCH:** Shutdown at Hopkins Sparks a Debate
- 589 **HOUSTON FLOOD:** Research Toll Is Heavy in Time and Money
- ▼589
623
690 **ANIMAL BEHAVIOR:** New Data Reveal the Sisterhood of Lions

NEWS FOCUS

- 590 **ECOLOGY:** Galápagos Takes Aim at Alien Invaders
- 592 **NORTH AMERICAN PALEONTOLOGICAL CONVENTION:** Fossils With Lessons for Conservation Biology
- 593 **GENETICS:** Can SNPs Deliver on Susceptibility Genes?
SNP-ing Drugs to Size
- 596 **SCIENCE COMPETITIONS:** Top Young Problem Solvers Vie for Quiet Glory
IMO's Golden Boy Makes Perfection Look Easy
Science Olympiads Offer a Variety of Arenas for Overachievers
- 601 **RANDOM SAMPLES**

SCIENCE'S COMPASS

603 LETTERS

The Pandas' Habitat at Wolong Nature Reserve T. Brooks, A. G. Bruner, J. Bruner, G. A. B. Da Fonseca, R. Liu, W. Sung, X. Yan; K. Baragona. **Response** J. Liu, M. Linderman, Z. Ouyang, L. An. **Social vs. Natural Science?** M. Eger. **UNSCEAR on the Health Effects from Chernobyl** Z. Jaworowski. **Captured** by Art P. Schwarz. **Corrections and Clarifications**

POLICY FORUM

- 608 **ANIMAL RESEARCH:** Reliability of Protocol Reviews for Animal Research S. Plous and H. Herzog

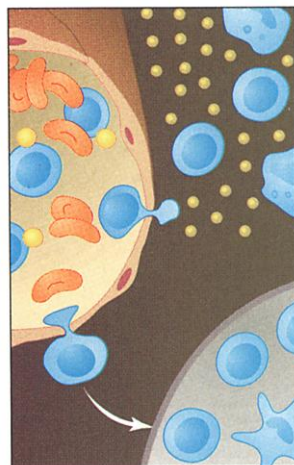
BOOKS ET AL.

- 610 **EVOLUTION:** *Animal Traditions Behavioural Inheritance in Evolution* E. Avital and E. Jablonka, reviewed by P. A. Gowaty
- 611 **CELL BIOLOGY:** *Cells, Gels and the Engines of Life A New Unifying Approach to Cell Function* G. H. Pollack, reviewed by T. P. Stossell

PERSPECTIVES

- 612 **STATISTICAL THERMODYNAMICS:** Taking a Walk on a Landscape C. L. Brooks III, J. N. Onuchic, D. J. Wales

- ▼614
705 **CELL BIOLOGY:** Surviving Starvation S. Gottesman and M. R. Maurizi
- ▼615
687 **VOLCANOLOGY:** Predicting Volcanic Eruptions R. Scarpa
- ▼616
708 **STRUCTURAL BIOLOGY:** Actin' Up E. M. De La Cruz and T. D. Pollard
- ▼618
702 **IMMUNOLOGY:** The Push-Me Pull-You of T Cell Activation M. J. Carson and D. Lo
- ▼619
683 **GEOLOGY:** The Smile of the Cheshire Cat J. Kramers



618

T cells lose their
inhibitions

619

A glimpse into
the Hadean



ECOLOGY THROUGH TIME

623 Filling Generation Gaps

NEWS

624 An Experiment for All Seasons
Where the Grass Never Stops Growing
Divining a Forest's Future From Its Past

627 The Partitioning of the Red Sea

REVIEWS

629 Historical Overfishing and the Recent Collapse of Coastal Ecosystems
J. B. C. Jackson, M. X. Kirby, W. H. Berger, K. A. Bjorndal, L. W. Botsford, B. J. Bourque, R. H. Bradbury, R. Cooke, J. Erlandson, J. A. Estes, T. P. Hughes, S. Kidwell, C. B. Lange, H. S. Lenihan, J. M. Pandolfi, C. H. Peterson, R. S. Steneck, M. J. Tegner, R. R. Warner

638 Noisy Clockwork: Time Series Analysis of Population Fluctuations in Animals
O. N. Bjørnstad and B. T. Grenfell

643 Complex Species Interactions and the Dynamics of Ecological Systems: Long-Term Experiments J. H. Brown, T. G. Whitham, S. K. Morgan Ernest, C. A. Gehring

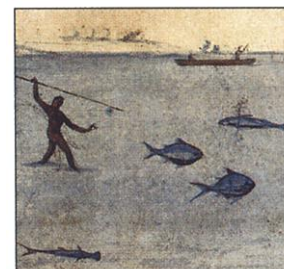
650 Long-Term Studies of Vegetation Dynamics M. Rees, R. Condit, M. Crawley, S. Pacala, D. Tilman

VIEWPOINTS

655 Investigating Long-Term Ecological Variability Using the Global Population Dynamics Database P. Inchausti and J. Halley

657 Ecological Forecasts: An Emerging Imperative J. S. Clark, S. R. Carpenter, M. Barber, S. Collins, A. Dobson, J. A. Foley, D. M. Lodge, M. Pascual, R. Pielke Jr., W. Pizer, C. Pringle, W. V. Reid, K. A. Rose, O. Sala, W. H. Schlesinger, D. H. Wall, D. Wear

See also News on p. 589 and Report on p. 690



COVER 623

Algonquian fishermen on Pamlico Sound, painted in 1585 by John White, later governor of the Roanoke colony. The abundant marine life includes hammerhead sharks and sturgeon, species rarely seen in shallow waters off North Carolina today. Such images show the extent to which our views of natural abundance have changed.
[copyright, British Museum Press]

RESEARCH

RESEARCH ARTICLE

663 Observation of Quantum Shock Waves Created with Ultra-Compressed Slow Light Pulses in a Bose-Einstein Condensate
Z. Dutton, M. Budde, C. Slowe, L. V. Hau

668 The Composite Genome of the Legume Symbiont *Sinorhizobium meliloti*
F. Galibert *et al.*

REPORTS

673 Optical Response of High-Dielectric-Constant Perovskite-Related Oxide
C. C. Homes, T. Vogt, S. M. Shapiro, S. Wakimoto, A. P. Ramirez

676 β -Helical Polymers from Isocyanopeptides J. J. L. M. Cornelissen, J. J. M. Donners, R. de Gelder, W. S. Graswinckel, G. A. Metselaar, A. E. Rowan, N. A. J. M. Sommerdijk, R. J. M. Nolte

680 Topochemical Polymerization of C_{70} Controlled by Monomer Crystal Packing
A. V. Soldatov, G. Roth, A. Dzyabchenko, D. Johnels, S. Lebedkin, C. Meingast, B. Sundqvist, M. Haluska, H. Kuzmany

▼683 Calibration of the Lutetium-Hafnium Clock E. Scherer, C. Munker, K. Mezger

▼687 Very-Long-Period Seismic Signals and Caldera Formation at Miyake Island, Japan
H. Kumagai, T. Ohminato, M. Nakano, M. Ooi, A. Kubo, H. Inoue, J. Oikawa

▼690
589
623
694

Egalitarianism in Female African Lions
C. Packer, A. E. Pusey, L. E. Eberly

Modeling Household Transmission of American Trypanosomiasis J. E. Cohen and R. E. Gürtler

698

An Autoinhibitory Mechanism for Nonsyntaxin SNARE Proteins Revealed by the Structure of Ykt6p H. Tochio, M. M. K. Tsui, D. K. Banfield, M. Zhang

▼702
618

Lysophosphatidylcholine as a Ligand for the Immunoregulatory Receptor G2A J. H. S. Kabarowski, K. Zhu, L. Q. Le, O. N. Witte, Y. Xu

▼705
614

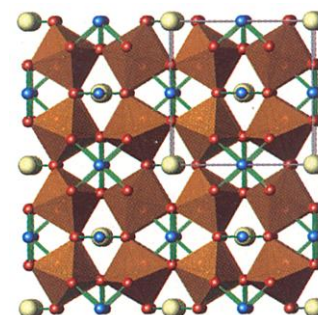
Role of Inorganic Polyphosphate in Promoting Ribosomal Protein Degradation by the Lon Protease in *E. coli* A. Kuroda, K. Nomura, R. Ohtomo, J. Kato, T. Ikeda, N. Takiguchi, H. Ohtake, A. Kornberg

▼708
616

The Crystal Structure of Uncomplexed Actin in the ADP State L. R. Otterbein, P. Graceffa, R. Dominguez

711

Tauopathy in *Drosophila*: Neurodegeneration Without Neurofibrillary Tangles C. W. Wittmann, M. F. Wszolek, J. M. Shulman, P. M. Salvaterra, J. Lewis, M. Hutton, M. B. Feany



673

High dielectric constant perovskite oxides



AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals Mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2001 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): \$115 (\$64 allocated to subscription). Domestic institutional subscription (51 issues): \$370; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$87. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Publications Mail Agreement Number 1069624. Printed in the U.S.A.

Change of address: allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to Science, P.O. Box 1811, Danbury, CT 06813-1811. Single copy sales: \$9.00 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 \$8.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075/83 \$8.00. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

New on Science Express Neural stem cell allocation



A N Y T H I N G I S P O S S I B L E

IS YOUR SEQUENCING ABOUT TO MOVE *forward,* OR BACK?

High quality sequencing data is critical to moving forward in your research. And as you know, the sequencing chemistry you use will directly impact data quality.

But did you know this: you may soon be told to change your sequencing chemistry. At that point, ask, "To what? Will it be as bright and as robust? Will I lose signal? Will I have to change my workflow to make it work? Will I have the same easy clean up process as before?" Ask questions, then test against DYEnamic™ ET terminator chemistry from Amersham Pharmacia Biotech—now available for all ABI PRISM™ instruments.

Put DYEnamic ET Terminator Cycle Sequencing Kit to the test

DYEnamic ET chemistry has reliably sequenced billions of bases in some of the largest sequencing facilities in the world. Want to move forward in your sequencing with the proven chemistry and kits? Go to www.apbiotech.com and order a test kit at our special promotional price.

Amersham Pharmacia Biotech UK Limited,
Amersham Place, Little Chalfont,
Buckinghamshire, England HP7 9NA


amersham pharmacia biotech

Circle No. 16 on Readers' Service Card

Scienceonline

www.scienceonline.org

CONTENT HIGHLIGHTS AS OF 27 JULY 2001

Daily coverage of science and science policy by Science's news team

sciencenow

www.sciencenow.org

science magazine www.sciencemag.org

SCIENCE EXPRESS www.sciencexpress.org

Global Analysis of Protein Activities Using Proteome Chips H. Zhu *et al.*

A chip containing 80% of the proteins encoded by *S. cerevisiae* is used to study protein-protein and protein-lipid interactions.

Resistance to an Herbivore Through Engineered Cyanogenic Glucoside Synthesis D.

B. Tattersall *et al.*

Metabolic engineering applied to *Arabidopsis* has resulted in increased effectiveness of defenses against the plant's pests.

Segregation of Human Neural Stem Cells in the Developing Primate Forebrain

V. Ourednik *et al.*

Human neuronal stem cells transplanted into fetal brains of bonnet monkeys can migrate through the developing brain, a finding that offers clues about the origin of neural stem cells in human brains.

TECHNICAL COMMENTS

The Y Chromosome and the Replacement Hypothesis

Ke *et al.* (Reports, 11 May 2001, p. 1151), in an analysis of three Y chromosome markers characteristic of African origins in 12,127 males from 163 Asian populations, found no support for even a minimal contribution to the gene pool from previous Asian hominids—a result consistent with the "Out-of-Africa" or replacement hypothesis for the origin of modern humans. Hawks comments that the Ke *et al.* study relied too heavily on a single line of evidence, and that a "balanced view" that encompasses both other genetic data and archeological and fossil evidence argues against a simple replacement hypothesis "for East Asians, or indeed for any ancient human population." Jin and Su respond that Y chromosome markers, although not the only genetic evidence, represent "the best choice so far," and that historical and fossil evidence, valuable as a snapshot of events, "can hardly illuminate whether human beings living at that moment actually contributed to the extant populations."

The full text of these comments can be seen at www.sciencemag.org/cgi/content/full/293/5530/567a.

science's stke

www.stke.org

Review: Stressed to Death—Regulation of Apoptotic Signaling Pathways by the Heat Shock Proteins H. M. Beere

How HSPs influence JNK, Akt, death receptor, and Ras-Raf signaling pathways.

Protocol: Analysis of Protein Arginine Methylation and Protein Arginine-Methyltransferase Activity K. A. Mowen and M. David

Assaying for protein methylation—it's not just for histones anymore.

Perspective: HOG on the Promoter—Regulation of the Osmotic Stress Response S. P. Chellappan

Transcriptional regulation by Hog1 mitogen-activated protein kinase in a protein complex at the promoter of target genes.

science's next wave

www.nextwave.org

US: Facing Down a Midcourse Crisis M. Sincell

The time has finally come to throw yourself into your first big research project. So why the sudden feeling of dread? Don't panic—it's all perfectly normal.

