

Science

25 May 2001

Vol. 292 No. 5521
Pages 1437–1596 \$9



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

NEW
ENGLAND
BIOLABS

MAPPING THE HUMAN GENOME

ADVANCED BY A DIVERSE RANGE OF

8-BASE CUTTERS

FROM NEW ENGLAND BIOLABS

ENZYME	SEQUENCE	%GC	CAT. #
 AacI	GG/CGCGCC	100%	R0558
 FseI	GGCCGG/CC	100%	R0588
 NotI	GC/GGCCGC	100%	R0189
 SgrAI	CPu/CCGGPyG	100-75%	R0603
 SfiI	GGCCN4/NGGCC	100-60%	R0123
SbfI	CCTGCA/GG	75%	V0101
 PmeI	GTTT/AAAC	25%	R0560
 PacI	TTAAT/TAA	0%	R0547
 SwaI	ATTT/AAAT	0%	R0604

 Recombinant

New England Biolabs provides researchers with the largest selection of recognition sequences for genome mapping projects. Our recombinant 8-base cutters offer exceptional purity, less lot-to-lot variation and unmatched value.

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; India (542) 366473; Israel (08) 9366066; Italy (02) 381951; Japan (03) 5820-9408; Korea (02) 556-0311; Mexico (5) 678 1931; Netherlands (033) 495 00 94; New Zealand 0800 807809; Norway 23 17 60 00; Singapore 4457927; Spain (93) 401.01.73; Sweden (08) 30 60 10; Switzerland (061) 486 80 80; Taiwan (02) 28802913; Venezuela (2) 265-3386

Circle No. 28 on Readers' Service Card

 NEW ENGLAND
BioLabs[®] Inc.
where science is the priority

HTS Platform

Introducing Fluo-peptides™ in
Fluorescence Polarization:

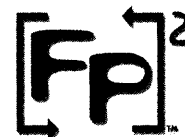
MAKE [FP]²
PART OF YOUR
HTS EQUATION

Products You Trust

A New Family of Homogeneous Fluorescence
Polarization GPCR Binding Assays

Now there is a simple, nonradioactive technique for GPCR binding that is robust, fast, and easy to use. Proven for 96- and 384-well formats, and extendable to 1536-well, PerkinElmer Life Sciences' new NEN® [FP]² family of fluorescence polarization assays uses a homogeneous "mix and measure" protocol.

[FP]² products incorporate patented Fluo-peptide technology, and superior red-shifted BODIPY® dyes to provide automation friendly results that can be read in a matter of minutes. Validated assay kit and protocols are available for a selection of GPCR targets, along with expert assistance and extensive custom services. Call today, or visit www.perkinelmer.com/fp2 for complete information. [FP]² assays for HTS... exponentially better.



Worldwide Headquarters: PerkinElmer Life Sciences, 549 Albany Street, Boston, MA 02118-2512 USA (800) 551-2121

European Headquarters: PerkinElmer Life Sciences, Imperiastraat 8, B-1930 Zaventem Belgium +32 2 717 7911

Technical Support: in Europe: techsupport.europe@perkinelmer.com

in US and Rest of World: techsupport@perkinelmer.com

Fluo-peptides and [FP]² are trademarks, and NEN is a registered trademark of PerkinElmer Life Sciences, Inc. BODIPY is a registered trademark of Molecular Probes, Inc.

© 2000 PerkinElmer Life Sciences, Inc.

www.perkinelmer.com/lifesciences

Circle No. 19 on Readers' Service Card

Science

Volume 292 25 May 2001

Number 5521

1443 **SCIENCE ONLINE**
1445 **THIS WEEK IN SCIENCE**
1449 **EDITORIAL**
Steven J. Brams and
Dudley R. Herschbach
The Science of Elections

1451 **EDITORS' CHOICE**
1455 **NETWATCH**
1458 **CONTACT SCIENCE**
1559 **NEW PRODUCTS**
1563 **AAAS NEWS & NOTES**



1472

The personal side
of Big Science

NEWS

NEWS OF THE WEEK

- 1462 **U.S. ENERGY POLICY:** Administration's Energy Plan Is Short on Scientific Details
- 1463 **EMBRYONIC STEM CELLS:** Court Asked to Declare NIH Guidelines Legal
- 1463 **U.S. SCIENCE EDUCATION:** Lawmakers Vie to Shape NSF Program
- 1465 **EUROPEAN HIGHER EDUCATION:** Thirty Nations Pledge to Harmonize Degrees
- 1465 **SCIENCE SCOPE**
- 1466 **HUMAN EXPERIMENTATION:** Bioethics Panel Urges Broader Oversight
- ▼1467 **CELL BIOLOGY:** Protein Clumps Hijack Cell's Clearance System
1552
- ▼1468 **NEUROBIOLOGY:** New Clue to the Cause of Alzheimer's
1550
- 1468 **SOLID STATE PHYSICS:** Rubbery Liquid Crystal Gives Lasers a Stretch

- 1469 **GENE SILENCING:** A Faster Way to Shut Down Genes
- 1471 **QUANTUM PHYSICS:** Microscale Weirdness Expands Its Turf

NEWS FOCUS

- 1472 **ASTRONOMY:** 'Invisible' Astronomers Give Their All to the Sloan
Funding the Sloan
- 1477 **ACADEMIC COLLECTIONS:** Japan Shakes the Dust off Treasure Trove of Specimens
- 1478 **EGYPTIAN SCIENCE:** A Biotech Gambit in the Desert
- 1479 **GEOLOGY:** Thermal Features Bubble in Yellowstone Lake
- 1481 **EVOLUTION:** Putting Limits on the Diversity of Life
- 1483 **RANDOM SAMPLES**

SCIENCE'S COMPASS

1485 LETTERS

Hypoxia, Fertilizer, and the Gulf of Mexico C. S. Snyder; R. W. Howarth; D. Winstanley. **Response** D. Ferber. **A Global Strategy to Defeat Invasive Species** J. K. Waage and J. K. Reaser. **The Identity of Plant Glutamate Receptors** B. Lacombe, D. Becker, R. Hedrich, R. DeSalle, M. Hollmann, J. M. Kwak, J. I. Schroeder, N. Le Novère, H. G. Nam, E. P. Spalding, M. Tester, F. J. Turano, J. Chiu, G. Coruzzi. **Corrections and Clarifications**

POLICY FORUM

- 1489 **EDUCATION:** Workforce Alternatives to Graduate Students? S. A. Gerbi, H. H. Garrison, J. P. Perkins

BOOKS ET AL.

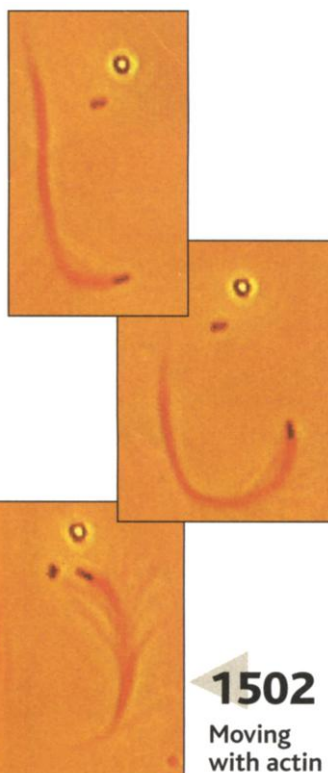
- 1491 **GENOMICS:** *Transducing the Genome Information, Anarchy, and Revolution in the Biomedical Sciences* G. Zweiger, reviewed by M. A. Goldman
- 1492 **ECOLOGY:** *Corals of the World* J. E. N. Veron, reviewed by S. D. Cairns

PERSPECTIVES

- ▼1493 **ECOLOGY:** Coral Reef Biodiversity—Habitat Size Matters N. Knowlton
1532
- ▼1495 **GEOPHYSICS:** Silent Slip on the Cascadia Subduction Interface W. Thatcher
1525
- ▼1496 **PALEONTOLOGY:** Digging Up Fresh Clues About the Origin of Mammals A. Wyss
1535
- ▼1498 **PHYSICS:** Quasi-Particles Survive—for Now B. Keimer
1509
- ▼1499 **POPULATION ECOLOGY:** Not All Sheep Are Equal J.-M. Gaillard, M. Festa-Bianchet, N. G. Yoccoz
1528
- 1500 **ASTROPHYSICS:** Mass Outflow in Active Galactic Nuclei D. M. Crenshaw

REVIEW

- 1502 **CELL BIOLOGY:** Mechanism of Actin-Based Motility D. Pantaloni, C. Le Clainche, M.-F. Carrier



1502

Moving
with actin

RESEARCH

RESEARCH ARTICLE

- ▼ 1509
1498 **Fermi Surface Nesting and Nanoscale Fluctuating Charge/Orbital Ordering in Colossal Magnetoresistive Oxides** Y.-D. Chuang, A. D. Gromko, D. S. Dessau, T. Kimura, Y. Tokura



1532

The assembly of coral communities

REPORTS

- 1513 **Evidence for a Solar System–Size Accretion Disk Around the Massive Protostar G192.16–3.82** D. S. Shepherd, M. J. Claussen, S. E. Kurtz
- 1518 **Spatially Resolved Spin-Injection Probability for Gallium Arsenide** V. P. LaBella, D. W. Bullock, Z. Ding, C. Emery, A. Venkatesan, W. F. Oliver, G. J. Salamo, P. M. Thibado, M. Mortazavi
- 1521 **MgB₂ Superconducting Thin Films with a Transition Temperature of 39 Kelvin** W. N. Kang, H.-J. Kim, E.-M. Choi, C. U. Jung, S.-I. Lee
- 1523 **Hydrated Salt Minerals on Ganymede's Surface: Evidence of an Ocean Below** T. B. McCord, G. B. Hansen, C. A. Hibbitts
- ▼ 1525
1495 **A Silent Slip Event on the Deeper Cascadia Subduction Interface** H. Dragert, K. Wang, T. S. James
- ▼ 1528
1499 **Age, Sex, Density, Winter Weather, and Population Crashes in Soay Sheep** T. Coulson, E. A. Catchpole, S. D. Albon, B. J. T. Morgan, J. M. Pemberton, T. H. Clutton-Brock, M. J. Crawley, B. T. Grenfell
- ▼ 1532
1493 **Regional-Scale Assembly Rules and Biodiversity of Coral Reefs** D. R. Bellwood and T. P. Hughes

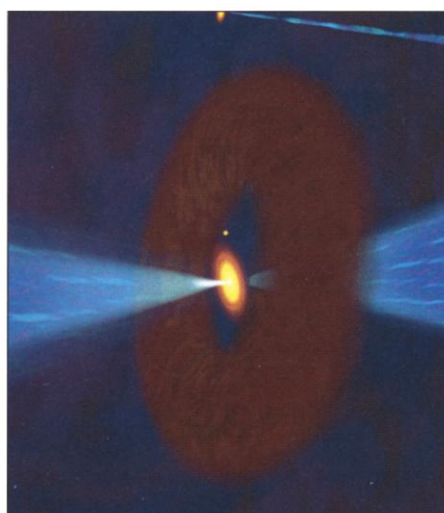


AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

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 \$9.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075/83 \$9.00. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

- ▼ 1535
1496 **A New Mammaliaform from the Early Jurassic and Evolution of Mammalian Characteristics** Z.-X. Luo, A. W. Crompton, A.-L. Sun
- 1540 **Chromatin Docking and Exchange Activity Enhancement of RCC1 by Histones H2A and H2B** M. E. Nemerlut, C. A. Mizzen, T. Stukenberg, C. D. Allis, I. G. Macara
- 1543 **Protective Role of ATP-Sensitive Potassium Channels in Hypoxia-Induced Generalized Seizure** K. Yamada, J. J. Ji, H. Yuan, T. Miki, S. Sato, N. Horimoto, T. Shimizu, S. Seino, N. Inagaki
- 1546 **Requirement of DNase II for Definitive Erythropoiesis in the Mouse Fetal Liver** K. Kawane, H. Fukuyama, G. Kondoh, J. Takeda, Y. Ohsawa, Y. Uchiyama, S. Nagata
- ▼ 1550
1468 **Metabolic Regulation of Brain A β by Neprilysin** N. Iwata, S. Tsubuki, Y. Takaki, K. Shirotani, B. Lu, N. P. Gerard, C. Gerard, E. Hama, H.-J. Lee, T. C. Saido
- ▼ 1552
1467 **Impairment of the Ubiquitin-Proteasome System by Protein Aggregation** N. F. Bence, R. M. Sampat, R. R. Kopito



HIGHLIGHTS FROM www.sciencexpress.org

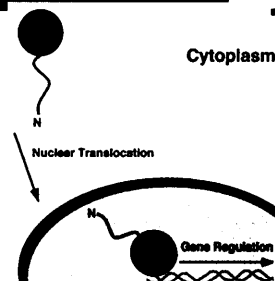


COVER 1535

A reconstruction of *Hadrocodium wui*, an Early Jurassic fossil (about 195 million years old) found in Yunnan, China. This newly described mammaliaform is an extinct close relative of living mammals, with many advanced features despite its early age. On the basis of a subadult skull, the tiny insectivore is estimated to weigh approximately 2 grams. The reconstruction of this mammal is shown in comparison to a paper clip (32 millimeters). [Reconstruction artwork: Mark A. Klingler/Carnegie Museum of Natural History]

1513

Big disk alters stellar and planetary evolution

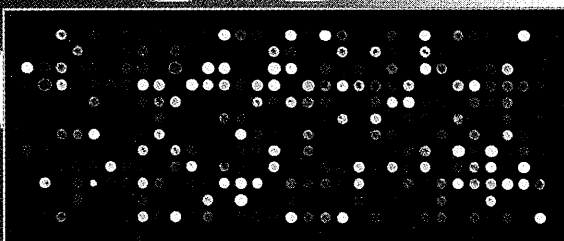


Releasing transcription factors from the plasma membrane

THE

brightest

CHOICE OF KITS



Now available, CyScribe™ First-Strand cDNA Labelling Kit and the NEW CyScribe Post-Labelling Kit for preparing highly fluorescent and evenly labelled probes for microarray hybridization.