GrantsNet

www.grantsnet.org
RESEARCH FUNDING DATABASE

NEW! AIDScience

www.aidsience.com
HIV PREVENTION AND VACCINE RESEARCH

NeuroAIDS

www.sciencemag.org/NAIDS
EXPERIMENTAL WEB SITE

ONLINE STAFF

SCIENCENOW EDITORS Laura Helmuth, Martin Enserink, Erik Stokstad

SCIENCE'S NEXT WAVE EDITORIAL: MANAGING EDITOR Crispin Taylor; EDITORS Eick von Ruschkowski (Germany), Kirstie Urquhart (UK); CONTRIBUTING EDITORS Lesley McCarney (Canada), Mark Sincell; PROJECT MANAGER Ric Weib; WRITERS Jim Austin, Katie Cottingham; MARKETING: MARKETING MANAGERS Karen Horting (Global), Hazel Crocker (Europe); PROGRAM DIRECTOR Lisa Kozlowski; MARKETING ASSOCIATE Joey D'Adamo

AIDSCIENCE SENIOR EDITOR Roberto Fernandez-Larsson; ASSOCIATE EDITOR Patricia Peacock

SCIENCE'S STKE EDITOR Bryan Ray; ASSOCIATE EDITORS Lisa Chong, Nancy Gough, John Nelson; PUBLICATIONS ASSISTANT Christopher Kenny

ELECTRONIC MEDIA MANAGER Don Hemenway; INTERNET PRODUCTION MANAGER Betsy Hartman; ASSISTANT PRODUCTION MANAGER Wendy Stengel; SENIOR PRODUCTION ASSOCIATE Lisa Stanford; ASSOCIATES Carla Cathey, Mark Croatti, Louis Williams; LEAD APPLICATIONS DEVELOPER Carl Saffell

SCIENCECAREERS.ORG

Job Alerts: Get Science Careers job postings in your e-mail! Sign up for Job Alerts today and get the job postings you specify e-mailed to you weekly. Sign up today at www.sciencecareers.org.

AD SUPPLEMENT / 3 AUGUST ISSUE

SPECIAL FEATURE

Career Opportunities and Graduate Programs for BS/MS Scientists:

This ad supplement will discuss career opportunities for individuals with BS and MS degrees in the life sciences. Look for it in the 3 August issue.

SPECIAL AD SECTION / 3 AUGUST ISSUE

LAB TECHNOLOGY TRENDS

Technologies in Drug Discovery: This special advertising section details advances and technologies in combinatorial chemistry, computational chemistry, drug design, HTS/UHTS, and more. Look for it in the 3 August issue.





From Sample to Results in Less Than Three Hours

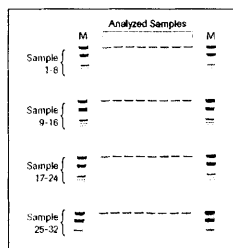
Perform nucleic acid purification and analysis more quickly and more precisely with MagNA Pure LC and the LightCycler Instrument.

Process samples faster: Isolate DNA, RNA, or mRNA in less than two hours, then view quantitative PCR results on-line only 30 minutes later.

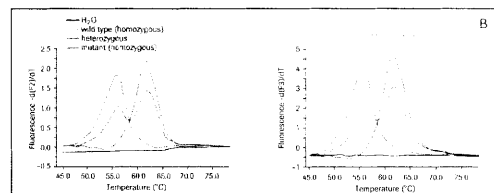
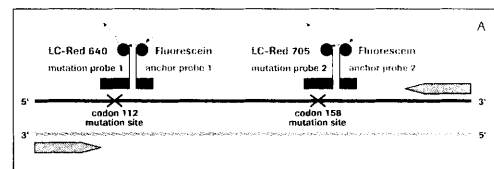
Fully automate sample processing: Combine MagNA Pure LC, the LC Carousel Centrifuge, and the LightCycler Instrument to process samples with minimal "hands-on" time, freeing technicians for other research.

Achieve greater precision and flexibility: Precisely control pipetting, reaction set-up, and thermal cycling temperatures to obtain more accurate, reproducible results.

For more information, visit our web site
<http://biochem.roche.com/lightcycler>
 or contact us at (800) 428-5433.



Genomic DNA isolation from 32 samples of human whole blood using MagNA Pure LC. No visible intra-assay variance.



Dual-color genotyping using the LightCycler Instrument.
A. Schematic of the PCR. **B.** Melting curve analysis was performed on different genotypes at codons 112 and 158 of the Apo E sequence (in channels 2 and 3) to discriminate wild type, heterozygous, and mutant genotypes.



MagNA Pure and LightCycler are trademarks of a member of the Roche Group. The technology used for the LightCycler is licensed from Idaho Technology, Inc. © 2001 Roche Diagnostics Corporation. All rights reserved.

Roche Diagnostics Corporation
 Roche Molecular Biochemicals
 Indianapolis, IN

THIS WEEK IN Science

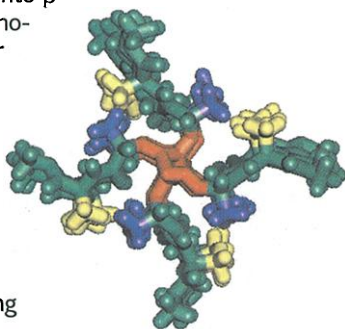
edited by Phil Szuromi

Shocking Behavior in Condensates

Although defects are often unwanted, their controlled introduction can provide useful signatures or probes of a medium. The ability to introduce localized defects into Bose-Einstein condensates (BECs) would be an extremely useful tool to probe the properties of such macroscopic quantum systems and superfluids. Combining their slow-light technique with electromagnetic-induced transparency, Dutton *et al.* (p. 663) report the formation of localized defects in a BEC and the response of the BEC to the defect. Small-scale, large-amplitude sound wave collapse in the BEC results in the breakdown of the superfluidity by the formation of topological defects such as solitons and the nucleation of vortices. The results present a superfluid analog to classical shock waves. 

Building β -Helical Polymers

Although less common than α -helices and β -sheets, the β -helix motif, in which parallel β -strands coil up to form a large helix, can occur, such as in the fibrous form of transthyretin, which is associated with a number of diseases, and are also present in insect antifreeze proteins. Cornelissen *et al.* (p. 676) have synthesized a polymeric isocyanopeptide that also organizes into β -helices but with variation on the motif. The backbone of the polymer forms a central helix, about which the adjoining peptides form sheetlike arrangements. This structure shows stability in both organic solvents and in water, and it may be possible to use these materials as templates for crystal growth, anchors for metal catalysts, or for organizing nonlinear optical chromophores.



Crystal Packing Directs C_{70} Polymerization

When subjected to pressure, the fullerene C_{60} can polymerize through cycloaddition to form three-dimensional networks. Similar reactions for the next higher known fullerene, C_{70} , have been elusive, and pressurization normally forms only C_{70} dimers. Soldatov *et al.* (p. 680), following a lead from theoretical modeling, show that the packing of the C_{70} crystal makes all of the difference. Unlike cubic packed crystals, hexagonally packed crystals contain a twofold screw axis that allows zig-zag polymer chains to form under pressure. The resulting structures were verified by x-ray diffraction and spectroscopy.

668 Nitrogen-Fixing Symbiont

The α -proteobacterium *Sinorhizobium meliloti* not only has affinity with important plant (*Agrobacterium*) and animal (*Brucella*) pathogens but is also a symbiont of leguminous plants. This symbiosis is responsible for a substantial proportion of the approximately 100 million tons of nitrogen fixed in terrestrial ecosystems. Galibert *et al.* (p. 668) sequenced the 6.7-megabase genome of *S. meliloti*, which consists of three replicons (one chromosome and two megaplasmids). Some surprising features include partitioning of several classes of insertion elements among the replicons, the presence of 26 nucleotide cyclases, a type IV secretion system and two types of pili genes, as well as the apparent absence of type III secretion, the sigma factor *rpoS*, and the nitrogenase *nifQ*.

When the Crust Took Shape

Although the use of the uranium-lead system for dating may be more familiar, the radioactive decay of lutetium to hafnium (^{176}Lu to ^{176}Hf) has also been a critical tool for dating old crust. Scherer *et al.* (p. 683; see the Perspective by Kramers) have determined a more precise value for the decay constant of ^{176}Lu to ^{176}Hf through age comparisons. Their value agrees with recent decay counting experiments and is smaller than previous age comparison values.

Their result pushes back the appearance of Earth's first crust from 4.1 billion to 4.3 billion years ago and indicates that differentiation occurred quickly after the formation of the planet.

Volcanic Piston

In June 2000, the volcano on Miyake Island, Japan, developed a relatively large caldera at its summit amidst a small flurry of minor eruptions. Caldera formation was synchronous with some very-long-period seismic signals that indicated the outflow of magma at depth. The signals indicated that the magma was flowing away from Miyake Island to the northwest toward Kozu Island. To explain this unusual combination of observations, Kumagai *et al.* (p. 687; see the Perspective by Scarpa) have developed a model of a "piston" of solid material within the conduit that pushes down into the shallow magma chamber and forces magma outflow at depth. Each downstroke of the piston increases the size of the caldera.

Prides and Prejudice

Recent models have shown the circumstances in which reproduction can be apportioned among female group members in social animals. Many empirical studies have focused on species in which reproduction is highly skewed. Packer *et al.* (p. 690; see news story by Pennisi) have examined the degree of reproductive skew within African lion prides using data collected during the past few decades, which tell a different story. They compared the observed variance in reproduction within prides with the variance produced by simulations that under or overestimated variance in reproduction. In most cases, reproductive output was partitioned fairly evenly among the females in a pride. These results provide a rare example of egalitarianism in an animal society.

A Model for Control of Chagas Disease

Chagas disease is a widespread, chronic, and ultimately fatal disease of the rural poor in Latin America that is caused by the parasite, *Trypanosoma cruzi*. This protozoan is transmitted by blood-sucking triatomine bugs. It has long been suggested that improving the quality

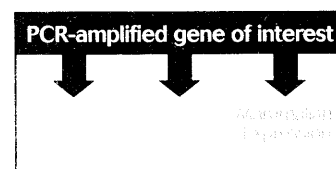
Clip, shape, and style the tool of your choice.



Introducing TOPO[®] Tools for customized expression.

To each his own. Everyone has their own individual style. Now you can express that individuality in your research. TOPO[®] Tools allows you to create a linear DNA construct that's custom designed for your specific expression needs.

What'll it be today? TOPO[®] Tools uses the combined power of PCR and topoisomerase I to build expression constructs. Simply join the 5' and 3' elements of your choice—including promoters and tags—to your amplified gene. Without



traditional cloning or transformation, you'll get a functional, linear DNA

construct that's ideal for your research. And, you'll save days in the process.

Style and function. TOPO[®] Tools lets you build customized constructs for multiple applications. Mammalian two-hybrid screening, expression analysis in mammalian cells, and production of RNA transcripts are just the beginning. We're designing new 5' and 3' elements now. Soon the possibilities will be endless.

Why compromise when you can get what you need with an ideal tool? Call Invitrogen or visit our web site. Express your individuality with TOPO[®] Tools today.



Circle No. 5 on Readers' Service Card

United States Headquarters:
Invitrogen Corporation
1600 Faraday Avenue
Carlsbad, California 92008
Tel: 1 760 603 7200
Tel (Toll Free): 1 800 955 6288
Fax: 1 760 603 7229
Email: tech_service@invitrogen.com

European Headquarters:
Invitrogen Ltd
3 Fountain Drive
Inchinnan Business Park
Paisley PA4 9RF, UK
Tel (Free Phone Orders): 0800 269 210
Tel (General Enquiries): 0800 5345 5345
Fax: +44 (0) 141 814 6287
Email: eurotech@invitrogen.com

International Offices:
Argentina 5411 4556 0844
Australia 1 800 331 627
Austria 0800 20 1087
Belgium 0800 14894
Brazil 0800 11 0575
Canada 800 263 6236
China 10 6849 2578
Denmark 80 30 17 40

France 0800 23 20 79
Germany 0800 083 0902
Hong Kong 2407 8450
India 11 577 3282
Italy 02 98 22 201
Japan 03 3663 7974
The Netherlands 0800 099 3310
New Zealand 0800 600 200
Norway 00800 5456 5456

Spain & Portugal 900 181 461
Sweden 020 26 34 52
Switzerland 0800 848 800
Taiwan 2 2651 6156
UK 0800 838 380
Other countries see our website

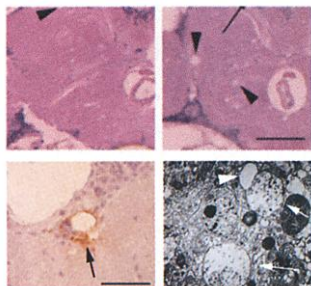
of housing could control this disease. Cohen and Gürtler (p. 694) have now mathematically modeled the complex set of variables that contribute to disease transmission within a household. They offer simple recommendations for exclusion of pets and structural improvement of sleeping areas that would virtually eliminate Chagas disease in human beings.

Getting to Grips with SNARES

The SNARE proteins are involved in the promotion of faithful fusion events during membrane traffic. Tochio *et al.* (p. 698) examined the structure of one of the SNARE proteins, Ykt6p, from yeast using nuclear magnetic resonance spectroscopy. The amino-terminal structure did not resemble that of another well-characterized SNARE protein, syntaxin, but rather has characteristics in common with the actin regulatory protein profilin. Ykt6p may adopt different conformations that would affect its incorporation into productive fusion complexes.

Death Without Entanglements

Many human neurodegenerative diseases are characterized by abnormalities in the conformation and phosphorylation of the microtubule-binding protein tau, and it has been speculated that these abnormalities play a causal role in neuronal killing. Wittmann *et al.* (p. 711; see the 14 June news story by Ferber) have created a genetic model of these so-called "tauopathies"



by expressing human wild-type and mutant tau in the nervous system of the fruit fly *Drosophila melanogaster*. The transgenic flies developed many features of the human tauopathies, including adult-onset progressive neurodegeneration and early death. Curiously, however, the dying neurons showed no signs of neurofibrillary tangles—the large filamentous aggregates of tau—that are a prominent feature of tauopathies in humans and rodent models. Because of its genetic accessibility, the fly model is expected to provide new insights into the cellular mechanisms that underlie tau-mediated neurotoxicity. X

Receptor for an Inflammatory Lipid

An orphan G protein-coupled receptor called G2A has important immunoregulatory roles because its deletion in mice results in an autoimmune disorder similar to systemic lupus erythematosus. Kabarowski *et al.* (p. 702; see the Perspective by Carson and Lo) have now determined that a lipid present in cell membranes and serum called lysophosphatidylcholine (LPC) is the activating ligand of this receptor. LPC has previously been implicated in chronic inflammatory conditions such as systemic autoimmune diseases and atherosclerosis. The G2A-LPC interaction altered the migratory behavior of T cells.

Destined for Destruction

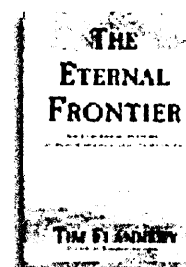
When cells are starved, they tend to cannibalize excess proteins. Kuroda *et al.* (p. 705; see the Perspective by Gottesman and Maurizi) examined this process in bacteria and discovered that inorganic polyphosphate appears to be a key factor in promoting the specific degradation of unassembled (excess) ribosomal subunits, presumably in order to recycle their constituent amino acids. They propose that the inorganic polyphosphate binds noncovalently to the ribosomal proteins and targets them for degradation by the adenosine triphosphate-dependent protease, Lon.

How One Phosphate Changes Actin

Monomeric actin binds adenosine triphosphate (ATP) and associates with itself to form actin polymers, the core component of the thin filaments that make up the cytoskeleton. Polymerization can take place in the absence of ATP hydrolysis, which occurs at a slow rate and appears to increase the propensity of monomers to dissociate from the filament (see the Perspective by De La Cruz and Pollard). How this works has been unclear because the available structures of actin (necessarily in complex with other proteins to prevent polymerization) have not revealed any differences between the ATP and adenosine diphosphate (ADP) states. Otterbein *et al.* (p. 708) present a structure of uncomplexed actin with ADP bound and thus describe the conformational changes triggered by nucleotide hydrolysis and phosphate release.

CREDIT: WITTMANN ET AL.

Discounted Scientific Titles for Members at the AAAS Bookstore



The Eternal
Frontier

Tim Flannery
ISBN: 0-87113-789-5

From DNA
to
Diversity



Sean Carroll, Jennifer Grenier,
Scott Weatherbee
ISBN: 0-632-04511-6

From the hottest new titles to
the biggest bestsellers,
Fatbrain delivers great
scientific and technical titles.

Update your library
today at:

www1.fatbrain.com/AAAS



AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

fatbrain 
a Barnes & Noble.com company

2001 Fatbrain.com, Inc. Fatbrain.com and the Fatbrain.com
logo are trademarks of Fatbrain.com.



FLIGHT ATTENDANT MEDICAL RESEARCH INSTITUTE

ANNOUNCEMENT OF FAMRI AND THREE CLINICAL RESEARCH AWARDS

In October 1991, Miami attorneys, Stanley and Susan Rosenblatt, brought a class action suit against the tobacco industry seeking damages on behalf of flight attendants and their survivors, for the diseases and death that have been caused by their exposure to environmental tobacco smoke (ETS) in airline cabins. The October 1997 settlement, after four months of trial, among other substantial benefits to class members, established an endowment fund of \$300 million that has supported a not-for-profit research foundation, the Flight Attendant Medical Research Institute (FAMRI). The Mission of FAMRI is to sponsor scientific and medical research for the early detection, treatment, and cure of diseases and medical conditions associated with exposure to ETS. FAMRI is headed by a board of trustees, with the majority of flight attendants, a Medical Advisory Board of highly qualified, internationally recognized clinical scientists, chaired by former United States Surgeon General Julius Richmond, M.D. FAMRI has contracted the American Institute of Biological Sciences to conduct the peer review of the three clinical research awards detailed below. More information about FAMRI and the awards, including the Requests for Applications is available on the web at: <http://www.famri.org>. Other communications should be directed to: FAMRI, c/o Stanley M. Rosenblatt and Susan Rosenblatt, Class Counsel, 66 West Flagler Street, 12th Floor, Miami, FL, 33130. TEL: (305) 374-6131 FAX: (305) 381-8818

YOUNG CLINICAL SCIENTIST AWARD (YCSA)

The purpose of the FAMRI YCSA is to help prepare and support new clinical investigators with a M.D. or Ph.D. as they begin their careers as independent researchers. The program is limited to the development of young researchers in smoking-related disorders. FAMRI is particularly interested in helping to provide the bridge between the clinic and the laboratory for the critical translation of basic research findings into diagnostic and therapeutic approaches. The YCSAs are being offered to two groups of scientists: research fellows and junior faculty members

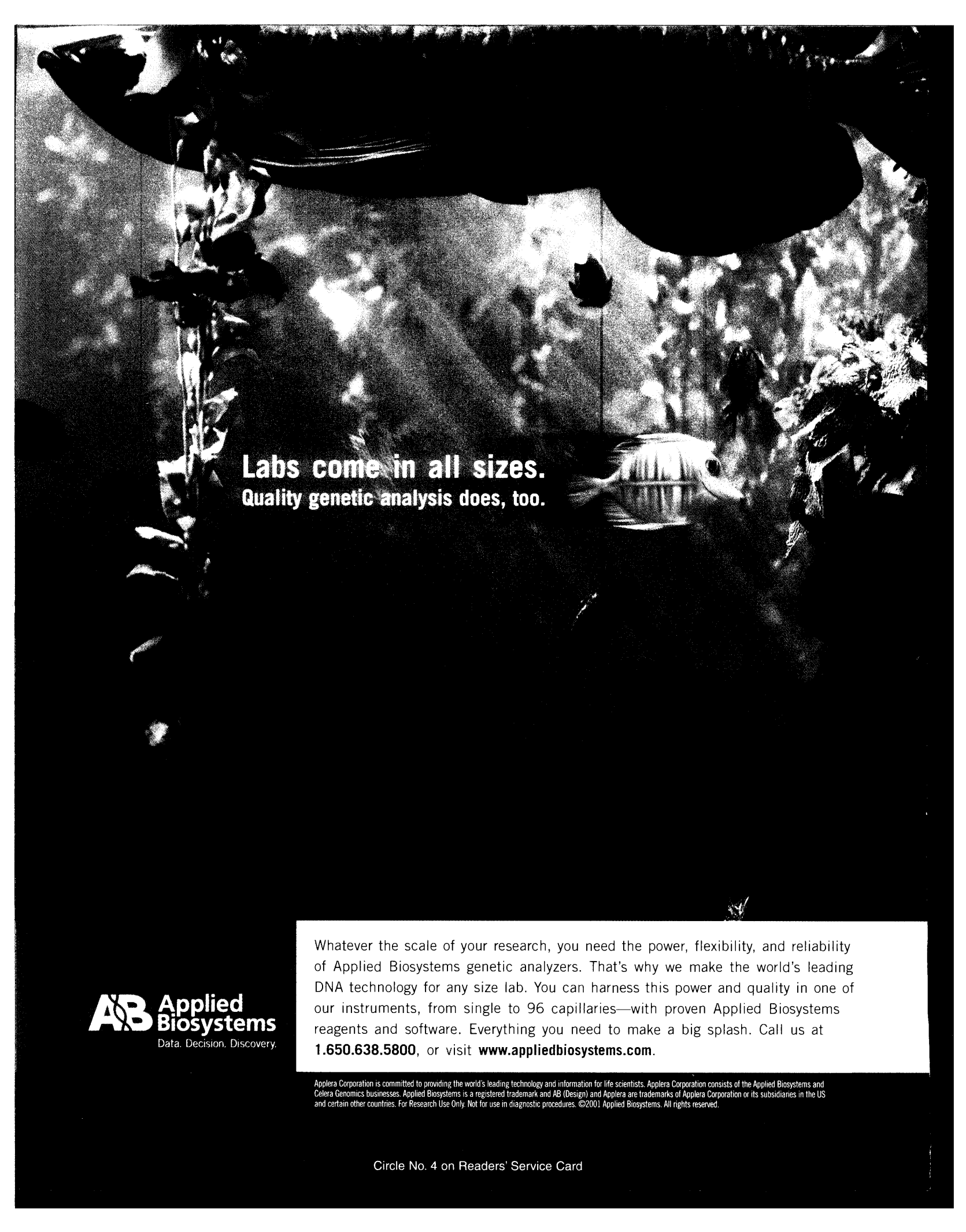
CLINICAL INNOVATOR AWARD (CIA)

FAMRI established the CIA to stimulate novel medical and clinical scientific research studies on the topic of ETS. While considerable government and non-government funding is available to support established mainstream biomedical research projects, funds for high-risk projects are generally quite limited. With the CIA, FAMRI hopes to foster innovative breakthroughs and creative collaborations. The CIA is available to clinical investigators with a M.D. or Ph.D.

CENTER OF EXCELLENCE (CoE)

FAMRI's CoE will be the centerpiece to linking physicians and scientists from various disciplines into multidisciplinary programs in patient care and research. The aims of FAMRI's Centers of Excellence are to enhance the knowledge base relating to the exposure of ETS, to serve as a new source for more effective approaches to detection, diagnosis, and therapy for diseases associated with exposure to ETS, and to serve as principal deliverers of medical advances to those suffering from exposure to ETS. FAMRI has developed this award program on an institutional basis, striving for comprehensive research plans, including the entire range of research endeavors from basic to clinical research, as well as community outreach.

***FAMRI does not support individuals who
or institutions that are currently receiving funds from the tobacco industry or its affiliates.
Full disclosure of any prior tobacco industry funding is required of all applicants.***



Labs come in all sizes.
Quality genetic analysis does, too.

AB Applied Biosystems
Data. Decision. Discovery.

Whatever the scale of your research, you need the power, flexibility, and reliability of Applied Biosystems genetic analyzers. That's why we make the world's leading DNA technology for any size lab. You can harness this power and quality in one of our instruments, from single to 96 capillaries—with proven Applied Biosystems reagents and software. Everything you need to make a big splash. Call us at **1.650.638.5800**, or visit **www.appliedbiosystems.com**.

Applera Corporation is committed to providing the world's leading technology and information for life scientists. Applera Corporation consists of the Applied Biosystems and Celera Genomics businesses. Applied Biosystems is a registered trademark and AB (Design) and Applera are trademarks of Applera Corporation or its subsidiaries in the US and certain other countries. For Research Use Only. Not for use in diagnostic procedures. ©2001 Applied Biosystems. All rights reserved.

Circle No. 4 on Readers' Service Card

CUSTOM OLIGOS

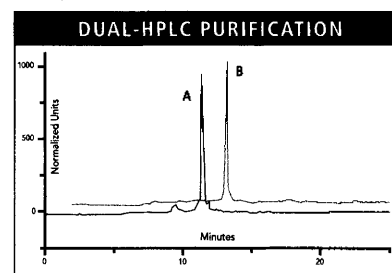
MODIFIED OLIGOS— Quality To Dye For.

With over 14 years experience supplying oligos to scientists, Sigma-Genosys has the expertise to synthesize a broad range of modified oligos. As new labeling and detection technologies emerge, we actively license oligo modifications for commercialization. Our specialty modification department is committed to excellence — developing innovative synthesis and purification techniques to provide you with the highest-quality oligos and reliable delivery.