CyScribe Post-Labelling Kit:

- The only post-labelling kit to include individually dispensed, ready-to-use, specially packaged, reactive CyTM3 and Cy5 dyes optimized for microarray post labelling
- Equal incorporation of Cy3 and Cy5 into probe is achieved
- Includes CyScriptTM reverse transcriptase, which gives excellent yields of first-strand cDNA

For more information on CyScribe, visit us at:
www.apbiotech.com/cyscribe

Or contact your local office.

Amersham Pharmacia Biotech UK Limited
 Amersham Place Little Chalfont Buckinghamshire England HP7 9NA
 Ad 07-01



amersham pharmacia biotech

Scienceonline

www.scienceonline.org

CONTENT HIGHLIGHTS AS OF 25 MAY 2001

science magazine www.sciencemag.org

SCIENCE EXPRESS www.scienceexpress.org

Acoustic Oscillations in the Early Universe and Today C. J. Miller,
R. C. Nichol, D. J. Batuski

A comparison of the cosmic microwave background and the present-day matter-density distribution supports a Hot Big Bang start to the Universe.

G-Protein Signaling Through Tubby Proteins S. Santagata *et al.*

The onset of obesity involves neurotransmitters, G proteins, phosphorylated inositols, transcription, and Tubby.

Impulsive Choice Induced in Rats by Lesions of the Nucleus Accumbens Core

R. N. Cardinal, D. R. Pennicott, C. L. Sugathapala, T. W. Robbins, B. J. Everitt

The core of the nucleus accumbens is central to impulsive choice behavior.

SPECIAL FEATURES

Science Functional Genomics

www.sciencegenomics.org

The site's news page (www.sciencegenomics.org/news/) offers links to daily stories in genomics and postgenomics from *Science*, *ScienceNOW*, and other sources, along with brief reviews of interesting recent sightings on the Web.

science's stke

www.stke.org

Perspective: Neurotrophins: Which Way Did They Go? R. Segal

Brain-derived neurotrophic factor acts as a forward and backward signaling messenger.

science's next wave

www.nextwave.org

US: Time IS on Your Side M. Sincell

Good time management skills can trim years off graduate school. Our "Survive and Thrive" columnist tells you how.

US: Working in Controversial Fields—Politics and Research in Molecular Anthropology A. Merriweather

Life in academia can be tough, but it's far tougher if your work cuts to the chase in a discipline rife with debate.

US: CPST Comments E. Babco

A compilation of the latest news and information from the scientific job-hunting world.

Canada: Transition to Academia—The Teaching Dossier S. Cheung

How do you go about documenting, for search committees and tenure review boards, your skills as a teacher and a mentor? Easy—put together a teaching portfolio.

UK: European Young Investigators Get a Boost K. Urquhart

The huge response to the European Molecular Biology Organization's Young Investigator Programme highlights just how badly Europe's early-career researchers need support.

GrantsNet

www.grantsnet.org

RESEARCH FUNDING DATABASE

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 Robert Metzke (Germany), Kirstie Urquhart (UK); CONTRIBUTING EDITORS Lesley McCarney (Canada), Mark Sincell; PROJECT MANAGER Emily Klotz; WRITERS Katie Cottingham, Mona Mort; MARKETING: MARKETING MANAGERS Karen Horting (US and Canada), Hazel Crocker (Europe); PROGRAM DIRECTOR Lisa Kozlowski; MARKETING ASSOCIATE Joey D'Adamo

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

ELECTRONIC MEDIA MANAGER David Gillikin; INTERNET PRODUCTION MANAGER Betsy Harman; ASSISTANT PRODUCTION MANAGER Wendy Stengel; SENIOR PRODUCTION ASSOCIATE Lisa Stanford; ASSOCIATES Carla Cathey, Mark Croatti, Robert Owens, Louis Williams

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

sciencenow

www.sciencenow.org

NOW!

ADDITIONAL RESOURCE

SCIENCECAREERS.ORG

Meetings and Announcements

Check out our fully searchable Meetings and Announcements database at www.sciencemeetings.org. Search for important events, grant announcements, courses, training, and more.

AD SUPPLEMENT / 1 JUNE ISSUE

FOCUS ON CAREERS

Informatics: The successful sequencing of the human genome demanded supercomputers and software programs. This ad supplement will address some of the nontraditional jobs that this area has created. Look for it in the 1 June issue.

ADDITIONAL RESOURCE

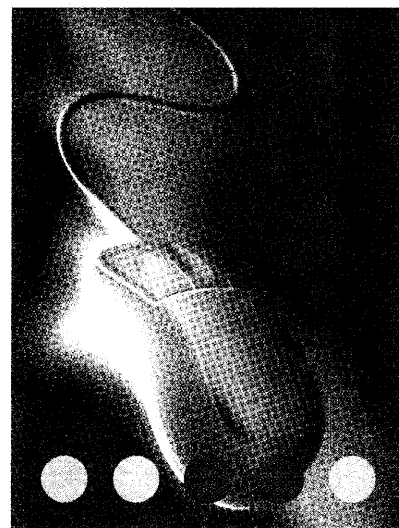
AD SUPPLEMENT / 15 JUNE ISSUE

LAB TECHNOLOGY TRENDS

Biotechnology — A Global Perspective

This ad supplement will discuss the tools that have allowed researchers worldwide to make significant progress in directing biotechnology to improve our lives. Look for it in the 15 June issue.

ADDITIONAL RESOURCE



Fast and efficient cloning for the expression of 6xHis-tagged proteins

The diagram illustrates the pQE-30 UA 3.5 kb plasmid. The linear sequence at the top includes the PT5 promoter, lacO operator, RBS, ATG start codon, 6xHis tag, MCS, U, MCS2, and a Stop Codon. The circular plasmid map shows the Ampicillin resistance gene and the ColEI origin of replication.

- Highly efficient cloning
- No need for restriction enzyme digestion
- Fast ligation procedure
- Simplified primer design

Get your QIAexpress UA Cloning Kit today and start expressing your 6xHis-tagged protein tomorrow!

For further information, visit us at www.qiagen.com

Trademarks: QIAGEN®, QIAexpress®. The PCR process is covered by U.S. Patents 4,683,195 and 4,683,202 and foreign equivalents owned by Hoffmann-La Roche AG.
© 2001 QIAGEN, all rights reserved.

www.qiagen.com

Circle No. 18 on Readers' Service Card

Distributors:

Argentina Tecnolabs S.A. [011] 5555 0010 **Austria/Hungary/** Slovenia r. v. P. MARGARITA Austria [01] 889 18 19 **Belgium/**
Luxemburg Westburg B.V. # 0800 1 9815 **Brazil** Uniceut do Brasil [01] 3622 2320 **China** Gene Company Limited 158218296 **Colombia/**
Synchrocentric Ltd [02] 765 416 **Czech Republic** BIOCONSULT spol s r.o. [0224447] 1239 **Denmark** Merck Europe A/S
43 86 87 88 **Egypt** Cynlax [255] 7212 **Finland** Merck Europe Oy [09] 804 551 **France** bioAnalytics S.A. [01] 640 03 18 **India** Genetec
[01] 542 1714 r. [01] 1515 9346 **Israel** Westburg [Israel] Ltd. 06 66 50 153 r. 1 800 22 20 20 **Korea** RS Laboratories, Inc.
[02] 142 73 73 **Latvia** Merck Europe A/S [06] 66 50 153 **Malaysia** Merck Europe A/S [03] 939 9399 **Mexico** Merck Europe A/S
The Netherlands Westburg B.V. [03] 4950094 **New Zealand** Biolabs Scientific Ltd [09] 980 620 r. 0800 933 966 **Norway**
Merck Europe A/S 22 90 00 00 **Poland** Synchro Biotech Sp z o.o. [017] 351 41 06 r. 0601 70 60 07 **Portugal** IZASA PORTUGAL
LDA [1] 424 73 64 **Singapore** Research Biobols Pte Ltd 2731066 **Slovak Republic** BIOCONSULT Slovakia spol s r.o.
[07] 50221 336 **South Africa** Southern Cross Biotechnology (Pty) Ltd [01] 671 5166 **Spain** IZASA, S.A. [93] 902 20 30 r. **Sweden**
[08] 42 14 56 72 **Switzerland** Merck Europe A/S [043] 31 31 31 **Taiwan** Merck Europe A/S [02] 2860 1313 **Thailand** Thera Trade Trading Co.
[02] 412 65 672 **In other countries** contact: QIAGEN, Germany.

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

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



CYB110C30116XC

THIS WEEK IN Science

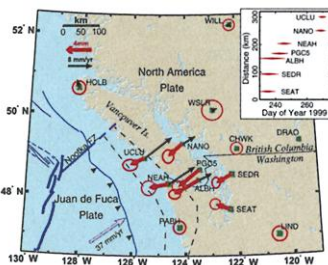
edited by Phil Szuromi

Seeing Solar System–Sized Disks

Disks of gas and dust around stars are considered to be the most likely places for planet formation. Such disks have been observed around young, low-mass stars, but similar observations for high-mass stars have been more difficult, and have left astronomers pondering how common the conditions may be for planet formation in the universe. Shepherd *et al.* (p. 1513) have now observed a very massive disk (similar to the mass of the solar system) around a high-mass young star, G192.16–3.82. They used the National Radio Astronomy Observatory's Very Large Array radio interferometer coupled with the Very Long Baseline antenna in Pie Town, New Mexico, to improve their resolution by an order of magnitude over previous observations.

Silent Earthquake

The Juan de Fuca plate is being subducted under the North American plate along the coast of southern British Columbia and of Washington and Oregon. A network of about 14 Global Positioning System (GPS) sites show motion to the northeast consistent with that of the Cascadia subduction zone. Dragert *et al.* (p. 1525; see the Perspective by Thatcher) observed seven of these sites reverse their motion to the southwest over a period of tens of days in 1999. This shift was modeled as an aseismic event with about 2 centimeters of upward-propagating slip over a large area along the deeper part of the subduction zone. Such a silent slip could add stress or possibly trigger an earthquake on the shallower, seismogenic part of the subduction zone. ✕



Colossal Magnetoresistance to Order

The wealth of magnetic, electronic, and temperature-dependent properties displayed by the doped bilayered manganites make them potentially very useful not just for novel devices but also for further understanding the complex magnetic and electronic phase transitions observed in other correlated-electron systems. Chuang *et al.* (p. 1509; see the Perspective by Keimer) used high-resolution angle-resolved photoemission spectroscopy to determine the transport parameters of the manganite and found that the measured conductivity is an order of magnitude lower than that expected from the transport data. The discrepancy may be caused by the formation of a pseudogap (through the nanoscale phase separation of charge and spin) that removes a considerable fraction of carriers for conduction. ✕

Spin Injection Goes Flat-Out

1518

The success implementation of spintronics, in which the spin properties of charge carriers are used to carry information, will require getting polarized charges into semiconductors. LaBella *et al.* (p. 1518) studied the spin-injection efficiency into a semiconductor from a ferromagnetic tip. Spin injection can be as high as 92% for current tunneling into the flat terraces of the GaAs, but it is almost decimated when current transport takes place near or at the terrace step.

A Salty Satellite

Ganymede, the largest of the Jupiter's satellites, has a surface dominated by water ice, and it has been hypothesized that Ganymede, like Europa, has an ocean below the ice. McCord *et al.* (p. 1523) analyzed reflectance spectra of Ganymede taken by the Galileo spacecraft's near-infrared mapping spectrometer during a relatively close flyby

of the satellite. The ice contains hydrated minerals, such as hydrated magnesium sulfate, that may be derived from a briny layer of water lying beneath the ice.

Superconducting MgB₂ Thin Films

The recent observation of superconductivity in magnesium diboride with a relatively high transition temperature (T_c) of 39 K has generated a flurry of activity. Studies are now aimed at establishing the mechanism, teasing out possible routes for boosting the T_c , and developing more practical preparation techniques. Using precursor boron films, Kang *et al.* (p. 1521) report that thin films of MgB₂ prepared by a pulsed laser deposition and sintering technique exhibit a sharp T_c at 39 K and can sustain large current densities. ✕

Assembly Rules for Coral Reefs

Protection of the rich faunas of coral reefs will require a greater understanding of their complexity and diversity. Bellwood and Hughes (p. 1532; see the Perspective by Knowlton) have compiled a data set for all Indo-Pacific coral reefs and show that the taxonomic composition of corals and reef fishes is very conservative and that only a narrow range of many possible configurations occurs at the family level. More than half of the observed variation in species diversity is explained by area of available habitat, and there is little relation between latitude and diversity. These results suggest a need for the protection of habitat over regional-scale areas, with international coordination of conservation programs.

Counting Sheep

A challenge in animal population dynamics is to tease apart the deterministic factors that affect population size from noise. Coulson *et al.* (p. 1528; see the Perspective by Gaillard *et al.*) used a combination of empirical analyses of survival and fecundity and age-structured modeling to analyze long-term population data for Soay sheep in the isolated archipelago of St. Kilda off the northwest coast of Scotland. Much of the "noise" is actually deterministic in origin, because animals of different age and sex respond in contrasting ways to population density and to weather patterns. This approach allows much improved predictions of future changes in population size.



Poison Dart Frog (*Dendrobates azureus*)

Maximize your Possibilities in Protein Expression

Express functional proteins for your drug discovery programs with the new Rapid Translation System RTS 500* from Roche Molecular Biochemicals. Produce 50–500 µg of proteins using the breakthrough continuous-exchange, (CECF) *in vitro* transcription/translation technology.

Overcome the limitations of your current expression systems

- Express cytotoxic or inhibitory proteins (Table 1).
- Express proteins of <150 kDa.
- Express insoluble proteins by controlling expression conditions in the "open" RTS 500 reaction device.

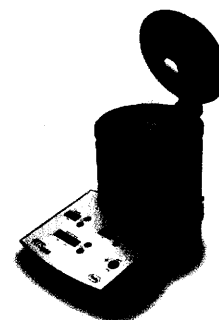
Protein	MW (kDa)	Limitations of other systems
TC3 (human)	14.5	Cellular proteolysis
Microtubuli-binding protein (MID-1, human)	24	Protein inhibits cell division
Lunasin (soybean polypeptide fusion protein)	32	Protein inhibits cell division

Table 1. Examples of proteins successfully expressed in the RTS 500 System.

Express your proteins today

Learn more about the revolutionary RTS 500 System, and see the list of more than 60 successfully expressed eukaryotic and prokaryotic proteins by visiting us at

<http://www.proteinexpression.com>



Roche Diagnostics GmbH
Roche Molecular Biochemicals
Mannheim, Germany

Internet: <http://biochem.roche.com>

*The Rapid Translation System consists of the benchtop RTS 500 Instrument (3.75 kg) and the *E. coli* Circular Template Kit. The continuous-exchange cell-free (CECF) technology applied in the RTS 500 products is exclusively licensed by a member of the Roche Group from the Institute of Protein Research at the Russian Academy of Sciences, Pushchino, Russia. Rapid Translation System and RTS are trademarks of a member of the Roche Group.

© 2001 Roche Diagnostics GmbH. All rights reserved.

Argentina 54 1 951-0041; Australia +61-2 9899 7999; Austria +43-1 277 870; Belgium +32 2 247 49 30; Brazil +55 (11) 3666 3565, +55 (11) 3667 0829, +55 (11) 3666 4897, +55 (11) 3667 3993; Canada +1-450 686 7050; (800) 361 2070; Chile +56-2 375 2011; China +86-21 6427 5586, +86-21 6427 1331; Czech Republic +420-5 5 712 50 18; Denmark +45-36 39 99 99; Egypt 202 361 9047; Finland +358-9 525 333 66; France +33-4-76 76 46 85; Germany (49) 621 759-8568; Greece +30 1 686 0600; Hong Kong (852) 2485 7596; India (22) 43123 12; Indonesia +62-21 525 7738; Iran +98 21 208 2266, +98 21 878 5656; Republic of Ireland 1 800 409041; Israel 972-6-638 9591; Italy +39-039 247 4108; Japan +81-3 5443 5284; Malaysia +60-3 755 5039; Mexico +52-50 81 58 00; The Netherlands +31-36 539 49 11; New Zealand +64-9 276 4157; Norway (47) 23 373300; Philippines +63-2 8934567; Poland +48-226684305, +48-226679168; Portugal +351-1 417 1717, +351-1 4164400; Saudi Arabia +966-14010333/4040266/4031145; Singapore 65 3716533/65 3716632; South Africa 011-886 2400; South Korea 82-2 3471-6500; Spain (93) 201 4411; Sweden 08 40 488 00; Switzerland +41 (41) 799 6161; Taiwan +886-2 2505 25 33; Thailand 66(2)9370444; Turkey 0090 212 213 32 80; United Kingdom +44 1273 480444, 0808 100 89 98; USA (800) 428 5433

Circle No. 4 on Readers' Service Card

A Handle on Histones Marks Chromatin

The protein RCC1 can be considered as a marker for chromatin, and as such plays an important role in the transport of molecular cargoes between the nucleus and cytoplasm, spindle formation during cell division, and formation of the nuclear envelope. These functions are mediated through RCC1's interaction with the small guanosine triphosphatase Ran. However, little is known about how RCC1 associates with chromatin. Nemerlut *et al.* (p. 1540) show that RCC1 interacts not with DNA, but with the histones that package DNA into chromatin, and specifically with histones H2A or H2B, and does not require higher order chromatin structure for binding. Binding of chromatin promotes RCC1's ability to stimulate guanine nucleotide exchange on Ran.

Early Mammalian Traits

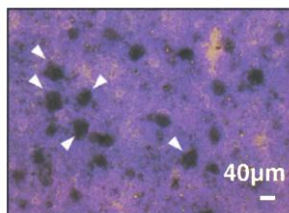
Two characteristics of living mammals are enlarged brains and the separation of the middle ear bones from the jawbone. Luo *et al.* (p. 1535; see the cover and see the Perspective by Wyss) present a fossil find from the early Jurassic, named *Hadrocodium*, that extends the "first appearance" of these advanced anatomical features by more than 40 million years, or about one-quarter of the period of mammalian existence. It suggests that mammalian features were in place long before the major diversifications of mammals.

Metabolism, Excitability, and Seizures

Potassium channels that are sensitive to adenosine triphosphate (ATP) couple the intracellular metabolic state to electrical activity at the plasma membrane. Yamada *et al.* (p. 1543) show in a knockout study that these channels exert a protective effect in the brain during hypoxia. Mice lacking ATP-sensitive K^+ -channels were more sensitive to generalized seizures. In slice experiments, neurons from knockout animals in the substantia nigra pars reticulata, an important brain area for the control of seizures, began to depolarize upon a hypoxic challenge rather than hyperpolarize like the neurons from normal control animals.

Fatal Indigestion

During the later stages of mammalian embryogenesis, erythrocytes (red blood cells) are formed in the liver and bone marrow from erythroid precursor cells that have expelled their nucleus. The molecular events involved in erythrocyte enucleation are not well understood. Using genetically modified mice, Kawane *et al.* (p. 1546) show that mice lacking the enzyme deoxyribonuclease II are severely anemic and die shortly before birth. The critical cellular source of the enzyme appears to be macrophages, which are present at the site of erythropoiesis in the fetal liver and probably digest the nuclear DNA expelled from the erythroid precursor cells.



Alzheimer's Balancing Act

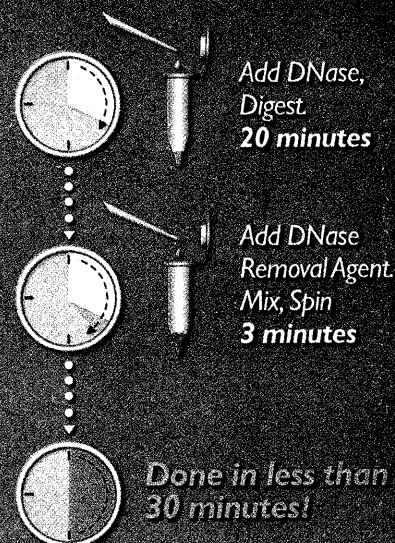
One of the initial steps in the course of Alzheimer's disease (AD) is the deposition of amyloid β peptide ($A\beta$) in the brain. The enzyme neprilysin, which can degrade $A\beta$, may be an important player in the pathophysiology of AD. Iwata *et al.* (p. 1550; see the news story by Marx) compared the metabolism of $A\beta$ in homozygous and heterozygous neprilysin knockout mice with that in wild-type animals. They observed a reduced catabolism of exogenously labeled $A\beta$ in the gene-deficient animals, and endogenous $A\beta$ was elevated in a gene dose-dependent way in the knockout mice. Even a slight imbalance between production and removal of $A\beta$ due to a reduced rate of enzymatic catabolism could increase the risk of developing AD.

Protein Aggregation and Degradation

Many neurodegenerative disorders are characterized by the prevalence of protein aggregates in the brain. These aggregates are often composed of proteins that have been modified by the addition of ubiquitin—a marker that should lead to degradation of the offending protein by a cytosolic proteolytic complex known as the proteasome—but are the aggregates a cause or a consequence of the disease process? Bence *et al.* (p. 1552; see the news story by Helmuth) now show that protein aggregation per se appears to inhibit the proteasomal protein degradation system.

CREDIT: K. KAWANE ET AL.

Get
**DNA-free
RNA** *Fast and Easy*
with Ambion's DNA-free™



**DNase digestion, inactivation,
and removal in less than
30 minutes**

**Novel DNase removal agent
means no extraction, heating,
or precipitation**

**Compatible with all
RNA isolation techniques**

Ambion®

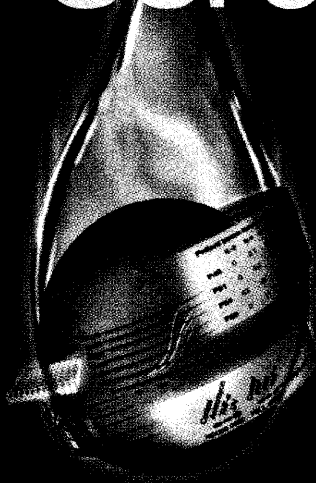
THE RNA COMPANY®

2130 WOODWARD ST. AUSTIN, TX 78744
tel (512) 651-0200 • fax (512) 651-0201
email: moinfo@ambion.com

www.ambion.com

Circle No. 56 on Readers' Service Card

run up to 100 different ELISAs in just 12 μ l of serum



Speed Drug Discovery with the First Ever **Quantitative** Protein Array System.

Introducing the Bio-Plex™ protein array system — a world of information from a single drop. Here's a complete, easy-to-use system that lets you quantitate up to 100 different proteins and peptides simultaneously in a single microtiter well. You'll save up to 100-fold on time, labor, and those precious rare samples. Mix and match from a broad selection of bead-based assays to create your

own "liquid protein chip" or let Bio-Rad customize one for you. The Bio-Plex system features a fluorescent reader, data analysis software, validation tools, and optimized assay kits from a single source — seamlessly integrated to ensure accurate and reproducible assay results. Contact your local Bio-Rad representative or visit us on the Web at www.bio-rad.com/bioplexsystem/.

What Will You Discover Next?

Visit us on the Web at discover.bio-rad.com. Call toll free at 1-800-4BIORAD (1-800-424-6723); outside the US, contact your local sales office.

Circle No. 15 on Readers' Service Card

BIO-RAD



diabetes gene classified:
discovery **Applied**

AB Applied Biosystems
Data. Decision. Discovery.

Type 2 diabetes, also called adult-onset or non-insulin-dependent diabetes, affects more than 15 million Americans. Although there is no single gene that can explain the risk of diabetes, scientists using DNA analysis systems from Applied Biosystems have recently pinpointed a gene that plays a key role in this complex disease.

Meet the new Applied Biosystems. As a \$1.4 billion company serving 40,000 scientists in over 150 countries, we bring more than just the broadest range of technologies to genetics research, protein analysis, high-throughput screening, and bioinformatics challenges. We also bring optimism.

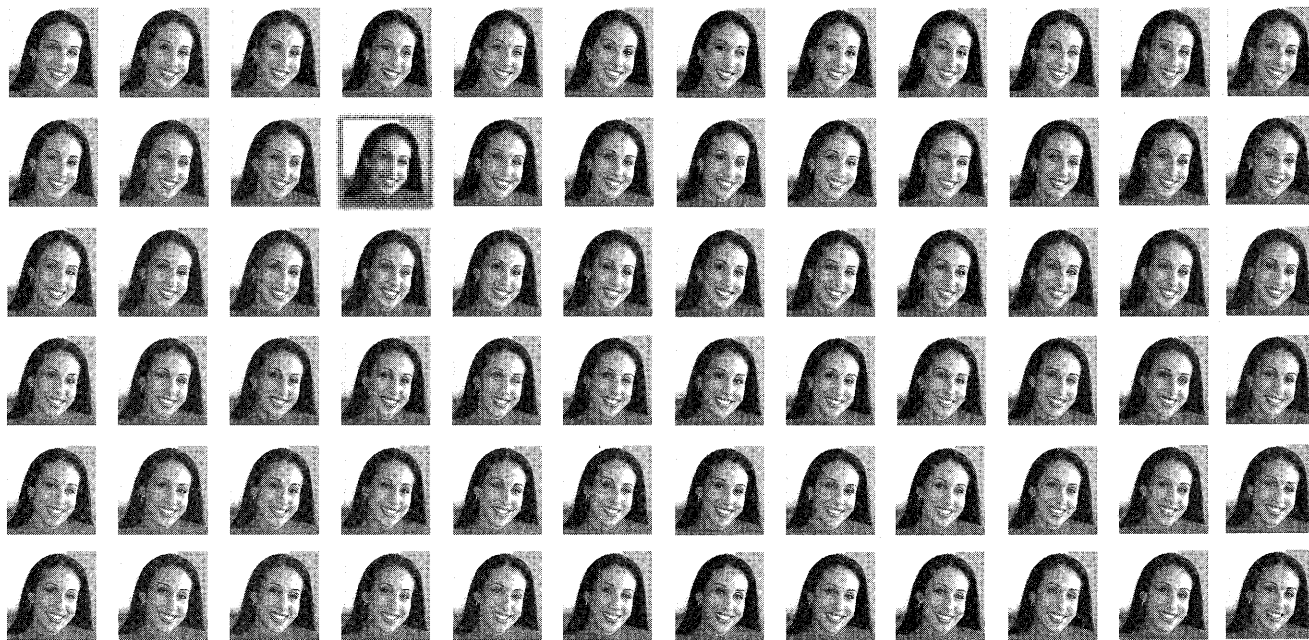
www.appliedbiosystems.com

Applera Corporation is committed to providing the world's leading technology and information for life scientists. Applera Corporation consists of the Applied Biosystems and Cepiva Genomics businesses. Applied Biosystems is a registered trademark and AB (Design) is a trademark of Applera Corporation or its subsidiaries in the US and certain other countries. ©2001 Applied Biosystems. All rights reserved.