Call us at 888-400-4363 for information and pricing on any modifications including:

- Dual-labeled fluorogenic probes, Molecular Beacons
- Fluorescein, 6-FAM, HEX, TET, TAMRA
- Molecular Probes, Inc. modifiers such as Oregon Green® 488, Texas Red®, BODIPY® FL, Rhodamine Red™, and Rhodamine Green™ dyes
- Amine, biotin, thiol modifiers
- IRDye™700 and IRDye™800
- Acrydite™

Molecular beacons are sold under license from the Public Health Research Institute of the City of New York, Inc. Custom oligos that incorporate Molecular Probes, Inc. dyes are licensed from Molecular Probes, Inc. IRDye™700 and IRDye™800 are licensed from LI-COR. Acrydite™ is licensed from Mosaic Technologies, Inc.



Trace A represents a crude Molecular Beacon (5'-end TET and 3'-end Dabcyl). Trace B is the same oligo after dual-HPLC purification.

Oligos are quality-checked by PAGE and statistical MALDI-TOF mass spectrometry. Dual-labeled probes and Molecular Beacons are purified by a two-step HPLC process to ensure high quality.

www.genosys.com

Circle No. 10 on Readers' Service Card
LEADERSHIP IN LIFE SCIENCE AND HIGH TECHNOLOGY

1442 LAKE FRONT CIRCLE • THE WOODLANDS, TX 77380-3600
800-617-9246 • FAX: 281-363-2212 • EMAIL: ginformation@sial.com • A Member of the Sigma-Aldrich Family

SIGMA
GENOSYS



Need a hand with your lab reports?

Actually, with the web-enabled NuGenesis® Scientific Data Management System you won't need much help at all. Now you can forever dispense with cumbersome manual report preparation methods. Instead, using all your lab data and any other printable electronic files, you'll easily create electronic reports in your favorite word processing, spreadsheet and presentation applications—in minutes instead of days. Find out how to give yourself more time for science.

Visit www.nugenesis.com/key or email info@nugenesis.com.

Visit our booth #1011 at Drug Discovery Technology 2001!

©2001 NuGenesis Technologies Corporation. All rights reserved. NuGenesis is a registered trademark and NuGenesis Technologies is a trademark of NuGenesis Technologies Corporation.

NuGenesis®
TECHNOLOGIES

More Science. Less Paper. It's About Time.™

Circle No. 90 on Readers' Service Card

1200 New York Avenue, NW
Washington, DC 20005

Editorial: 202-326-6550, FAX 202-289-7562

News: 202-326-6500, FAX 202-371-9227

Permissions: 202-326-7074, FAX 202-682-0816

Subscriptions: 800-731-4939 or 202-326-6417, FAX 202-842-1065

**Bateman House, 82-88 Hills Road
Cambridge, UK CB2 1LQ**

(44) 1223-326500, FAX (44) 1223-326501

EDITOR-IN-CHIEF **Donald Kennedy**

EDITOR **Ellis Rubinstein**

MANAGING EDITOR **Monica M. Bradford**

DEPUTY MANAGING EDITORS NEWS EDITOR
R. Brooks Hanson Katrina L. Kelnor Colin Norman

EDITORIAL/COMPASS SUPERVISORY SENIOR EDITORS Barbara Jasny, Guy Riddihough, Phillip D. Szuroni; SENIOR EDITOR/PERSPECTIVES Orla Smith; SENIOR EDITORS Gilbert J. Chin, Pamela J. Hines, Paula A. Kiberstis (Boston), L. Bryan Ray, Linda R. Rowan; ASSOCIATE EDITORS Lisa D. Chong, Marc S. Lavine, Beverly A. Purnell, H. Jesse Smith, Valda

PUBLISHER **Richard S. Nicholson**

ASSOCIATE PUBLISHER **Beth Rosner**

MEMBERSHIP/CIRCULATION DIR. **Michael Spinella**

MEMBERSHIP/CIRCULATION (membership@aaas.org) DEPUTY DIRECTOR Marlene Zennell; MEMBER SERVICES MANAGER Michael Lung; SENIOR SPECIALIST Mary Curry; COORDINATOR Jantell Stone; SPECIALISTS Laurie Baker, Pat Butler, Elizabeth Early, Katrina Smith; MARKETING MANAGER Gregory Urquhart; PRODUCTION MANAGER Lauri Sirois; ASSOCIATE Deborah Stromberg; EUROPE SENIOR EXECUTIVE Ruth Jackson; EXECUTIVE Martin Paine; RESEARCH MANAGER Renuka Chander; BUSINESS AND FINANCE MANAGER Teresa Ellis; ADMINISTRATIVE SUPPORT Zadia McKinnon; COMPUTER SPECIALIST John Williams

SUBSCRIPTION SERVICES For change of address, missing issues, new orders and renewals, and payment questions: 800-731-4939 or 202-326-6417, FAX 202-842-1065. Mailing addresses: AAAS, P.O. Box 1811, Danbury, CT 06813 or AAAS Member Services, 1200 New York Avenue, NW, Washington, DC 20005

REPRINTS Ordering/Billing/Status 800-407-9190; Corrections 202-326-6501

MEMBER BENEFITS For Credit Card: MBNA 1-800-847-7378; Car Rentals: Hertz 1-800-654-2200 CDP#343457, Dollar 1-800-800-4000 #AA1115; AAAS Travels: Barchart Expeditions 1-800-252-4910; Life Insurance: Seabury & Smith 1-800-424-9883; Other Benefits: AAAS Member Services 1-202-326-6417.

FINANCE AND ADVERTISING BUSINESS MANAGER Deborah Rivera-Wienhold; SENIOR ANALYST Randy Yi; FINANCIAL ANALYSTS Lisa Donovan, Jessica Tierney-Rubin; RIGHTS AND PERMISSIONS: ASSOCIATE Emilie David; ASSISTANT Karen Lentz; MARKETING: DIRECTOR John Meyers; RECRUITMENT MARKETING

Vinson; EDITOR, SCIENCE ONLINE Stewart Wills; ASSOCIATE BOOK REVIEW EDITOR Sherman J. Suter; ASSOCIATE LETTERS EDITOR Christine M. Pearce; INFORMATION SPECIALIST Janet Kegg; CONTRIBUTING EDITOR Kevin Ahern; EDITORIAL MANAGER Cara Tate; SENIOR COPY EDITORS Jeffrey E. Cook, Harry Jach, Etta Kavanagh, Barbara P. Ordway; COPY EDITORS Joshua Marcy, Monique Martineau, John Meade; EDITORIAL COORDINATORS Carolyn Kyle, Ellen E. Murphy, Beverly Shields; PUBLICATIONS ASSISTANTS Chris Filiatreau, Joi S. Granger, Jeffrey Hearn, Charlene King, Elise Laffman, Gail Murphy, Anita Wynn; EDITORIAL ASSISTANT Patricia M. Moore; EDITORIAL SUPPORT ASSISTANTS Osa Atoe, Yolanda Matthews, Brian White; EXECUTIVE ASSISTANT Sylvia S. Kihara; ADMINISTRATIVE SUPPORT Patricia F. Fisher

science_editors@aaas.org (for general editorial queries)
science_letters@aaas.org (for letters to the editor)
science_reviews@aaas.org (for returning manuscript reviews)
science_bookrevs@aaas.org (for book review queries)

NEWS SENIOR CORRESPONDENTS Eliot Marshall, Jean Marx; DEPUTY NEWS EDITORS Robert Coontz, Jeffrey Mervis, Leslie Roberts; CONTRIBUTING EDITORS Elizabeth Culotta, Polly Shulman; NEWS WRITERS Martin Enserink, Laura Helmuth, Constance Holden, Jocelyn Kaiser, Richard A. Kerr, Andrew Lawler (Boston), David Malachuk, Elizabeth Pennisi, Charles Seife, Robert F. Service (Pacific NW), Gretchen Vogel, Joshua Gewolb (intern); CONTRIBUTING CORRESPONDENTS Marcia Barinaga (Berkeley, CA), Kathryn Brown, Barry A. Cipra, Jon Cohen (San Diego, CA), Daniel Ferber, Ann Gibbons, Robert Irion, Mitch Leslie (NetWatch), Charles C. Mann, Virginia Morell, Evelyn Strauss, Gary Taubes, David Voss, Ingrid Wickelgren; COPY EDITORS Linda B. Felaco, Daniel T. Helgeman; ADMINISTRATIVE SUPPORT Scherraine Mack, Fannie Groom; BUREAUS: Berkeley, CA: 510-652-0302, FAX 510-652-1867,

MANAGER Allison Pritchard; ASSOCIATES Mary Ellen Crowley, Amanda Donathen; ELECTRONIC MEDIA: MANAGER Don Hemmway; INTERNET PRODUCTION MANAGER Elizabeth Hartman; ASSISTANT PRODUCTION MANAGER Wendy Stengel; SENIOR PRODUCTION ASSOCIATE Lisa Stanford; PRODUCTION ASSOCIATES Carla Cathey, Mark Croatti, Louis Williams; LEAD APPLICATIONS DEVELOPER Carl Saffell; ADMINISTRATIVE SUPPORT Joyce Scott

PRODUCT ADVERTISING (science_advertising@aaas.org) NATIONAL SALES MANAGER Richard Teeling: 973-694-9173, FAX 973-694-9193 • NORTH-EAST AND E. CANADA Elizabeth Pointek: 978-969-1542, FAX 413-480-0008 • MIDWEST Rick Bongiovanni: 330-405-7080, FAX 330-405-7081 • WEST COAST/W. CANADA Neil Boylan: 415-673-9265, FAX 415-673-9267 • MID-ATLANTIC AND SOUTHEAST SALES Christopher Breslin: 443-512-0330, FAX 443-512-0331 NEW MEDIA SALES MANAGER Chris Peterson: 410-560-3960, FAX 410 560-3961 • UK/SCANDINAVIA/France/ITALY/BELGIUM/NETHERLANDS Andrew Davies: 44 (0)1-782-750-111, FAX 44 (0)1-782-751-999 • GERMANY/SWITZERLAND/AUSTRIA Tracey Peers: (44) 1-782-752-530, FAX (44) 1-782-752-531 JAPAN Masayoshi Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852 • TRAFFIC MANAGER Carol Maddox; TRAFFIC ASSOCIATE Halimah S. Whitby; SENIOR SALES ASSOCIATE Sheila Myers

RECRUITMENT ADVERTISING (science_classifieds@aaas.org); PRODUCTION MANAGER Jennifer Rankin; ASSISTANT PRODUCTION MANAGER Deborah Tompkins; U.S. SALES MANAGER Gabrielle Boguslawski: 718-491-1607, FAX 202-289-6742; WEST COAST SALES MANAGER Kristine von Zedlitz; EAST COAST SALES MANAGER Jill Steinberg; INTERNET SALES MANAGER Beth Dwyer; ASSISTANT SALES MANAGER Daryl Anderson; SENIOR SALES COORDINATOR Erika Bryant; SALES COORDINATORS Rohan Edmonson, Caroline Gallina, Shirley Young; SALES REPRESENTATIVES Kathleen Clark, Jody Fenty, Christina Geiger, Bren Peters-Minnis; ASSISTANTS Sussy Castilla, Emmet Tesfaye; ASSOCIATES Christine Hall, Dawn Bruno, Dina Freeman; PUBLICATIONS AS-

Boston, MA: 617-542-5098, San Diego, CA: 760-942-3252, FAX 760-942-4979, Pacific Northwest: 541-342-6290

PRODUCTION DIRECTOR James Landry; **MANAGER** Wendy K. Shank; **ASSISTANT PRODUCTION MANAGER** Rebecca Doshi; **ASSOCIATES** Vicki J. Jorgensen, Tara L. Kelly, Jessica K. Moshell, Amanda K. Skelton

PREFLIGHT OPERATIONS DIRECTOR David M. Tompkins

ART DESIGN DIRECTOR C. Faber Smith; **ART DIRECTOR** Alan T. Stonebraker; **ASSOCIATE ART DIRECTOR** Joshua Moglia; **ILLUSTRATORS** Cameron Slayden, Katharine Sutcliffe; **ASSOCIATES** Holly Bishop, Debra J. Moryenegg, Preston Morrigan; **PHOTO RESEARCHER** Leslie Blizard

SCIENCE INTERNATIONAL

EUROPE (science@science-int.co.uk) EDITORIAL SUPERVISORY SENIOR EDITOR Andrew M. Sugden; SENIOR EDITOR/PERSPECTIVES Julia Uppenbrink; SENIOR EDITORS Caroline Ash, Stella M. Hurlley; ASSOCIATE EDITORS Ian S. Osborne, Stephen J. Simpson, Peter Stern; EDITORIAL SUPPORT Jenny Parker, Sarah Parker; ADMINISTRATIVE SUPPORT Janet Mumford, Liz Ellis, Viv Hogarth; NEWS: EUROPEAN NEWS EDITOR Richard Stone, CORRESPONDENT Michael Balter (Paris: (33) 1-49-29-09-01, FAX (33) 1-49-29-09-00); CONTRIBUTING CORRESPONDENT Robert Koenig (Bern); John Pickrell (intern)

ASIA Japan Office: Asca Corporation, Eiko Ishioka, Fusako Tamura, 1-8-13, Hirano-cho, Chuo-ku, Osaka-shi, Osaka, 541-0046 Japan; (81) 6-6202-6272, FAX (81) 6-6202-6271; asca@os.gulf.or.jp JAPAN NEWS BUREAU: Dennis Normile (contributing correspondent, (81) 3-3335-9925, FAX (81) 3-3335-4898; dnormile@twics.com); CHINA REPRESENTATIVE Hao Xin, (86) 10-6307-4439 or 6307-3676, FAX (86) 10-6307-4358; science@public3.bta.net.cn; INDIA Pallava Bagla (contributing correspondent (91) 11-271-2896; pbagla@ndb.vsnl.net.in)

ASSISTANTS Robert Buck, Jane Vaughn; U.K./EUROPE: SALES MANAGER Debbie Cummings; PROMOTIONS COORDINATOR Richard Walters; INTERNET SALES EXECUTIVE Tracy Holmes; SALES EXECUTIVE Bonnie Price Lofton; AUSTRALIA/NEW ZEALAND: Keith Sandell; (61) 02-9922-2977, FAX (61) 02-9922-1100 JAPAN: Masayoshi Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852

AAAS BOARD OF DIRECTORS RETIRING PRESIDENT, CHAIR Mary L. Good; PRESIDENT Peter H. Raven; PRESIDENT-ELECT Floyd E. Bloom; TREASURER David E. Shaw; EXECUTIVE OFFICER Richard S. Nicholson; BOARD LEWIS M. Branscomb; Nina V. Fedoroff; Karen A. Holbrook; Sally Gregory Kohlstedt; Richard A. Meserve; Robert C. Richardson; Neena B. Schwartz; Lydia Villa-Komaroff

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

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.