Circle No. 7 on Readers' Service Card

Single Nucleotide Polymorphisms

Finally you can detect SNPs
with total confidence.



2,700,000 known SNPs today. Millions more tomorrow.
Is your lab ready?

Yes, your lab will be prepared with the new **AcycloPrime™-FP SNP Detection System** from PerkinElmer Life Sciences. The first fluorescence polarization-based SNP reagent system, AcycloPrime reagents are complemented by our Victor² V fluorescence polarization reader, a state-of-the-art multi-use fluorescence detection instrument. Finally, detecting all known SNPs – today and tomorrow – is easy, quick and accurate.

- **How easy?** As a homogenous assay, there are no washing or separation steps.
- **How fast?** The optional Victor² V auto dispenser eliminates hand-pipetting. Plus, 40 plates – each with 384 wells – can be stacked at once.
- **How accurate?** With our new AcycloTerminators™, there's no guesswork. So you can detect SNPs with confidence the first time.



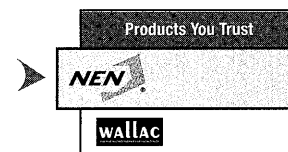
World Headquarters: PerkinElmer Life Sciences, Inc. 549 Albany Street, Boston, MA 02118-2512 USA (800) 551-2121
For country-specific locations, visit our web site.

Special introductory offer – expires June 30, 2001

To celebrate the introduction of our new SNP instrumentation and reagent system, we're offering substantial savings on the Victor² V through June 30, 2001.

For more information, contact PerkinElmer Life Sciences at (800) 551-2121 (U.S.) or +32 2 717 7924 (Europe).

Or visit www.perkinelmer.com/lifesciences



☒ Virtual surgery

☒ Real successes



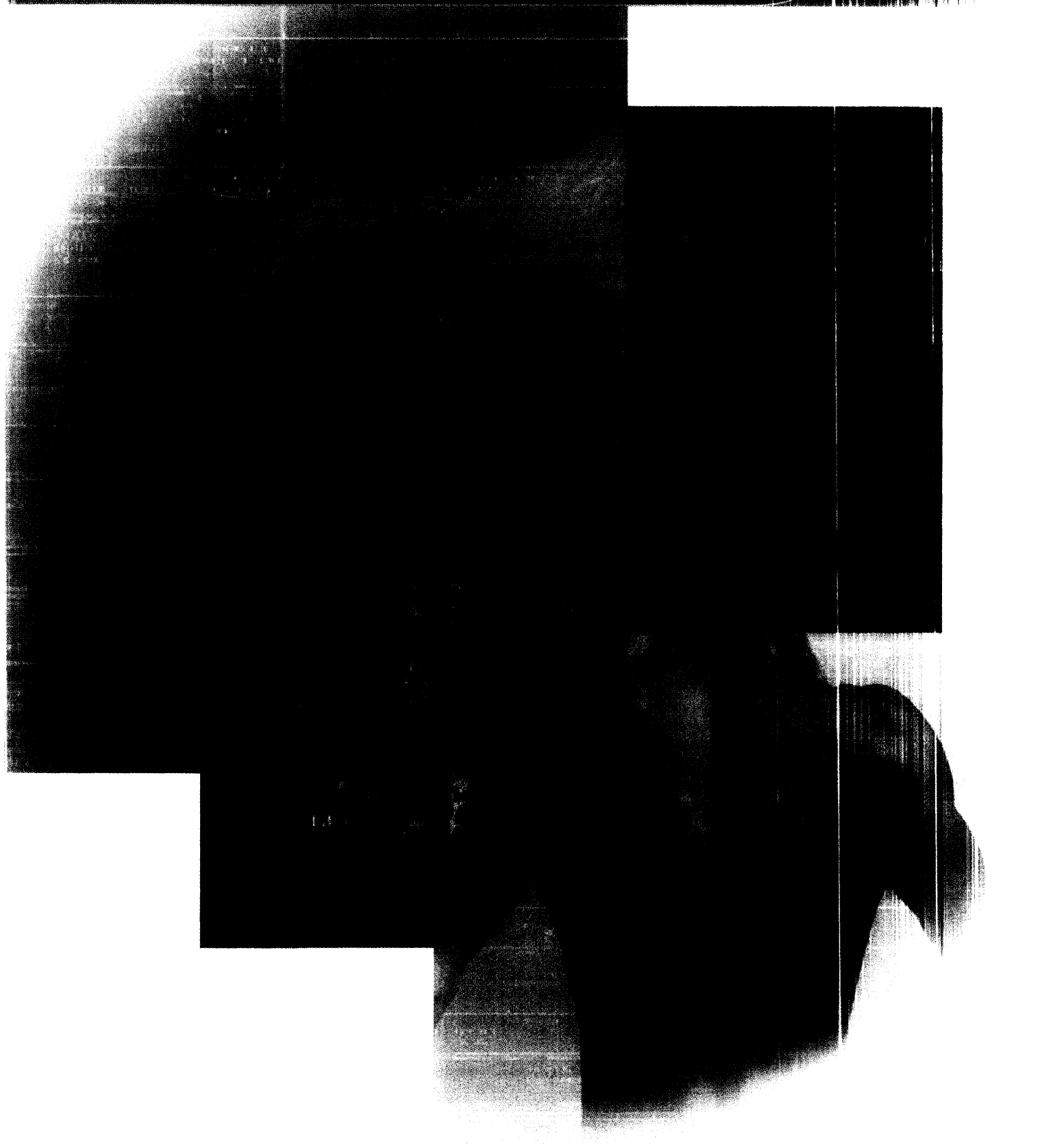
No medical procedure is more delicate or complex than brain surgery. But when surgeons have the advantage of practice and experimentation, complex procedures can become less life-threatening. With the help of Silicon Graphics® workstations from SGI, doctors are using a new visualization technology called brain mapping to simulate surgery with high-resolution, three-dimensional images. According to Dr. Arthur Toga, professor of neurology at the UCLA School of Medicine, "Medical visualization is vital to brain surgery because it allows doctors to identify areas of the brain that should not be disturbed." With technology from SGI, the power of medical visualization can help hospitals achieve the seemingly impossible—to learn from procedures before operating. And stay ahead. To learn more about SGI™ solutions, or for information on our services, consulting and support, visit our Web site.

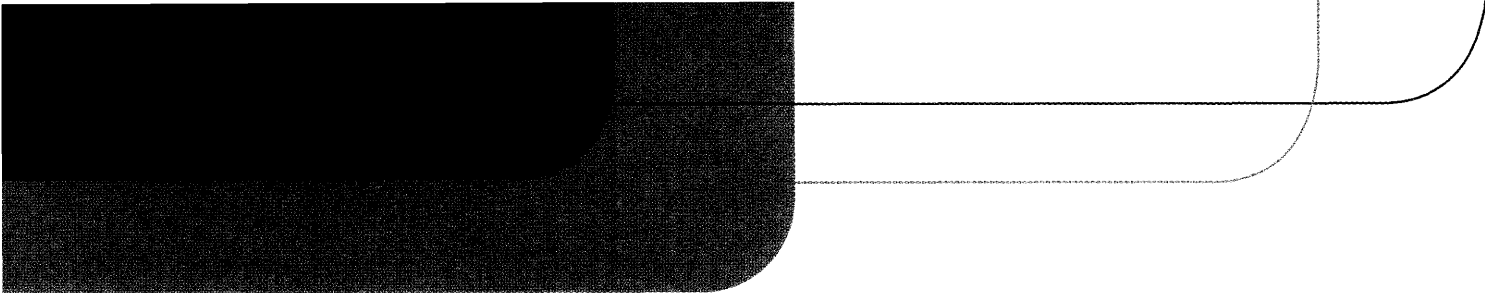
www.sgi.com/ahead

sgiTM
One step ahead

Announcing

Celera's Assembled and Annotated Mouse Genome





Unleash the Power of Comparative Genomics with the only

Assembled and Annotated Mouse Genome. Celera's high quality genome assembly is fully integrated with the Celera Human Reference Genome and all of the intuitive analysis tools found in the Celera Discovery System. Celera's mouse assembly is comprised of strains critical to modern drug development and transgenic research.

Speed Your Research— Conduct it *In Silico*

- Eliminate mouse chromosome-walking experiments. Use the Celera Discovery System to save valuable time and resources by simply scrolling across a mouse genomic region to identify target genes.
- Eliminate the resource-intensive screening of clone libraries. Instead use simple alignment tools integrated into the Celera Discovery System.

Gain New Insights—Use Comparative Genomics

- Use human-mouse synteny to analyze homologous genes, transcription factor binding sites and regulatory regions. Gain a broader understanding of human biology with comparative genomics.
- Decipher the complex functions of human genes utilizing human-mouse homology information. Translate your research into treatments for disease.

Discover Causes of Complex Diseases

- Identify and prioritize human target genes by interpreting the wealth of existing mouse experiments.
- Plan mouse knock-out experiments to validate gene function and to correlate with biological pathways.



Leverage Celera's Fully-Integrated Mouse Genome To Increase Your Knowledge of:

- | | |
|-------------------------|----------------------|
| ■ Cancer | ■ Aging |
| ■ Developmental Biology | ■ Neurology |
| ■ Immunology | ■ Metabolic Diseases |
| ■ Hematology | |

To learn more visit
www.celera.com/mouse
or call 1-888-545-8801.

Circle No. 12 on Readers' Service Card



CELERA

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

R. Brooks Hanson Katrina L. Kelner

NEWS EDITOR

Colin Norman

EDITORIAL/COMPASS SUPERVISORY SENIOR EDITORS Barbara Jasny, Guy Riddihough, Phillip D. Szurmi; 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 Zentell; MEMBER SERVICES: MANAGER Michael Lung; SENIOR SPECIALIST Mary Curry; COORDINATOR Jantell Stone; SPECIALISTS Laurie Baker, Pat Butler, Elizabeth Early, Katrina Smith; REPRESENTATIVE Elizabeth Haberkorn; 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

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: Betchart 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;

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 Jason Llewellyn, 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, Christopher Kenny, 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 Penisi, Charles Seife, Robert F. Service (Pacific NW), Gretchen Vogel, John Davenport (intern); CONTRIBUTING CORRESPONDENTS Marcia Barinaga (Berkeley, CA), Kathryn Brown, Barry A. Cipra, Jon Cohen (San Diego, CA), Daniel Ferber, Ann Gibbons, Robert Irion, Charles C. Mann, Virginia Morell, Evelyn Strauss, Gary Taubes, David Voss, Ingrid Wickelgren; COPY EDITORS Linda B. Felaco, Daniel T. Helgerman; ADMINISTRATIVE SUPPORT Scherraine Mack, Fannie Groom; BUREAU: Berkeley, CA: 510-652-0302, FAX 510-652-1867, Boston,

MARKETING: DIRECTOR John Meyers; RECRUITMENT MARKETING MANAGER Allison Pritchard; ASSOCIATES Mary Ellen Crowley, Amanda Donathen; ELECTRONIC MEDIA: MANAGER David Gillikin; INTERNET PRODUCTION MANAGER Elizabeth Harman; ASSISTANT PRODUCTION MANAGER Wendy Stengel; SENIOR PRODUCTION ASSOCIATE Lisa Stanford; PRODUCTION ASSOCIATES Carla Cathey, Mark Croatti, Robert Owens, Louis Williams; 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/N. 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) 7-071-226-216, FAX (44) 7-071-226-233 • GERMANY/SWITZERLAND/AUSTRIA Tracey Peers: (44) 1-782-752-530, FAX (44) 1-782-752-531 JAPAN Masahiko 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-

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; ILLUSTRATORS Cameron Slayden, Katharine Sutliff; ASSOCIATES Holly Bishop, Joshua Moglia, Debra J. Morgenege, Preston Morrighan; 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. Hurtle; 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@ndvsnl.net.in)