INFORMATION FOR CONTRIBUTORS

See pages 145 and 146 of the 5 January 2001 issue or access www.sciencemag.org/misc/con-info.shtml

BOARD OF REVIEWING EDITORS

Frederick W. Alt
Children's Hospital,
Boston
Edouard Bard
Univ. d'Aix-Marseille III
Frank S. Bates
Univ. of Minnesota
Ray H. Baughman
Honeywell International
Stephen J. Benkovic
Pennsylvania St. Univ.
Michael J. Bevan
Univ. of Washington

Ton Bisseling
Washington University
Seth S. Blair
Univ. of Wisconsin
Mark Boguski
NCBI, NIH
Henry R. Bourne
Univ. of California,
San Francisco
Lewis M. Branscomb
Kennedy School, Harvard Univ.
Joseph A. Burns
Cornell Univ.

Dennis W. Choi
Washington Univ. School
of Medicine, St. Louis
Joanne Chory
The Salk Institute
David Clapham
Children's Hospital, Boston
Paul Harvey
Univ. of Oxford
Jonathan D. Cohen
Princeton Univ.
Daniel G. Colley
Centers for Disease Control
F. Fleming Crim
Univ. of Wisconsin
Robert Desimone
NIMH, NIH
Julian Downward
Imperial Cancer Research
Fund
Gerhard Ertl
Fritz-Haber-Institut, Berlin
Paul G. Falkowski
Rutgers Univ.
Douglas T. Fearon
Univ. of Cambridge
Jeffrey S. Flier
Harvard Medical School
Richard Forsey
The Natural History
Museum, London
Yves Frégnac
Unité de Neurosciences
Intégratives et Computation-
nelles, CNRS, Gif-sur-Yvette
Chris D. Frith
Univ. College London

Don Ganem
Univ. of California, SF
James Ginzewski
Univ. of California, LA
Alex Halliday
ETH Zentrum, Zürich
Paul Harvey
Univ. of Oxford
Martin Heimann
Max Planck Institute
of Biogeochemistry, Jena
Tasuku Honjo
Kyoto Univ.
Evelyn L. Hu
Univ. of California, SB
Herbert Jackle
Max Planck Institute for
Biophysical Chemistry,
Göttingen
Meyer B. Jackson
Univ. of Wisconsin
Medical School
Stephen Jackson
Univ. of Cambridge
Bernhard Keimer
Max Planck Inst. for
Solid State Research,
Stuttgart
Christian Körner
Botanisches Institut,
Basel
Michael LaBarbera
Univ. of Chicago
Angus I. Lamond
Univ. of Dundee

Antonio Lanzavecchia
Inst. of Res. in
Biomedicine, Bellinzona,
Switzerland
Anthony J. Leggett
Univ. of Illinois, Urbana-
Champaign
Norman L. Letvin
Beth Israel Deaconess
Medical Center, Boston
Richard Losick
Harvard Univ.
Raul Madariaga
École Normale
Supérieure, Paris
George M. Martin
Univ. of Washington
Diane Mathis
Harvard Medical School
Andrew Murray
Harvard Univ.
Elizabeth G. Nabel
NHLBI, NIH
Shigekazu Nagata
Osaka Univ. Medical School
James Nelson
Stanford Univ. School of
Medicine
Roger Nicoll
Univ. of California, SF
Roy R. Parker
Univ. of Arizona
Michele Parrinello
Max Planck Institute for
Solid State Research, Stuttgart

Linda Partridge
Univ. College London
Suzanne Pfeffer
Stanford Univ. School of
Medicine
Stuart L. Pimm
Columbia Univ.
Danny Reinberg
Univ. of Medicine and
Dentistry-New Jersey
Janet Rossant
Univ. of Toronto
Erkki Ruoslahti
The Burnham Institute
David G. Russell
Cornell Univ.
Georg Schulz
Albert-Ludwigs-Universität
Freiburg
Terrence J. Sejnowski
The Salk Institute
Manfred Sigrist
ETH Hönggerberg, Zürich
Susan Solomon
NOAA
Christopher R. Somerville
Carnegie Institution of
Washington, Stanford
Will J. Stewart
Marconi Caswell,
Towcester
Edward I. Stiefel
ExxonMobil Research
and Engineering
Bruce Stillman
Cold Spring Harbor Lab.

Cliff Tabin
Harvard Medical
School
Tomoyuki Takahashi
Univ. of Tokyo
Marc Tessier-Lavigne
Univ. of California,
San Francisco
Joan S. Valentine
Univ. of California,
Los Angeles
Michiel van der Klis
Astronomical Inst. of
Amsterdam
Derek van der Kooy
Univ. of Toronto
Bert Vogelstein
Johns Hopkins
Arthur Weiss
Univ. of California,
San Francisco
R. Sanders Williams
Duke University
Ian A. Wilson
The Scripps Res. Inst.
Richard A. Young
The Whitehead Inst.
Martin Zatz
NIMH, NIH
Walter Ziegängsberger
Max Planck Institute
of Psychiatry, Munich
Maria Zuber
Massachusetts Inst.
of Technology

SENIOR EDITORIAL BOARD

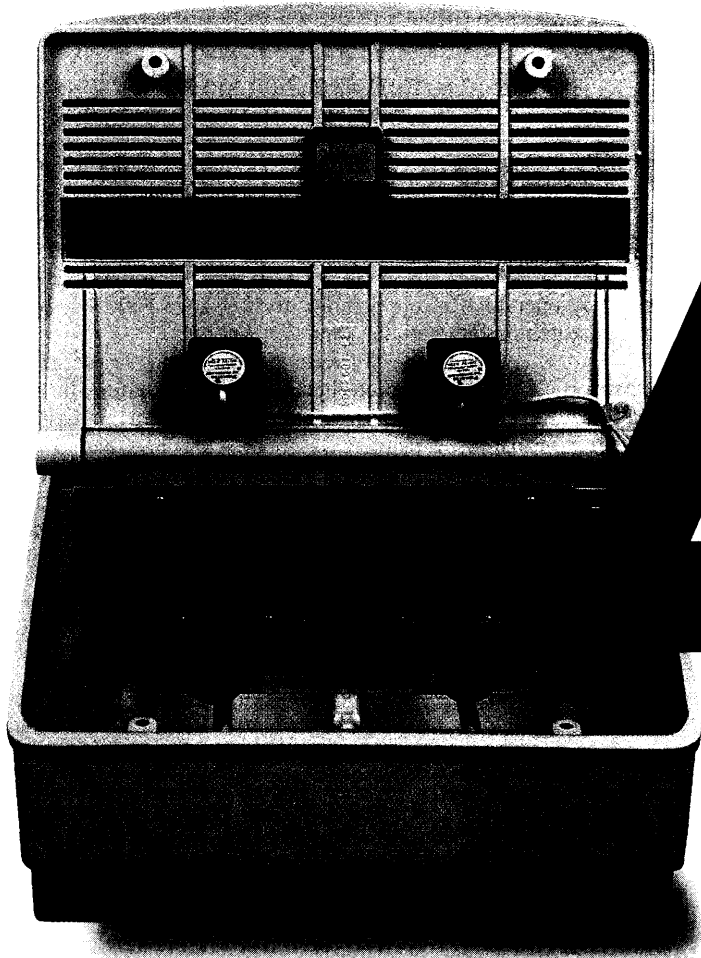
John I. Brauman, Chair, Stanford Univ.
Philip H. Abelson, AAAS
Joseph L. Goldstein, Univ. of Texas Southwestern Med. Ctr.
Richard Losick, Harvard Univ.
Robert May, Univ. of Oxford
Marcia McNutt, Monterey Bay Aquarium Research Inst.
Vera C. Rubin, Carnegie Institution of Washington
Christopher R. Somerville, Carnegie Institution of
Washington, Stanford
Yoshinori Tokura, Univ. of Tokyo
Gerhard Wegner, Max Planck Inst. of Polymer Research, Mainz

BOOK REVIEW BOARD

David Bloom, Harvard Univ.
Michael S. Gazzaniga, Dartmouth College
Richard Shweder, Univ. of Chicago
Robert Solow, Massachusetts Inst. of Technology
David Voss, Science
Ed Wasserman, DuPont
Lewis Wolpert, Univ. College, London

Open Your Eyes to the All New Mini-Prep

Now you can purify 48 samples in just over one hour



48

FOR AUTOMATED PLASMID DNA MINI-PREPS

The Mini-Prep 48 uses a revolutionary method of plasmid purification based on agarose gel electrophoresis and electroelution—all done automatically!

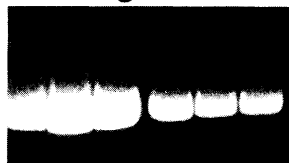
HIGH PURITY - FOR ALL YOUR FLUORESCENT AND MANUAL DNA SEQUENCING

SIMPLE OPERATION - BEGIN BY DIRECT LOADING OF CULTURE IN PRE-CAST SAMPLE CASSETTES

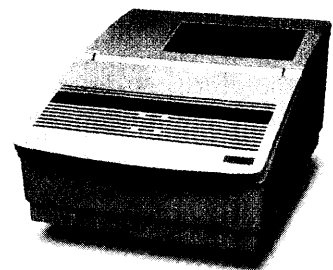
COST EFFECTIVE - LIST PRICE UNDER \$10,000

Call now to open the door to a great time-saving instrument for your lab!

1-800-466-7949



*You say 48 Yield is just too much for you?
Well, our famous Mini-Prep 24 is still available.*



MacConnell
RESEARCH

6195 CORNERSTONE COURT • SAN DIEGO, CA 92121

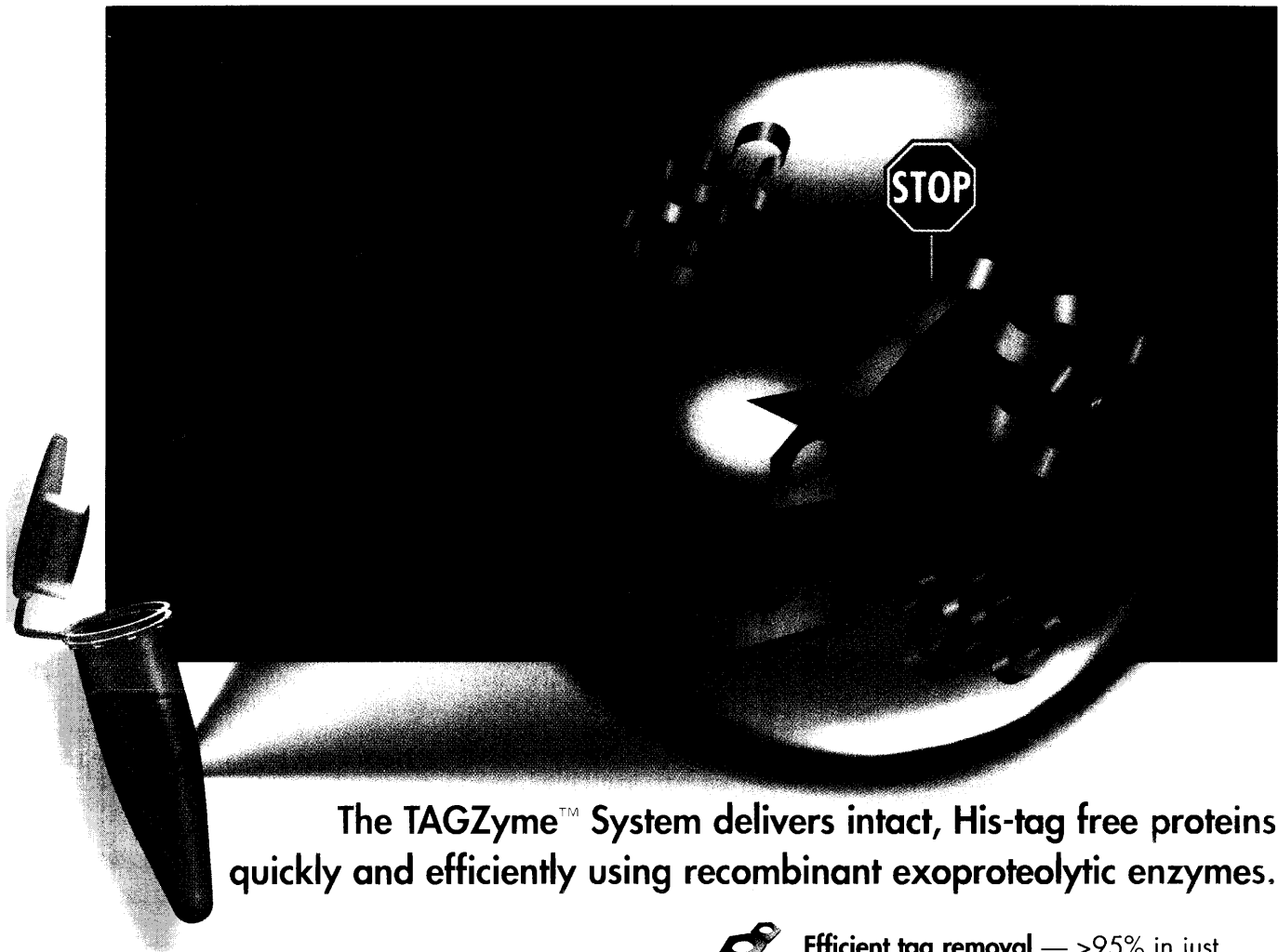
PHONE: (858) 452-2603

FAX (858) 452-6753

WWW.MACCONNELL.COM

Circle No. 12 on Readers' Service Card

Cleave Your His Tag, Not Your Protein



The TAGZyme™ System delivers intact, His-tag free proteins quickly and efficiently using recombinant exoproteolytic enzymes.

The TAGZyme System offers:



High specificity — exoproteolytic digest means that no nonspecific cleavage can take place within the body of the protein



A complete solution for His-tag removal — optimized vectors, enzymes, and Ni-NTA resin



Efficient tag removal — >95% in just 30 minutes at 37°C



High-purity end products — TAGZyme enzymes, residual uncleaved protein, and tag fragments are completely removed by subtractive Ni-NTA chromatography



Recombinant enzymes available in GMP-grade quality — important for the manufacture of therapeutics

QIAexpress® — Over a decade of experience in 6xHis-tagged protein expression, purification, detection, and assay.

For more information on the TAGZyme System visit us at www.qiagen.com or contact QIAGEN Technical Services or your local distributor.

Trademarks: QIAGEN®, QIAexpress®, Ni-NTA. TAGZyme is a trademark of UNIZYME. © 2001 QIAGEN, all rights reserved.

www.qiagen.com

Circle No. 84 on Readers' Service Card

QIAGEN:

Australia

Tel. 03-9489-3666
Fax 03-9489-3888

Germany

Tel. 02103-29-12400
Fax 02103-29-22022

Switzerland

Tel. 061-319-30-31
Fax 061-319-30-33

Canada

Tel. 800-572-9613
Fax 800-713-5951

Italy

Tel. 02-33430411
Fax 02-33430426

UK

Tel. 01293-422-999
Fax 01293-422-922

France

Tel. 01-60-920-930
Fax 01-60-920-925

Japan

Tel. 03-5547-0811
Fax 03-5547-0818

USA

Tel. 800-426-8157
Fax 800-718-2056

Distributors:

Argentina Tecnolab S.A. (011) 4555 0010 Austria/Hungary/Slovenia R. u. P. MARGARITELLA Austria (01) 889 18 19 Belgium/Luxembourg Westburg b.v. 0800-1-9815 Brazil Uniscience da Brasil (011) 3622 2320 China Gene Company Limited (852) 2896-6283 Cyprus Scientratics Ltd (02) 765 416 Czech Republic BIOCONSULT spol. s.r.o. (02) 4447 1239 Denmark Merck EuroLab A/S 43 86 87 88 Egypt Clinilab 525 7212 Finland Merck EuroLab Oy (09) 804 551 Greece BioAnalytica S.A. (01)-640 03 18 India Genetix (011)-542 1714 or (011)-515 9346 Israel Westburg (Israel) Ltd. 08 66 50 813 or 1-800 20 22 20 Korea ILS Laboratories, Inc. (02) 924-86 97 Malaysia Research Biolabs Sdn. Bhd. (03)-7312099 Mexico Quimica Valaner S.A. de C.V. (5) 525 57 25 The Netherlands Westburg b.v. (033)-4950094 New Zealand Biolab Scientific Ltd. (09) 980 6700 or 0800 933 966 Norway Merck EuroLab AS 22 90 00 00 Poland Syngen Biotech Sp. z o.o. (071) 351 41 06 or 0601 70 60 07 Portugal IZASA PORTUGAL LDA (1)-424 73 64 Singapore Research Biolabs Pte Ltd 2731066 Slovak Republic BIOCONSULT Slovakia spol. s.r.o. (07) 50221 336 South Africa Southern Cross Biotechnology (Pty) Ltd (021) 671 5166 Spain IZASA, S.A. (93) 902 20 30 90 Sweden Merck EuroLab AB (08) 621 34 00 Taiwan TAIGEN Bioscience Corporation (02) 2880 2913 Thailand Theera Trading Co. Ltd. (02) 412-5672 In other countries contact: QIAGEN, Germany



QIAPAG020013SWW

We've packaged experience.

GIBCO

- The most approved supplier to the biotechnology industry
- Broad range of standard and custom formulations and packaging
- Continual development of innovative products and services

GIBCO™ Cell Culture:
the standard for over 40 years.

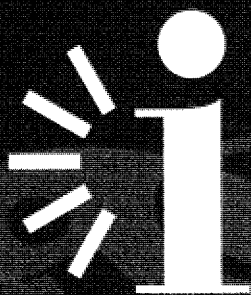
www.invitrogen.com

GIBCO Cell Culture

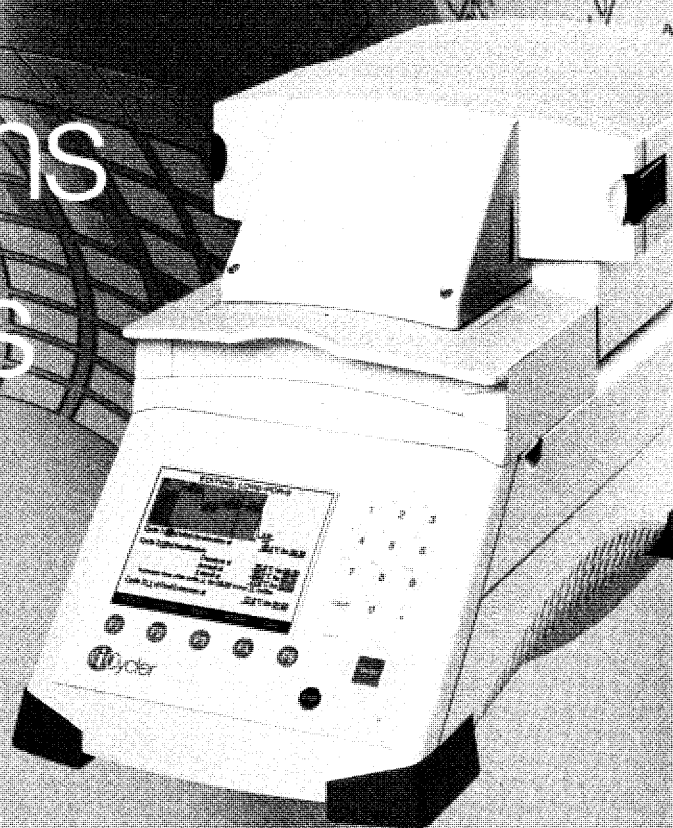
Invitrogen Corporation

These products are for laboratory research use only and are not intended for human or animal diagnostic, therapeutic, or clinical uses, unless otherwise stated. © 2001 Invitrogen Corporation 01-016MS

Circle No. 6 on Readers' Service Card

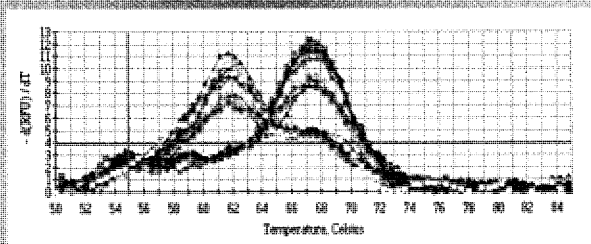


can offer
real solutions
 from the
real experts
 for
real results
 in
real time

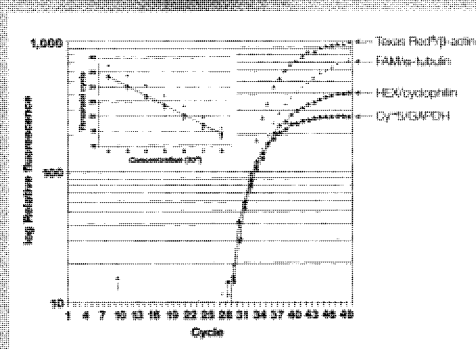


The iCycler Q4 Can Do It All!

- 4-color multiplexing
- Melt-curve function with integrated analysis
- Open platform system, supports all real-time chemistries
- Enhanced report templates
- On-site, personalized customer support



SNP detection using melt-curve feature.



4-color multiplex reaction demonstrated over 6 orders of dynamic range.

What Will You Discover Next?

Visit us on the Web at www.bio-rad.com/iCycler. Call toll free at 1-800-4BIORAD (1-800-424-6723); outside the US, call your local Bio-Rad sales office.

Circle No. 7 on Readers' Service Card

BIO-RAD

instant gratification.



INTRODUCING THE

QuickLigation™ Kit

FROM NEW ENGLAND BIOLABS

Advantages

- **Fast** — 5 minutes for cohesive or blunt ends
- **Convenient** — ligation performed at room temperature
- **Flexible** — suitable for all common ligation reactions

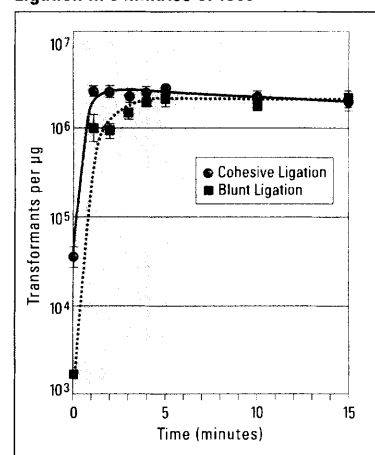
NEB Quick Ligation Kit

#M2200S 30 reactions
#M2200L 150 reactions

Includes: Quick T4 DNA Ligase,
2X Quick Ligation Buffer, Protocols

► Using the Quick Ligation Kit protocol, blunt and cohesive inserts were ligated into LITMUS 28 vector cut with either EcoR V (blunt) or Hind III (cohesive). Ligation products were transformed into chemically competent *E. coli* DH-5α cells.