SISTANTS 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: Masahiko 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 <i>Children's Hospital, Boston</i>	Ton Bisseling <i>Washington Univ. School of Medicine, St. Louis</i>	Dennis W. Choi <i>Univ. of Chicago</i>	Chris D. Frith <i>Univ. College London</i>	Michael LaBarbera <i>Univ. of Chicago</i>	Michele Parrinello <i>Max Planck Institute for Solid State Research, Stuttgart</i>	Tomoyuki Takahashi <i>Univ. of Tokyo</i>
Edouard Bard <i>Univ. d'Aix-Marseille III</i>	Seth S. Blair <i>Univ. of Wisconsin</i>	Joanne Chory <i>The Salk Institute</i>	Don Ganem <i>Univ. of California, San Francisco</i>	Angus I. Lamond <i>Univ. of Dundee</i>	Linda Partridge <i>Univ. College London</i>	Marc Tessier-Lavigne <i>Univ. of California, San Francisco</i>
Frank S. Bates <i>Univ. of Minnesota</i>	Mark Boguski <i>NCBI, NIH</i>	David Clapham <i>Children's Hospital, Boston</i>	James Gimzewski <i>Univ. of California, LA</i>	Antonio Lanzavecchia <i>Inst. of Res. in Medicine, Bellinzona, Switzerland</i>	Suzanne Pfeffer <i>Stanford Univ. School of Medicine</i>	Joan S. Valentine <i>Univ. of California, LA</i>
Ray H. Baughman <i>Honeywell International</i>	Henry R. Bourne <i>Univ. of California, San Francisco</i>	Jonathan D. Cohen <i>Princeton Univ.</i>	Alex Halliday <i>ETH Zentrum, Zürich</i>	Anthony J. Leggett <i>Univ. of Illinois, Urbana- Champaign</i>	Stuart L. Pimm <i>Columbia Univ.</i>	Michiel van der Klis <i>Astronomical Inst. of Amsterdam</i>
Stephen J. Benkovic <i>Pennsylvania St. Univ.</i>	Lewis M. Branscomb <i>Kennedy School, Harvard Univ.</i>	Daniel G. Colley <i>Centers for Disease Control</i>	Paul Harvey <i>Univ. of Oxford</i>	Norman L. Letvin <i>Beth Israel Deaconess Medical Center, Boston</i>	Danny Reinberg <i>Univ. of Medicine and Dentistry-New Jersey</i>	Derek van der Kooy <i>Univ. of Toronto</i>
Michael J. Bevan <i>Univ. of Washington</i>	Joseph A. Burns <i>Cornell Univ.</i>	F. Fleming Crim <i>Univ. of Wisconsin</i>	Martin Heimann <i>Max Planck Institute of Biogeochemistry, Jena</i>	Richard Losick <i>Harvard Univ.</i>	Janet Rossant <i>Univ. of Toronto</i>	Bert Vogelstein <i>Johns Hopkins</i>
		Robert Desimone <i>NIMH, NIH</i>	Tasuku Honjo <i>Kyoto Univ.</i>	Raul Madariaga <i>École Normale Supérieure, Paris</i>	Erkki Ruoslahti <i>The Burnham Institute</i>	Arthur Weiss <i>Univ. of California, San Francisco</i>
		Julian Downward <i>Imperial Cancer Research Fund</i>	Evelyn L. Hu <i>Univ. of California, Santa Barbara</i>	George M. Martin <i>Univ. of Washington</i>	David G. Russell <i>Cornell Univ.</i>	Zena Werb <i>Univ. of California, San Francisco</i>
		Hans Eklund <i>Swedish Univ. of Agricultural Sciences</i>	Herbert Jäckle <i>Max Planck Institute for Biophysical Chemistry, Göttingen</i>	Diane Mathis <i>Harvard Medical School</i>	Terrence J. Sejnowski <i>The Salk Institute</i>	R. Sanders Williams <i>Univ. of Texas Southwestern Med. Ctr.</i>
		Gerhard Ertl <i>Fritz-Haber-Institut, Berlin</i>	Paul G. Falkowski <i>Rutgers Univ.</i>	Andrew Murray <i>Harvard Univ.</i>	Manfred Sigrist <i>ETH Hönggerberg, Zürich</i>	Ian A. Wilson <i>The Scripps Res. Inst.</i>
		Paul G. Falkowski <i>Rutgers Univ.</i>	Douglas T. Fearon <i>Univ. of Cambridge</i>	Elizabeth G. Nabel <i>NHLBI, NIH</i>	Susan Solomon <i>NOAA</i>	Richard A. Young <i>The Whitehead Inst.</i>
		Jeffrey S. Flier <i>Harvard Medical School</i>	Bernhard Keimer <i>Max Planck Inst. for Solid State Research, Stuttgart</i>	Shigekazu Nagata <i>Osaka Univ. Medical School</i>	Christopher R. Somerville <i>Carnegie Institution of Washington, Stanford</i>	Martin Zatz <i>NIMH, NIH</i>
		Richard Fortey <i>The Natural History Museum, London</i>	Christian Körner <i>Botanisches Institut, Basel</i>	Roger Nicoll <i>Univ. of California, San Francisco</i>	Will J. Stewart <i>Marconi Caswell, Towcester</i>	Walter Ziegängsberger <i>Max Planck Institute of Psychiatry, Munich</i>
		Yves Frégnac <i>Unité de Neurosciences Intégratives et Computation- nelles, CNRS, Gif-sur-Yvette</i>	Anne Krueger <i>Stanford Univ.</i>	Roy R. Parker <i>Univ. of Arizona</i>	Edward I. Stiefel <i>ExxonMobil Research and Engineering</i>	Maria Zuber <i>Massachusetts Inst. of Technology</i>
					Cliff Tabin <i>Harvard Medical School</i>	

SENIOR EDITORIAL BOARD

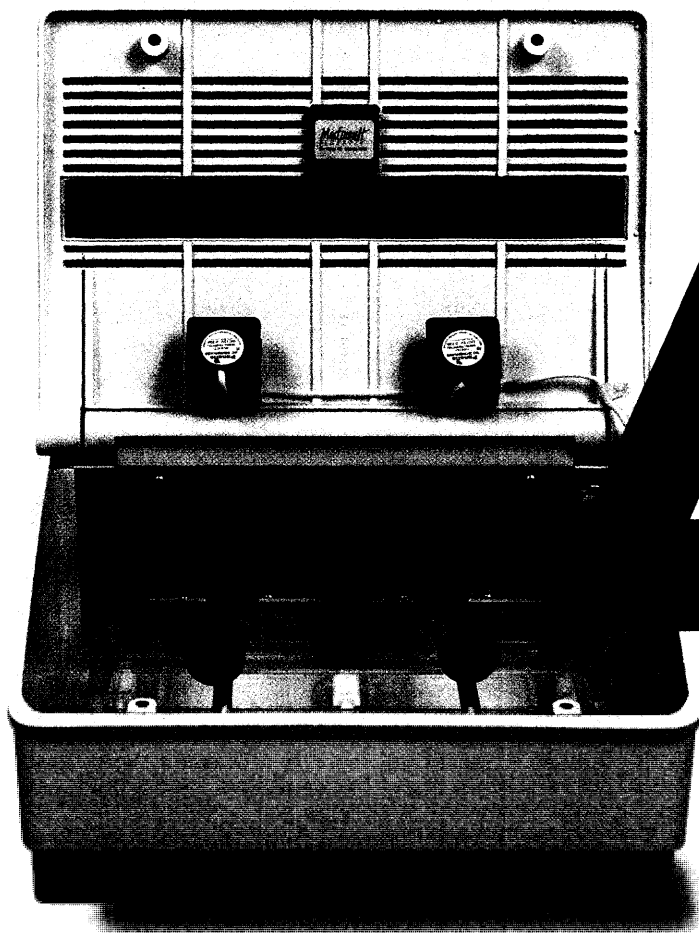
John I. Brauman, Chair, *Stanford Univ.*
Philip H. Abelson, *AAAS*
Joseph L. Goldstein, *Univ. of Texas Southwestern Med. Ctr.*
Richard Losick, *Harvard Univ.*
Robert May, *Univ. of Oxford*
Marcia McNutt, *Monterey Bay Aquarium Research Inst.*
Vera C. Rubin, *Carnegie Institution of Washington*
Christopher 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!

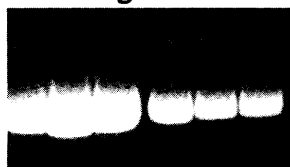
HIGH PURITY - FOR ALL YOUR FLUORESCENT AND MANUAL DNA SEQUENCING

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

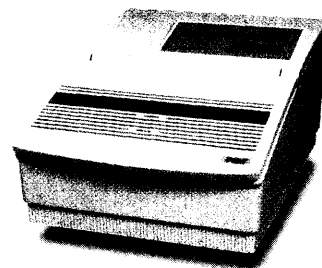
COST EFFECTIVE - LIST PRICE UNDER \$10,000

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. 57 on Readers' Service Card

Life Sciences

Drug Discovery

Research

Genetic Screening

PerkinElmer Life Sciences and NEN working together?

precisely.

Measured Success

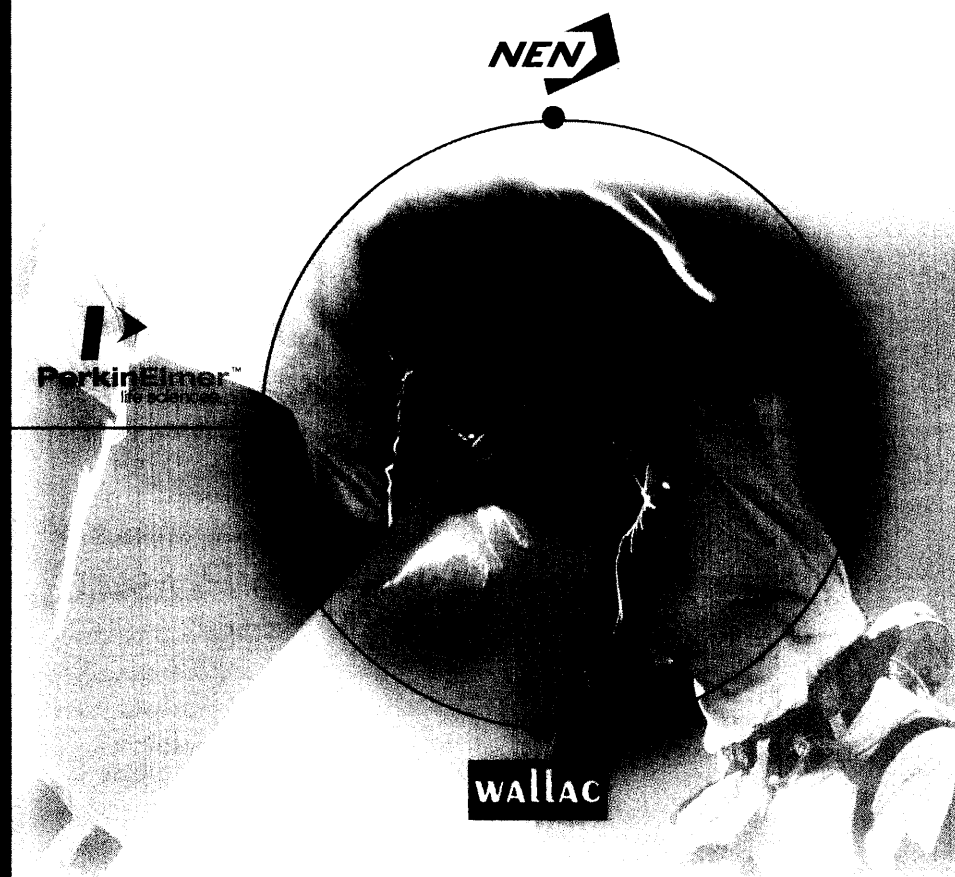
PerkinElmer and NEN are a perfect team. A combination so complementary it just had to happen. The premier life sciences brand in reagent systems joins the leader in biomedical, drug discovery and research instrumentation. Together, providing complete assay and research solutions to life science researchers everywhere.

Here's what this means to you:

The New PerkinElmer

- Leading-edge solutions in emerging fields such as functional genomics, biochips, SNPs, live cell imaging and "next generation" detection reagents.
- A complete line of instrumentation for liquid scintillation, fluorescence and luminescence detection, plus over 2,000 reagents and consumables.
- Complete assay development and instrumentation systems for high throughput screening and other areas involved in target validation for drug discovery.
- Optimized solutions through increased sales and technical support worldwide.

Learn more about the new PerkinElmer Life Sciences.
www.perkinelmer.com/lifesciences




PerkinElmer[™]
life sciences.

World Headquarters: PerkinElmer Life Sciences, 549 Albany Street, Boston, MA 02118-2512 USA (800) 551-2121

For country-specific locations, visit our web site.

www.perkinelmer.com/lifesciences

Circle No. 21 on Readers' Service Card

Quantitative gene analysis is now in sight.

Use I-SAGE™ and find your path
to gene analysis results.

Don't waste time running into dead ends on the path to gene expression analysis. Bring the power of SAGE™ technology into your lab with the I-SAGE™ Kit and see your way to quantitative, sensitive gene analysis results.

The Power of SAGE™ SAGE™, Serial Analysis of Gene Expression, is the most powerful, unbiased method for quantitative, genome-wide expression analysis. Unlike arrays, SAGE™ enables you to analyze every transcript in a cell, giving you a comprehensive expression profile. SAGE™ is quantitative and extremely sensitive so you can find low-abundance transcripts, detect up- or down-regulated genes, measure a compound's effect on expression, and identify novel genes.

The Path to Success. With the I-SAGE™ Kit, we've made SAGE™ significantly easier to implement. The I-SAGE™ Kit provides you with a complete set of pre-qualified, performance-guaranteed reagents. There's no sourcing, ordering, or testing reagents, saving you time and ensuring your SAGE™ success.

Set your sights on quantitative gene expression analysis with the I-SAGE™ Kit. For more information, contact Invitrogen today.



Circle No. 8 on Readers' Service Card

SAGE™ is a trademark of Genzyme Corporation. Genzyme is a registered trademark and service mark of Genzyme Corporation.