Ligation in 5 minutes or less



PRODUCTS YOU TRUST.
TECHNICAL INFORMATION YOU NEED.

www.neb.com

- **New England Biolabs Inc.** 32 Tozer Road, Beverly, MA 01915 USA 1-800-NEB-LABS Tel. (978) 927-5054 Fax (978) 921-1350 email: info@neb.com
- **New England Biolabs Ltd., Canada** Tel. (800) 387-1095 (905) 672-3370 Fax (905) 672-3414 email: info@ca.neb.com
- **New England Biolabs GmbH, Germany** Tel. 0800/BIOLABS (0)69/305-23-140 Fax 0800/BIOLABX (0)69/305-23-149 email: info@de.neb.com
- **New England Biolabs (UK) Ltd.** Tel. (0800) 31 84 86 (01462) 420616 Fax (01462) 421057 email: info@uk.neb.com

DISTRIBUTORS: Argentina (11) 4816-0820; Australia (07) 5594-0299; Belgium (0800) 1 9815; Brazil (011) 3666-3565; China 21-6495-1899; Czech Rep. 0800 124683; Denmark (39) 56 20 00; Finland (9) 584 121; France (1) 34 60 24 24; Greece (01) 5226547; Hong Kong 2649-9988; Israel (3) 9021330; Italy (02) 381951; Japan (03) 5820-9408; Korea (02) 556 0311; Netherlands (033) 495 00 94; New Zealand 0800 807809; Norway 23 17 60 00; Singapore 4457927; Spain (93) 401.02.10; Sweden (08) 30 60 10; Switzerland (061) 486 80 80; Taiwan (02) 28802913; Venezuela (2) 265-3386

NEW ENGLAND
BioLabs®
Inc.
where science is the priority

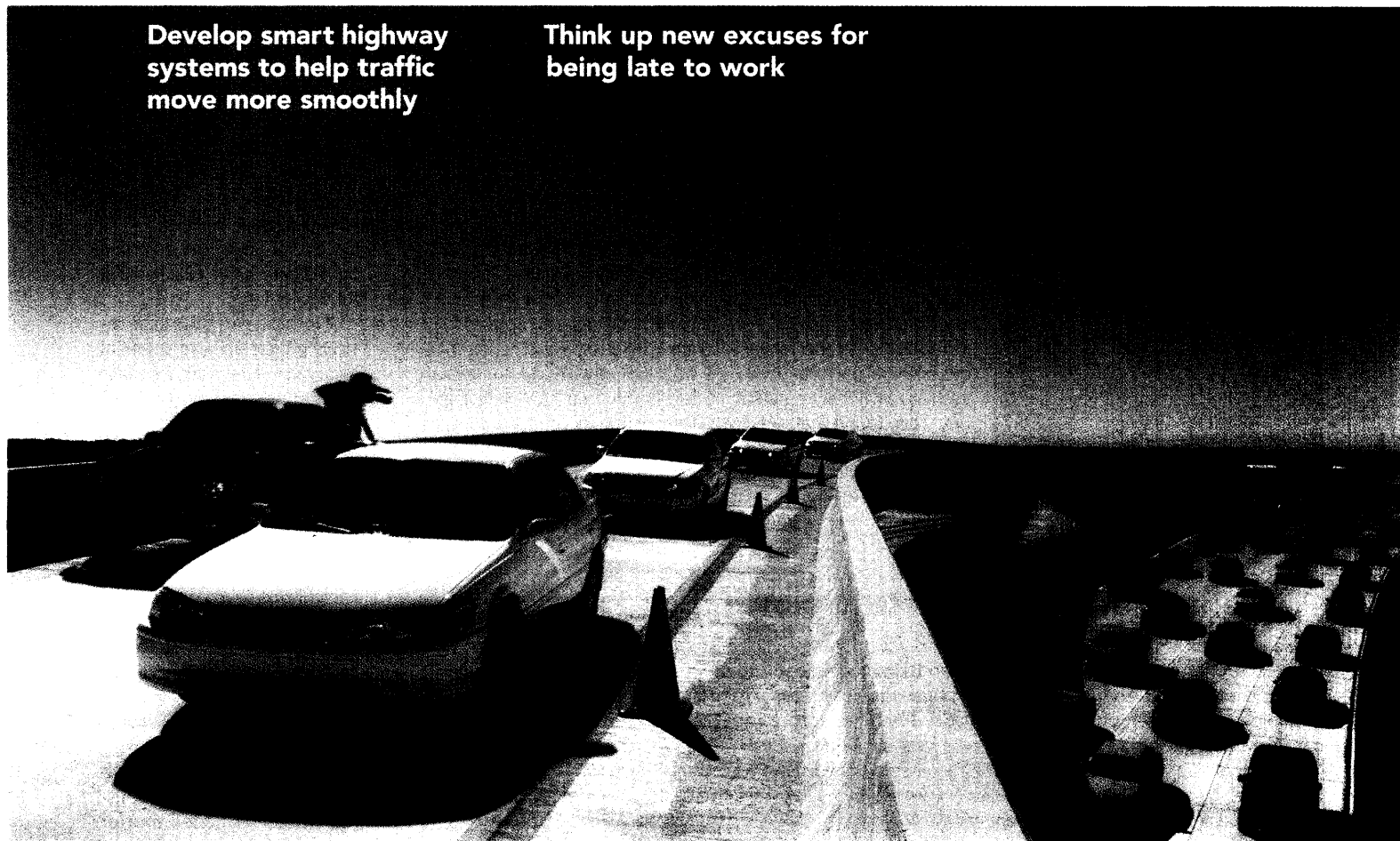
TODAY

Develop smart highway systems to help traffic move more smoothly

TOMORROW

Think up new excuses for being late to work

TOYOTA



"The dog ate my alarm clock."

"My long-lost uncle dropped in for tea."

"A squirrel short-circuited the garage door."

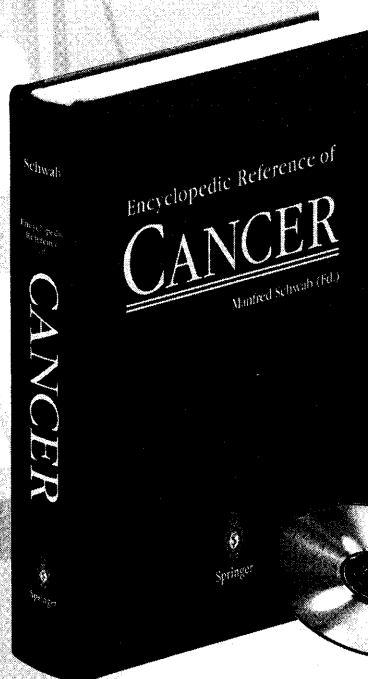
There will always be plenty of excuses for not getting to work on time. But in the future, traffic may not be one of them.

In San Diego, Toyota has tested a highway system that helps vehicles automatically maintain a safe distance from each other, regulating traffic flow. And our engineers are also developing on-board computers that monitor traffic congestion, suggest quicker alternative routes — even locate vacant parking spaces.

But that's just the beginning. We won't stop until bumper-to-bumper crawls are a thing of the past. And to those who say that's not possible, we have just one thing to say. Excuses, excuses, excuses.

www.toyota.com/tomorrow

Bridging the gap *between* cancer research *and* oncology



<http://www.springer.de/cancer>

M. Schwab (Ed.)

Encyclopedic Reference of Cancer

Key Features:

- Over 1400 pages, with more than 250 figures and 50 tables
- Almost 2000 entries, both keywords (such as definitions of acronyms or related terms), and detailed essays that review major topics
- Definitions cover the entire spectrum of cancer - for the researcher and the clinician

I. Essay length entries

Each of the 230 essay length entries falls into one of four types:

- ▶ Syndromes / diseases / cancer types
- ▶ Genes / molecules
- ▶ Biological & molecular processes
- ▶ Methods

Each essay length entry has a standardized structure, and is organized in sections that are easy to access.

II. Keyword entries

The keyword entries define acronyms (such as DLBCL, GEF, MEN2, SARA) or provide short definitions of related terminology (such as gammopathy, klatskin tumor, target validation).

The keyword entries are fully cross referenced with the essay length entries, making it easy to look up definitions or terms as necessary.

2001. Approx. 1400 pp. 250 figs., with CD-ROM. Hardcover DM 398; £ 147; FF 1604; Lit. 470,340; sFr 343; as of Jan. 2002: € 199
ISBN 3-540-66527-7

Pre-publication price valid until August 31, 2001:

DM 336; £ 124; FF 1355; Lit. 397,070; sFr 289

Please order from
Springer · Customer Service
Haberstr. 7
69126 Heidelberg, Germany
Tel: +49 (0) 6221 - 345 - 217/8
Fax: +49 (0) 6221 - 345 - 229
e-mail: orders@springer.de
or through your bookseller

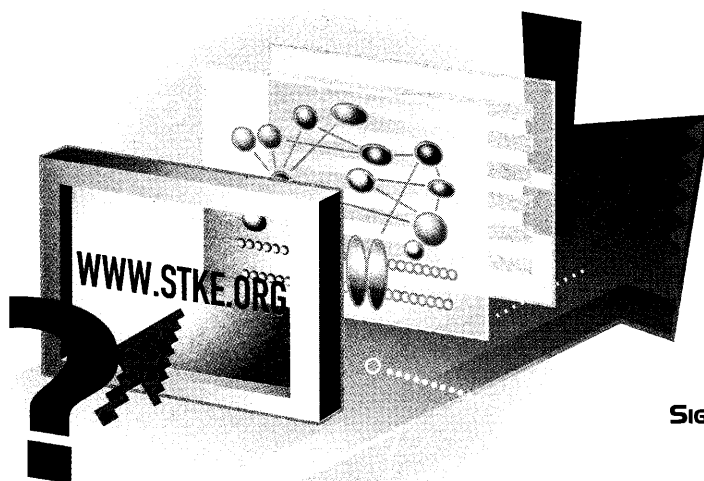
All prices are net-prices subject to local VAT, e.g. in Germany 7% VAT for books and 16% VAT for electronic products. Exception: prices quoted in FF and Lit. include local VAT. Prices and other details are subject to change without notice.
d&p · 007652/SF



Springer

Circle No. 9 on Readers' Service Card

STKE PUTS YOU ON THE RIGHT PATH



With standard features like Connections Maps, Protocols, Reviews, and Perspectives, plus an extended list of helpful e-tools like *personalization options* and *interactive letters*, *Science's Signal Transduction Knowledge Environment* puts you on the right path for all the latest signal transduction knowledge.

Updated weekly, *Science's STKE* provides the perfect combination of quick summaries and full text access to research papers from over 40 respected scientific journals.

For more information, or to subscribe, visit www.stke.org and click *subscription information*, or contact AAAS at (202) 326-6417 or membership2@aaaas.org.

Sciences
stke
You're on the right path™

SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT
a product of *Science* and Stanford University Libraries

www.stke.org



Learn from the EXPERTS THEMSELVES

In The AAAS Virtual Meetings Library

Now you can view lectures of the AAAS 2001 Annual Meeting and Science Innovation Exposition from the most respected authors and speakers in the science community. Human genomics, proteomics, signal transduction, gene sequencing, astronomy, and more. Logon as much as you want, when you want, from wherever you want. It's like you were actually there!

Visit www.aaasmember.org to access our Virtual Meetings Library.

**Free to AAAS members
through August 15th!**



AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

eLecture™

Email Author Take Notes Chat

It was "Wanderings of a Biochemist". In this he described how he wandered from one area to another based on the results that he obtained before.

Sequencing the Human Genome

Science

THE HUMAN GENOME

CELERA

This presentation, with the exception of previously copyrighted material, is the intellectual property of the presenter. It may not be copied, printed, transmitted, or published unless explicit permission is obtained in writing from the responsible party.

powered by

Genomes at TIGR and CELERA Microbial Genomes and Sequences at TIGR

DIGIScript

Functional information from interaction analysis

Chip-based SPR

SIGNAL TRANSDUCTION

DNA RESEARCH & REPAIR

CELL CYCLE CONTROL

APOPTOSIS

ANGIOGENESIS

CANCER RESEARCH

www.biacore.com/cancer

Biacore – at the heart of Cancer Research

Many processes in the development of cancer involve atypical biomolecular interactions. Studying these can be difficult and time-consuming.

Specifically designed to study the speed, strength, specificity and degree of binding in real time, Biacore's Surface Plasmon Resonance (SPR) technology reveals the secrets of these interactions... rapidly.

Life science research, without labels, even with crude samples. Biacore - for fast, accurate results.



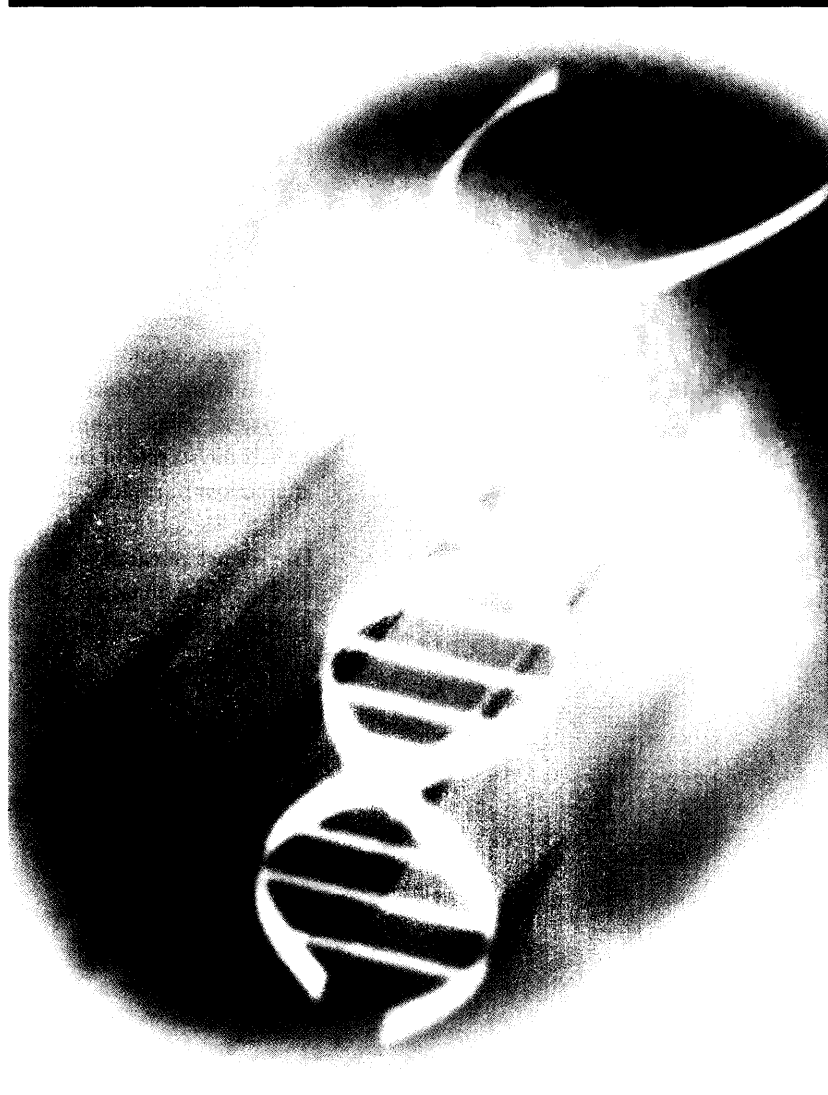
BIACORE



Circle No. 3 on Readers' Service Card

Unwind...