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:

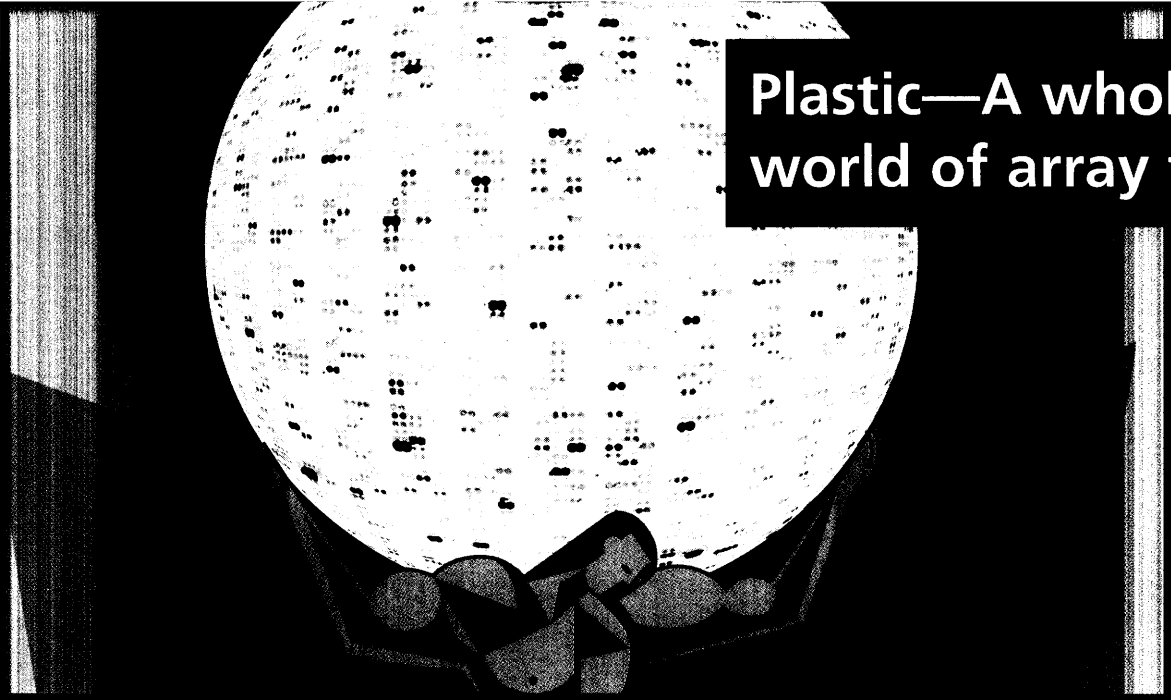
Invitrogen Ltd
3 Fountain Drive
Inchinnan Business Park
Paisley PA4 9RF UK
Tel/Toll Free Phone Orders: 0800 269 210
Tel/General Enquiries: 0800 5345 5345
Fax: +44 (0) 141 814 6287
Email: eurotech@invitrogen.com

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

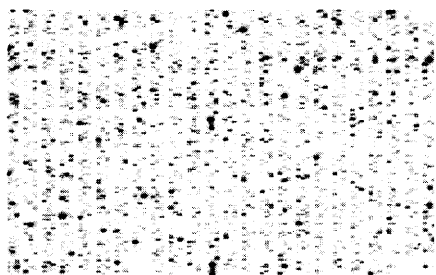
Spain & Portugal 900 181 461
Sweden 020 26 34 52
Switzerland 0800 848 800
Taiwan 2 2651 6156
UK 0800 838 380
Other countries see our website



Plastic—A whole new world of array technology.

Atlas™ Plastic Human 8K Microarray

Illustration inspired by the art of Juan Gris (1887–1929) & Piet Mondrian (1872–1944).



Expression profiling of diabetic human skeletal muscle using the Atlas™ Plastic Human 8K Microarray. 10 µg of total RNA from diabetic human skeletal muscle tissue was isolated and labeled with ³²P using the Atlas™ Pure Total RNA Labeling System (#K1038-1). The probe was hybridized to the Atlas Plastic Human Array according to the User Manual.

If you are considering using plastic microarray technology, try our new Atlas™ Plastic Microarray Trial Kit (#K1845-1), which includes a plastic microarray spotted with long oligos representing 100 well-characterized human genes.

For more information, go to atlas.clontech.com.

Now you can screen all named human genes in a single experiment. The Atlas™ Plastic Human 8K Microarray (#7905-1) contains sequences from more than 8,300 named genes printed in duplicate on our new plastic support surface. Like our glass microarrays, we print our plastic microarrays with thoroughly tested long oligo-nucleotides (~80 bases) so that each spot's identity is confirmed. In addition, we have calibrated each microarray using calibration standards for the most accurate cross-lot comparisons.

Plastic provides many of the benefits of both our nylon and glass arrays, with some powerful new ones. Like glass, plastic arrays are nonporous, which greatly decreases nonspecific background. Like nylon arrays, these films require no special equipment for imaging (just a standard phosphorimager), and can be stripped and reprobed. As an added bonus, the rigid plastic retains its shape upon stripping and reprobing, which allows quick and easy template alignment for high-throughput image analysis.

Call and order today!

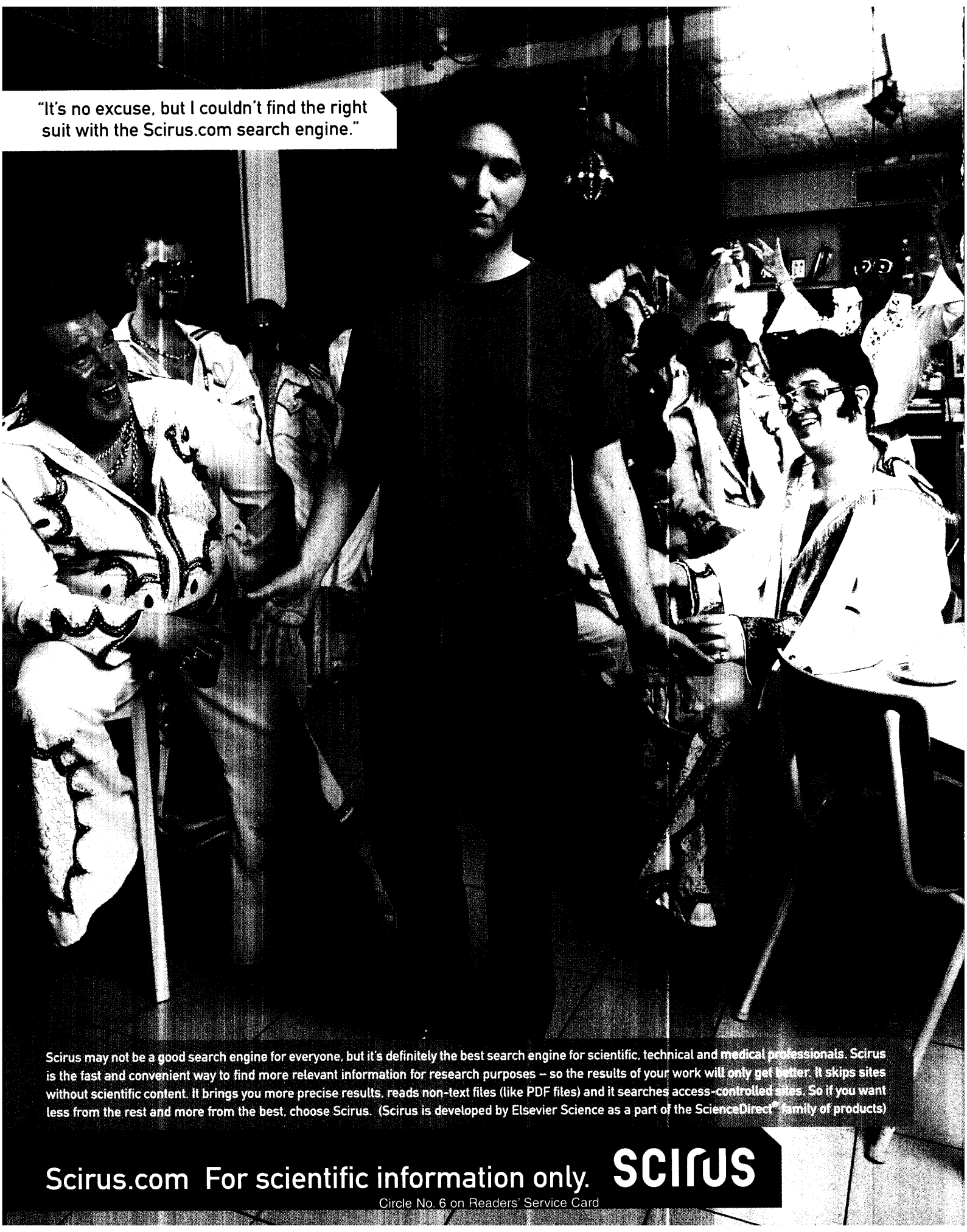
BD Biosciences

Clontech
Discovery Labware
Immunocytometry Systems
Pharmingen



BD Biosciences Clontech

Visit www.clontech.com or call (800) 622-2566 (CLON) to order



"It's no excuse, but I couldn't find the right suit with the Scirus.com search engine."

Scirus may not be a good search engine for everyone, but it's definitely the best search engine for scientific, technical and medical professionals. Scirus is the fast and convenient way to find more relevant information for research purposes – so the results of your work will only get better. It skips sites without scientific content. It brings you more precise results, reads non-text files (like PDF files) and it searches access-controlled sites. So if you want less from the rest and more from the best, choose Scirus. (Scirus is developed by Elsevier Science as a part of the ScienceDirect® family of products)

Scirus.com For scientific information only. **SCIRUS**

Circle No. 6 on Readers' Service Card

We've packaged experience.

- The industry standard for over 40 years
- Broad range of standard and custom formulations
- Continuous innovation

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

www.invitrogen.com

GIBCO Cell Culture

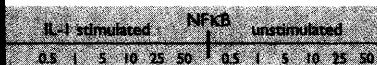
Invitrogen Corporation

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. 10 on Readers' Service Card

IT WORKED OK,

BUT THEN AGAIN,



μg of cell lysate

OLD

VS.

NEW

SEE THE FUTURE

transAMTM

The future in studying transcription activation.

Trans-AM combines high sensitivity with high throughput in assaying activation of transcription factors from mammalian tissue or cell extracts.

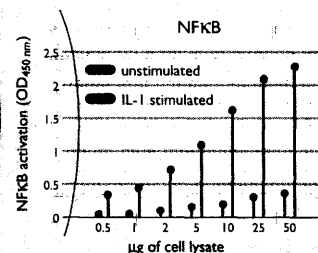
Trans-AM NFκB uses an oligonucleotide containing an NFκB consensus site immobilized to a 96-well plate at high densities*. The active form of NFκB contained in cell extracts specifically binds to this oligonucleotide. Trans-AM uses an ELISA format with colorimetric readout.

Trans-AM allows accurate quantitation in matter of hours instead of days. Radioactive probes, endless gel exposure, troublesome cloning or inefficient cell transfection is no longer required to measure transcription factor activation. Inconsistencies due to variable reporter plasmid transfections are eliminated as is the need to construct stable cell lines carrying reporter genes.

Trans-AM NFκB p50 and p65 assay kits are now available.

Trans-AM API and Trans-AM CREB coming soon!

* Technology covered by AAT filed patents and licensed exclusively to Active Motif.



Applications in signaling pathway investigation:

- Drug screening and/or potency
- Inhibitor or activator protein study
- Cytokine stimulatory effect
- Protein structure/function study

Advantages:

- Procedure 10-fold more sensitive than gel shift
- Yields result in less than 3.5 hrs
- Allows quantitative study from cell or tissue extract
- Compatible with high-throughput systems
- Non radioactive assay, no cell transfection hassles

Active Motif carries a line of antibodies to the NFκB pathway for further analysis.

Antibodies: A20 Phosphorylated-Akt1 IKKα Phosphorylated-IκBα IKKβ IKKγ TBK1 IRAK-1 IRAK-2 MyD88 NFκB p65 RANK TAB1 TRAF2 TRAF5 TRAF6

ACTIVE MOTIF

Cell Biology Tools for Gene Discovery

PCR Cloning?

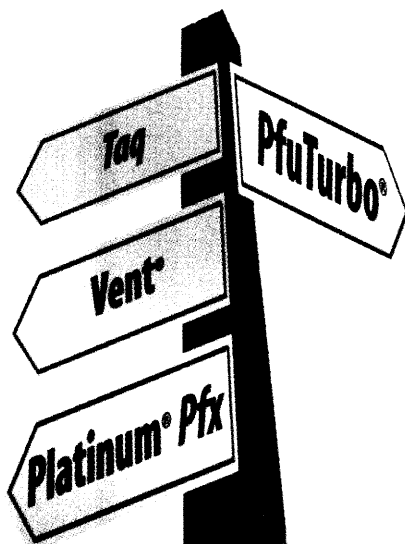
The Enzyme with the Best Accuracy
is the Fastest Road to Success

PfuTurbo
DNA POLYMERASE

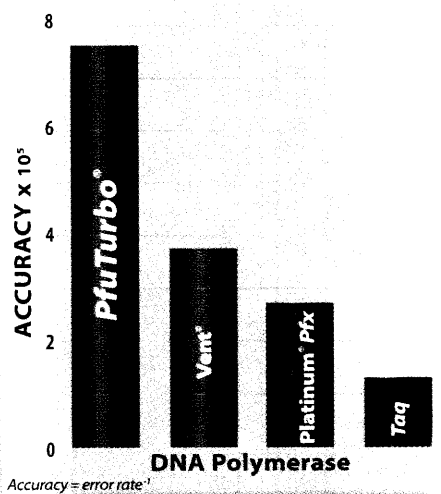
Hot-start
Version
Available!

Why risk getting the wrong PCR clone? Even with a 1 kb target, *Taq* introduces significantly more errors than *PfuTurbo*^{*} DNA polymerase^{*,†}, often resulting in the wrong clone. Using *PfuTurbo* DNA polymerase means getting the results you want faster and with confidence.

We started with *Pfu*^{**†} the highest-fidelity enzyme available, and added a novel PCR enhancing factor^{***} that boosts PCR performance. *PfuTurbo* DNA polymerase gives precise accuracy plus robust yields for targets up to 19kb. *PfuTurbo* Hotstart DNA polymerase adds hot-start capability!