...we have the thermal solution



Varian's DNA denaturation systems have always provided unmatched temperature control, to ensure the highest data quality. Now the superior performance common to our UV systems is also available for fluorescence applications.

With Varian's Cary spectrophotometers you can measure the temperature of the sample within the cuvette, so the accuracy of your data is always assured. This is combined with dedicated thermal software that provides a range of calculations including thermodynamic parameters such as ΔH , ΔG and ΔS .

When you're serious about thermal denaturation, only Varian has the total thermal solution.

To find out more about this life science solution from Varian, contact us today and ask for our Thermal application notes.

Another BioSolution...from Varian, Inc.

US 1.800.926.3000
Canada 1.800.387.2216

www.varianinc.com



VARIAN

Circle No. 87 on Readers' Service Card

NEW PRODUCTS

GeneDoc created by Karl Nicholas

Free of charge
www.psc.edu/biomed/
genedoc/

ALIGNMENT FORMATTER

The alignment of protein or DNA sequences is a fundamental technique in bioinformatics. It identifies conserved sequence regions and is an important step in molecular phylogenetics and in building sequence family profiles.

GeneDoc is a tool for formatting information in the alignments. About the only thing that GeneDoc cannot do is perform the multiple alignment itself. The program imports alignments in popular formats, including ClustalW, PileUp, and FASTA. Once an alignment has been changed in GeneDoc, it can be saved in alignment files or in an image, rich text file, or HTML format.

Visually, raw multiple alignment output is difficult to interpret. Shading can help the user identify which regions of an alignment share similar properties, and GeneDoc's rich palette allows the user to shade manually or by degree of conservation in a column (including generation of consensus residues), by physicochemical properties of amino acids, or by user-defined properties. Additional shading options are available for protein secondary structure (from a Protein Data Base or DSSP file) and motifs (from ReBase, ProSite, and MEME output files).

Automatic (computer-generated) multiple alignments can often be improved with judicious editing by an expert. GeneDoc lets the user "rearrange" such alignments by sliding letters like "beads on a string," maintaining the correct shading automatically. Other editing functions allow the insertion and removal of gaps, deletion of columns, the changing of letters, and deletion and addition of sequences. The program provides scoring calculations that measure the quality of alignments. After making changes, a range of columns can be selected, and one of four scoring methods can be used to produce a score for that range, allowing for an iterative approach to improving alignments.

GeneDoc's Alignment display is the program's basic display and shows the sequence letters and shading. The Summary display compresses the alignment horizontally (to fit more on the screen or page). The Tree display shows the information on an imported phylogenetic tree, or allows the users to create one. Other displays show reports and plots based on statistical and compositional analyses of the sequences.

GeneDoc's other features include special DNA functions, configurable project settings, and even the generation of RasMol scripts so that the alignment shading can be displayed in a three-dimensional image of a molecule.

Despite the many features of GeneDoc, the easy interface and extensive Help and Tutorial sections allow a new user to become productive in a short while. All in all, GeneDoc is a robust and versatile toolbox for multiple alignments. The program runs on the Windows operating system and is supplied by the author, free of charge.

—John B. Spalding

National Biotechnology Information Facility, New Mexico State University, Las Cruces, NM 88003-8002, USA. E-mail spalding@psl.nmsu.edu

Thermo Hybaid

For more information call
888-4-HYBAID or
circle 139
on the Reader Service Card
www.hybaid.com

SNP SCORING SYSTEM

The McSNP (Melting Curve Analysis of Single Nucleotide Polymorphisms) is an SNP scoring system. Developed to run alongside the manufacturer's established DASH (Dynamic Allele Specific

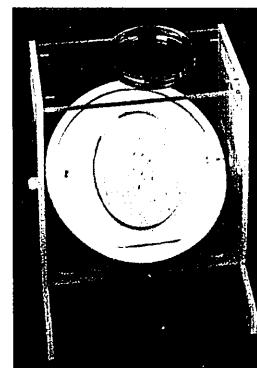
Hybridization) system and using the same instrumentation, the McSNP package combines the classic polymerase chain reaction (PCR)-restriction fragment length polymorphism (RFLP) approach with fluorescence-based, automatic, real-time SNP scoring. The package offers users sensitive SNP scoring, auto-scoring of both homozygotes and heterozygotes, simple assay optimization, automation of PCR-RFLP analysis, the capability of running up to 20,000 SNPs per week, and reproducibility.

Bel-Art Products

For more information call
800-4BEL-ART or
circle 140
on the Reader Service Card
www.bel-art.com

PLATE BOTTOM EXAMINATION

The Scienceware Plate Reader allows the safe examination of the bottom of microtiter plates and petri dishes without the potential problems of lifting the plate over the observer's head. This safe approach eliminates the risk of spills on the face and eyes of an observer. The Plate Reader consists of a clear deck for holding the plate and a large, clear, adjustable 3X mirror for viewing the reflection of the underside of the plate. This reader is particularly suited to hemagglutination, hemagglutination inhibition, hemolysis, and agglutination testing and counting of bacterial cell cultures for colony or plaque growth.



MacConnell Research

For more information call
800-466-7949 or
circle 141
on the Reader Service Card
www.macconnell.com

AUTOMATED PLASMID DNA PURIFICATION INSTRUMENT

The Mini-Prep 48 instrument is fully automatic, easy to operate, and consistently produces up to 48 samples of high-purity plasmid DNA in just over 1 hour. The plasmid DNA isolated by the Mini-Prep can be used for automated fluorescent or manual DNA sequencing. There is no centrifugation step, and the DNA cuts to completion with restriction enzymes. The size range can be from 2 kb to 15 kb on standard programs. Liquid bacteria culture can be loaded directly into the precast sample cassettes, which fit into an internal electrophoresis rig in the instrument. The cassette lanes are designed with microtiter plate spacing.

Numerical Algorithms Group

For more information call
630-971-2337 or
circle 142
on the Reader Service Card
www.nag.com

VISUALIZATION SOFTWARE

IRIS Explorer 5.0 is a new version of an advanced visualization system used by scientists and engineers to create two-dimensional and three-dimensional visualizations in fluid dynamics, molecular modeling, finite-element analysis, high-energy physics, chemistry, medicine, earth sciences, and other applications. The new version is a powerful tool for developing customized visualization applications without extensive programming. The new version includes several new features: Animated output from a series of visualization scenes can be exported in MPEG form for distribution. New visualizations can be created with the ability to output data to common ray-tracing

CONTINUED ON PAGE 716

software. New data reader modules can create templates for data, making data input easier. Visualization applications can now be distributed to user in a compact form, reducing system requirements.

MWG-Biotech

For more information call
+49 8092 8289 929 or
circle 143
on the Reader Service Card
www.mwg-biotech.com

SPOTTED OLIGONUCLEOTIDE YEAST ARRAY

A complete spotted high-density DNA yeast microarray on oligonucleotide basis with all the genes of the yeast genome is available. Yeast is an important organism for genetic research. It

can be used as a model organism for basic research to understand gene function and regulation, which helps identify disease genes, drug targets, or relevant gene products of biotechnological importance in other organisms as well. The manufacturer's automated and standardized microarray production process ensures high accuracy and reproducibility. Each slide is batch-to-batch checked to ensure consistency of quality.

Pierce

For more information call
800-874-3723 or
circle 144
on the Reader Service Card
www.piercenet.com

FUSION PROTEIN PURIFICATION

SwellGel Immobilized Glutathione Discs bridge the gap between coated microplates and larger column purification. When used for performing high-throughput glutathione S-transferase (GST) fusion protein, the SwellGel

Discs bind up to 1 mg per well. They are easy to use—simply add buffer solution to the dried media and it is ready to purify; the process of dispensing media into 96-well plates is not necessary. The disc will rehydrate to an immobilized glutathione agarose gel in less than 3 min after the addition of the buffer.

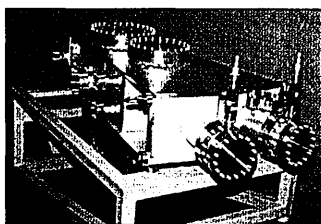
McPherson

For more information call
978-256-4512 or
circle 145
on the Reader Service Card
www.mcphersoninc.com

NORMAL INCIDENCE MONOCHROMATOR

The auto-focusing Normal Incidence Monochromator provides excellent spectral resolution and imaging properties in the extreme and vacuum ultraviolet. This 1-meter focal length spectro-

meter is optimized for work from 30 nm to the visible spectrum with selected gratings. The efficient and, for the most part, astigmatic optical design makes use of a concave diffraction grating. Excellent imaging is attained by using a small diffracted angle. The instrument is suitable for use with charge-coupled or micro-channel plate focal plane array detectors. The auto-focusing wavelength drive provides high resolution over the complete range of operation. It is available in focal lengths up to 6.65 meters.



InnoGenex

For more information call
925-543-1400 or
circle 146
on the Reader Service Card
www.innogenex.com

GENE EXPRESSION PROFILING

GeneXPRO contract services provide gene expression profiling, target localization, and validation by performing assays to analyze cellular and tissue level expression. The services include design, synthesis, and labeling of the probes;

correlation of gene expression profiles with normal and pathogenic conditions on the cells, tissues, and tissue arrays; and determination of changes in gene expression in response to candi-

date drugs. Assays include in situ hybridization to determine gene expression and to study the level of expression in different cells and tissues at different developmental stages. The translation of these transcripts into specific proteins can be localized and analyzed by the company's immunohistochemistry services. Services also include screening mouse monoclonal antibodies on mouse tissues, immunohistochemistry and in situ hybridization on human and rodent tissues, single and multiplex staining procedures, microwave target retrieval, and special tissue pretreatments.

Cambio

For more information call
+44 (0)1223 366500 or
circle 147
on the Reader Service Card
www.cambio.co.uk

CHROMOSOME PROBES

Two Rainbow*FISH kits are available for the visualization of either mouse or human chromosomes. Quick and reliable results are obtained following a simple protocol using these paints. The human probes visualize six chromosomes per

set and the mouse probes seven chromosomes per set. Therefore, in three or four experiments the entire mouse or human genomes can be tested. The kits are easy to use, and the probes make use of biotin, fluorescein, and Cy3.

BioVision

For more information call
800-891-9699 or
circle 148
on the Reader Service Card
www.biovisionlabs.com

CELL VIABILITY ASSAY

ApoSENSOR is a fast and sensitive cell viability assay capable of differentiating among apoptosis, necrosis, and cell proliferation in mammalian cells. The assay makes use of bioluminescent detection of the ATP and ADP levels via luciferase-

catalyzed reaction. The assay can be performed directly in culture plates, requiring no harvest, no washing, and no sample preparation. Results can be obtained in 20 min. The assay can be fully automatic for high throughput and is sensitive, detecting 10 to 100 cells per assay.

GeneMachines

For more information call
650-508-1634 or
circle 149
on the Reader Service Card
www.genemachines.com

OMNIGRID ACCENT

The OmniGrid Accent is a high-performance, high-speed benchtop microarrayer that prints with precision from three plates onto 50 slides and supports a print head with up to 48 pins. The user-friendly software interface gives users maximum control over the printing process, including array design, pin configuration, cleaning protocols, and sample sequences.

Millipore

For more information call
800-MILLIPORE or
circle 150
on the Reader Service Card
www.millipore.com

LITERATURE

Protein Purification, Concentration, and Analysis for Protein Chemists is a 12-page brochure that provides application-focused product information for research scientists in proteomics. These products allow scientists to purify their proteins of

interest with minimal sample loss. The brochure outlines purification and analysis solutions in proteins research from preparative purification to detailed protein analysis via mass spectrometry, sequencing, nuclear magnetic resonances, and more.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS of any products or materials mentioned is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Reader Service Card and placing it in a mailbox. U.S. postage is free.