- Ideal for cloning
- Robust product yields
- Best accuracy available
- Available in hot-start version
- Amplifies up to 19kb genomic targets
- Minimizes the chance of unwanted errors



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

STRATAGENE EUROPE
Belgium, Germany, The Netherlands,
Switzerland, United Kingdom
European Toll-Free Numbers
ORDER: 00800 7000 7000
TECHNICAL SERVICES: 00800 7400 7400
Austria
0800 312 526
France
00800 7000 7000 or 0800-100391

INTERNET
email: techservices@stratagene.com
website: www.stratagene.com

^{*} U.S. Patent No. 5,545,552 and 5,866,395 and 5,948,663 and 6,183,997 and patents pending

^{**} U.S. Patent No. 5,545,552 and 5,866,395 and 5,948,663 and patents pending

^{***} U.S. Patent No. 6,183,997 and patents pending

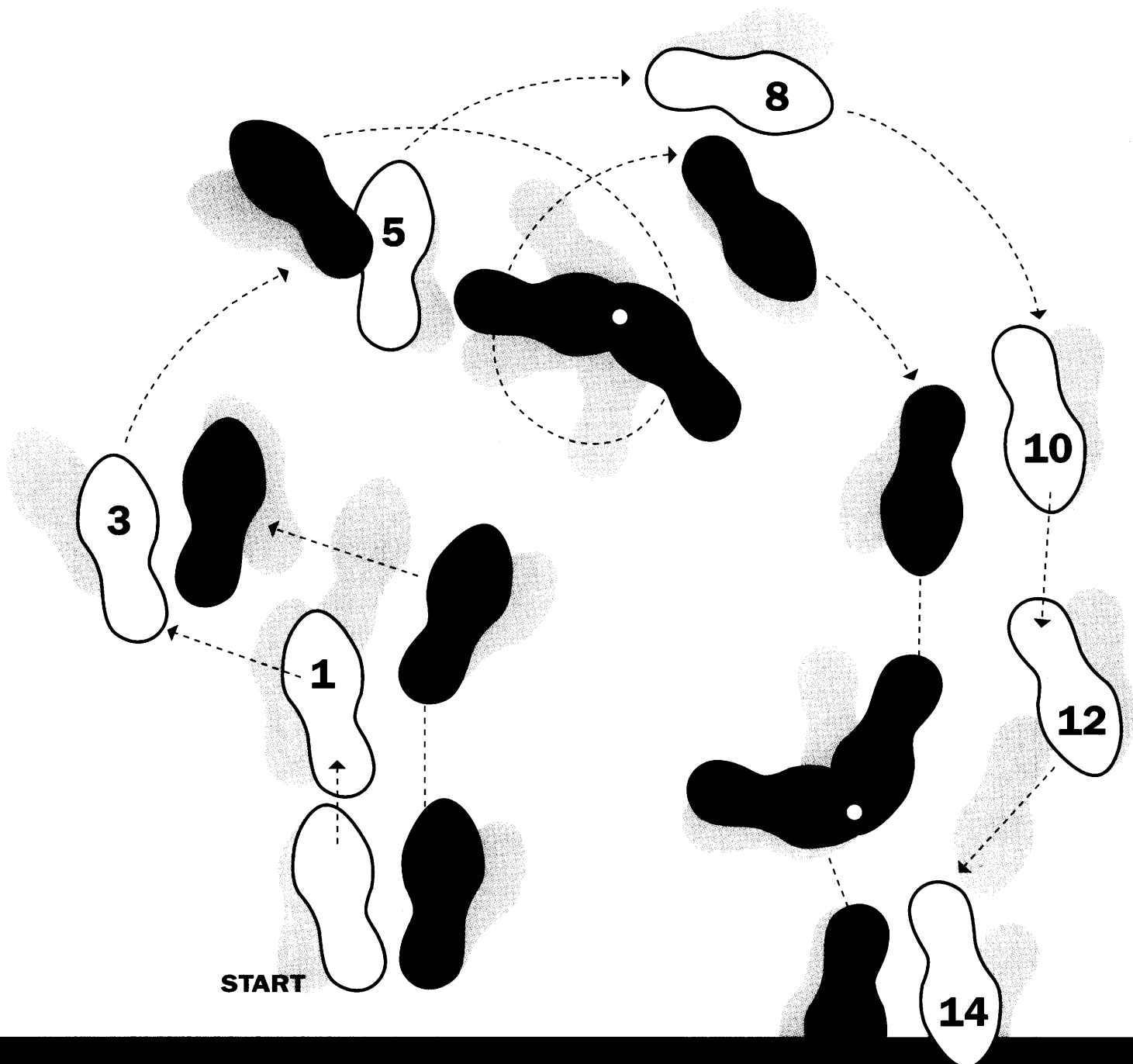
[†] Purchase of these enzymes is accompanied by a license to use them in the Polymerase Chain Reaction (PCR) process in conjunction with an Authorized Thermal Cycler. Stratagene's PCR products are sold under licensing arrangements with Roche Molecular Systems, Inc., F. Hoffmann-La Roche and PE Biosystems.

Turn to *PfuTurbo*[®] DNA polymerase
for all your PCR cloning!

PfuTurbo[®] DNA polymerase 100U #600250
PfuTurbo[®] Hotstart DNA polymerase 100U #600320



STRATAGENE[®]



Apoptosis detection without getting tangled up in too many steps.

Promega's CaspACE[®] FITC-VAD-FMK In Situ Marker simplifies apoptosis determination... just add, wash, read. Fewer steps means your experiment works the first time, and every time.

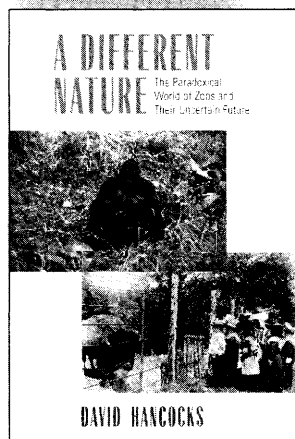
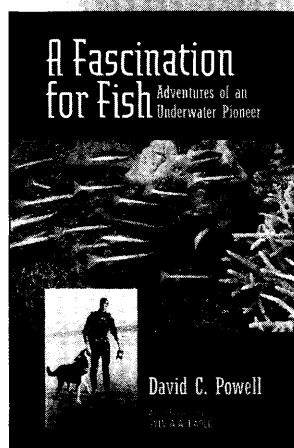
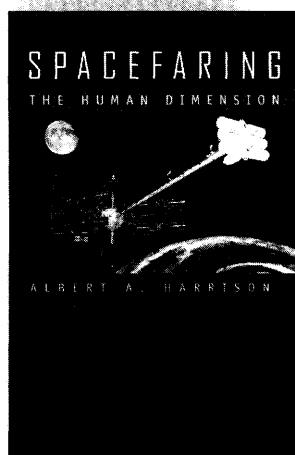
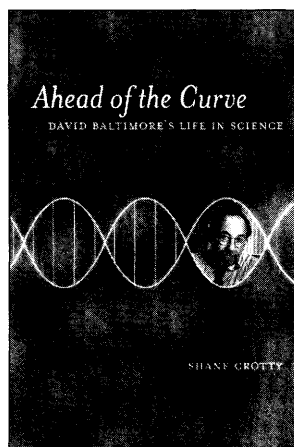
Get 50% off a sample size now!

Go to www.promega.com/cellsig/vad1 for product and ordering details. It's just one of the many solutions Promega offers for apoptosis.



Promega

From the INNER CELL to OUTER SPACE



AAAS Atlas of Population and Environment

Text by Paul Harrison and Fred Pearce
Foreword by Peter H. Raven

The *Atlas* is an important analysis of the relationships between human population and the environment. Illustrating how population factors such as rates of growth, density, movement, and resource consumption, along with the use of certain technologies, affect the world's ecosystems and natural resources both in the short and long term, it brings together a wealth of information from the most up-to-date sources.

\$65.00 hardcover, \$29.95 paperback

Ahead of the Curve

David Baltimore's Life in Science

by Shane Crotty

"Crotty writes with the drive and energy characteristic of his subject, David Baltimore, capturing the pulse of the life and times of a great scientist whose life has not only been spiked with the exhilaration of scientific discovery, but enmeshed in public science policy and politics and concerned with the building of great institutions."

—Thomas Cech, Nobel Laureate and President,
Howard Hughes Medical Institute

\$29.95 hardcover

Spacefaring

The Human Dimension

by Albert A. Harrison

"An enjoyable, informative look at what living and working in space will really be like.... A great read for space professionals or anyone interested in the future of our species as we expand into the 'final frontier.'"

—Patricia Santy, former NASA flight surgeon and
author of *Choosing the Right Stuff*

\$27.50 hardcover

A Fascination for Fish

Adventures of an Underwater Pioneer

by David C. Powell

Foreword by Sylvia A. Earle

"He's an engaging writer, sweeping us up in his enthusiasm for his subject, showing us the alien undersea world in a way we've never seen it before.... An excellent autobiography and an impassioned plea for the preservation of marine life." —*Booklist*

\$29.95 hardcover

A Different Nature

The Paradoxical World of Zoos
and Their Uncertain Future

by David Hancocks

"Giraffes, elephants, gorillas, snakes, and toucans respond poorly to the usual conventions of human architecture. Zoo architects usually respond no less poorly to the needs of animals. Hancocks draws on a lifetime's experience...to explore this dilemma, and offers a compelling vision for the future.

This is an important book." —William Conway,
former President and General Director of the
Wildlife Conservation Society and the Bronx Zoo

\$35.00 hardcover

The Aurelian Legacy

British Butterflies and Their Collectors

by Michael A. Salmon

With additional material by Peter Marren
and Basil Harley

This entertaining and informative book traces the history of butterfly collection in Britain from the seventeenth century, when the study of natural history had its beginnings.

\$35.00 hardcover

NEW IN PAPERBACK

Genes, Peoples, and Languages

by Luigi Luca Cavalli-Sforza

"A thoroughly readable account of some of the most fascinating ideas around."

—*The New Scientist*

\$15.95 paperback

Life's Matrix

A Biography of Water

by Philip Ball

With a New Preface

"A tour de force of scientific exposition.... A reader can learn more interesting chemistry, physics, biology, geology, and environmental science from this volume than from a collection of reference books."

—*Philadelphia Inquirer*

\$16.95 paperback

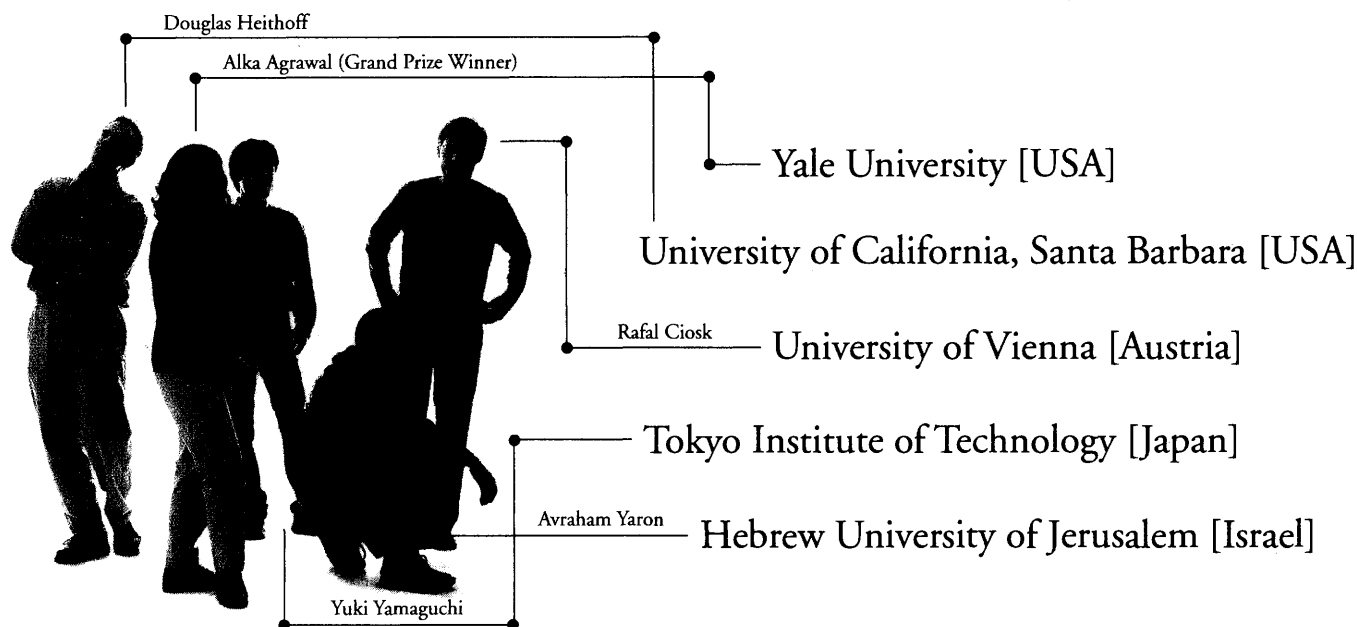
At bookstores or order (800) 822-6657

**UNIVERSITY OF
CALIFORNIA PRESS**

www.ucpress.edu

Award-winning

research completed at:



(PUT YOUR SCHOOL ON NEXT YEAR'S LIST.)

Did you complete your Ph.D. in molecular biology* in 2000? If so, then here's a chance to gain international acclaim for yourself and the research being conducted at your school. Just describe your work in a 1,000-word essay. Then submit the essay for entry into the 2001 Amersham Pharmacia Biotech & *Science* Prize.

The essay will be reviewed by a panel of distinguished scientists, who will then select one grand prize winner and up to seven other winners.

The grand prize winner will:

- get his or her essay published in *Science*
- receive US\$25,000
- win a trip to attend the award ceremony

AMERSHAM PHARMACIA
BIOTECH & SCIENCE
prize
FOR YOUNG
SCIENTISTS

Young Scientist Prize Selection Committee
Science
1200 New York Avenue, NW
Room 1049B
Washington, DC 20005
USA

Young Scientist Prize Selection Committee
Science International
Bateman House
82-88 Hills Road
Cambridge, CB2 1LQ
UNITED KINGDOM

* For the purpose of this prize, molecular biology is defined as "that part of biology which attempts to interpret biological events in terms of the physico-chemical properties of molecules in a cell" (McGraw-Hill Dictionary of Scientific and Technical Terms, 4th Edition).

All other winners will receive US\$5,000 and a trip to the award ceremony. Your essay may be submitted in English, French, German, Spanish, Japanese or Chinese (Mandarin). The closing date for entries is July 16, 2001. The Prize has existed since 1995 and is offered as a means to motivate students in the hope that they will continue their scientific research efforts.

Put your work (and face) in *Science*. Go to www.apbscienceprize.org where you can read the full details as well as submit your entry form. Or use the contact details (left) to find out more.

Science


amersham pharmacia biotech



CAYMAN CHEMICAL....HELPING MAKE RESEARCH POSSIBLE

COX-1/COX-2

Chemiluminescent Inhibitor Screening Assay
Selective Inhibitors
COX Activity Assay
Recombinant Human COX-2

Immunoassays

PGE₂
8-Isoprostane
cAMP & cGMP
LTB₄
TXB₂
Histamine

Nitric Oxide

NO₂/NO₃ Assay Kits
Colorimetric & Fluorometric
sGC Antibody
NO Donors
NOS Enzymes & Antibodies

Neurochemistry

CGRP EIA Kit
CB₁ & CB₂ Receptor Antibodies
Anandamides
Prion Protein Antibodies

Obesity

15-deoxy $\Delta^{12,14}$ PGJ₂
PPAR γ Polyclonal Antibody
Leptin EIA Kit



1180 E. Ellsworth Rd.
Ann Arbor, MI 48108

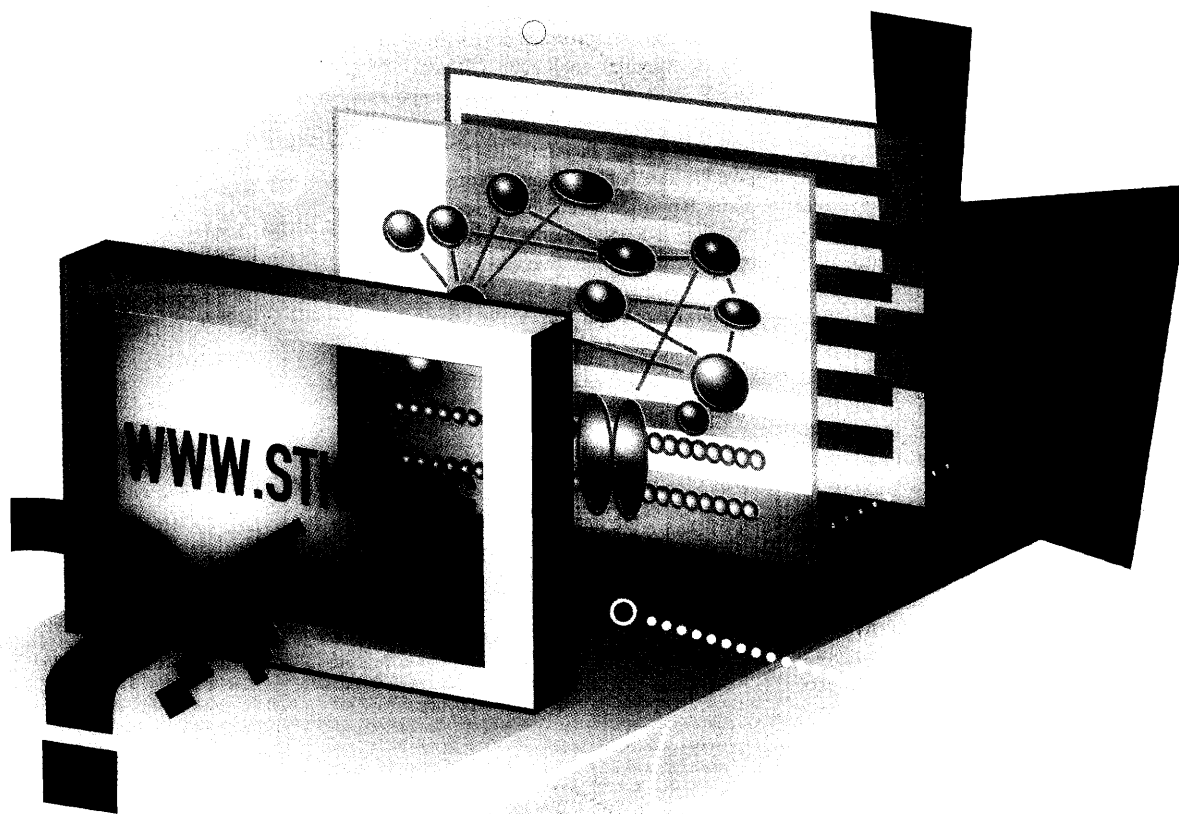
1-888.364.9897

Phone 734.971.3335

Fax 734.971.3420

**For more information on these and
our entire product line, visit us at
www.caymanchemical.com/science**

Circle No. 17 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 STKE* puts you on the right path for all the latest signal transduction knowledge.

Whether you are in an academic or industrial environment, *STKE* will suit all your needs. Even if you're not specifically involved in the field of signal transduction, we offer special features and options spanning multiple biological disciplines.

STKE is updated weekly and provides the perfect combination of quick summaries and full text access to research papers from 23 publishers and over 40 respected scientific journals. To subscribe to *STKE*, or for more information, visit *STKE* at www.stke.org and click

subscription information, or contact AAAS at (202) 326-6417 or membership2@aaas.org.

No one can know where new insights in signal transduction might lead you, but *STKE* will help you find the right path.

Science's
stke

You're on the right path™

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

www.stke.org



DISCOVER THE DRUG TARGET REVOLUTION WITH..

CURRENT DRUG TARGETS

Current Drug Targets is a new series of innovative review journals from Bentham Science Publishers. The journals aim to cover all the latest and outstanding developments on the medicinal chemistry, pharmacology, molecular biology, genomics and biochemistry of contemporary molecular targets involved in disorders. *Current Drug Targets* is essential reading for all biomedical and pharmaceutical scientists.

The following journals are:

Launch date May 2001:

CURRENT DRUG TARGETS

Cardiovascular & Hematological Disorders

Editor-in-Chief

Alexandra Lucas

(The John P. Roberts Research Institute, ON, Canada)

CURRENT DRUG TARGETS

Cancer (Current Cancer Drug Targets)

Editor-in-Chief

John K. Buolamwini (University of Tennessee, TN, USA)

CURRENT DRUG TARGETS

Infectious Disorders

Editor-in-Chief

Robert C. Goldman (National Institutes of Health, MD, USA)

CURRENT DRUG TARGETS

Immune, Endocrine & Metabolic Disorders

Co-Editors-in-Chief

Emilio Jirillo (University of Bari, Bari, Italy)

Michael Quon (National Institutes of Health, MD, USA)

Launch date January 2002:

CURRENT DRUG TARGETS

CNS & Neurological Disorders

Editor-in-Chief

Ian McDonald (Structural Bioinformatics, Inc., CA, USA)

CURRENT DRUG TARGETS

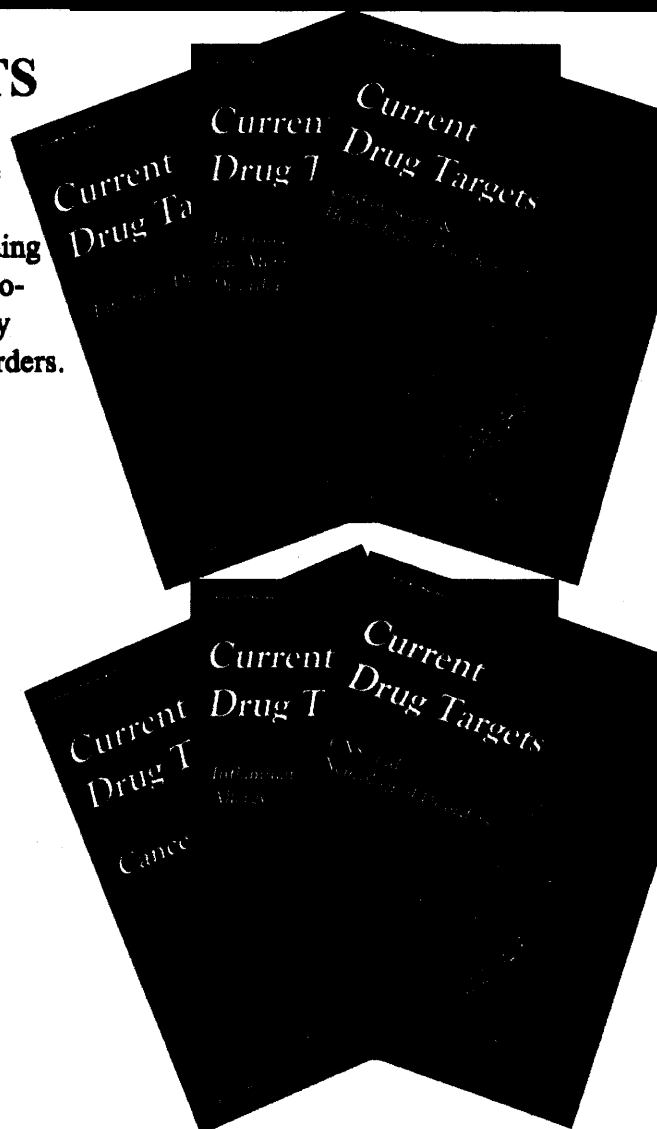
Inflammation & Allergy

Co-Editors-in-Chief

Cheuk K. Lau (Merck Frosst Centre, Quebec, Canada)

Philip J. Vickers (Pfizer Inc., Groton, CT, USA)

BENTHAM SCIENCE PUBLISHERS



All articles are:

- Comprehensive and authoritative
- Available online and in print
- Written by leaders in the field
- Subject to peer-review
- Published rapidly

To request, view a sample copy or to subscribe visit:

www.bentham.org

or please contact:

E-mail: shidding@worldonline.nl

Fax: +31-35-698-0150

Circle No. 14 on Readers' Service Card

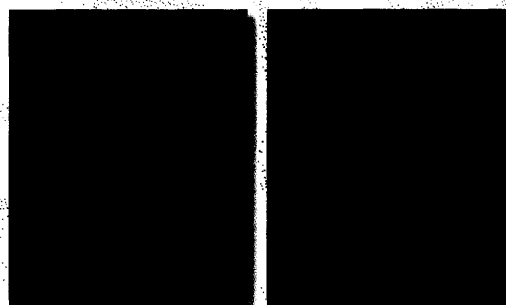
It's likely your expression arrays have been producing false data.

It's now likely they'll never do it again.



Submicro™ Expression
Array Detection Kit

Differential Array Pattern without Primer (Labeling of Genomic Contamination)



3DNA Submicro Direct Incorporation

*Human heart vs. human placenta,
4 µg per channel total RNA for 3DNA Submicro labeling,
20 µg per channel total RNA for direct incorporation.*

Your arrays are showing great differentials. But are they real, or just an artifact of genomic contamination?

The problem begins with using total RNA and conventional dye incorporation labeling methods for gene expression arrays.

Total RNA typically contains some genomic DNA contamination. Unfortunately, the RT enzyme used to generate the cDNA will label the genomic DNA along with the RNA.

As a result, labeling your sample with any method that incorporates labeled nucleotides can produce false data. This can take the form of false positives, when the genomic DNA labels differentially and creates the appearance of differential expression. As well as false negatives, when a strong but balanced signal from the genomic DNA masks a weak, but real, differential.

Clearly, this is a very big problem.

Fortunately, we've found a very big solution: Genisphere's new 3DNA Submicro labeling system is immune to data corruption caused by genomic contamination.

With the Submicro system, the labels are loaded on to our proprietary 3DNA nucleic acid dendrimer, not into the cDNA. So genomic contamination, even if present in your sample, can't generate a signal. You can be assured that what you see is gene expression and nothing else.

See additional data on the effect
of genomic contamination at:
www.genisphere.com/genomic

Genisphere Inc. 14 Philips Parkway Montvale, NJ 07645
Tel 877.888.3DNA 201.651.3100
Fax 877.FAX.3DNA 201.651.3116

Genisphere, 3DNA and Submicro are trademarks of Datascope Corp.

Genisphere®

A DATASCOPE COMPANY

Circle No. 1 on Readers' Service Card

NEW PRODUCTS

SmartDraw SmartDraw.com

San Diego, CA
\$49; Professional, \$99;
Professional Plus, \$198
800-501-0314
www.smartdraw.com

DRAWING SMARTLY

SmartDraw Professional is an interesting drawing program that does a reasonable job of providing drawing functions for scientists using Windows. The program is adequate for general-purpose object drawing, but users with an interest in the application's specialized

clip art libraries will benefit the most.

Drawings can be designed from scratch, using a standard set of drawing tools or, more easily, by "grabbing" and arranging clip art images from an extensive collection in the software. General categories of scientific clip art templates include electrical engineering, maps or geography, and science or math. Users can also import objects to expand existing libraries. Common clip art formats that can be imported include WMF, PostScript, and DXF. Clip art objects used by the program are vector-based, so they can be re-scaled without pixelation. An impressive collection of specialized scientific images includes objects for astronomy, biology, chemistry, equipment, safety, symbols (Greek, math), and meteorology. SmartDraw Professional also provides a fast search engine for navigating through the masses of clip art. A panel in the main window provides a view of the individual art library directories. Objects in a SmartDraw Professional document can be hyperlinked to other files created by the program, to a URL, or to a document created by a separate application. SmartDraw Professional supports import of objects created by Windows programs that use the object linking and embedding (OLE) standard.

Resizing of some objects produces unexpected results for major reductions or enlargements. Difficulties occur primarily when the original object is composed of multiple elements, such as lines and text. Attempts to color the interior of some objects, such as benzene rings were not successful, though other objects were easy to fill. Gradient fills are not supported. A curious problem arose in coloring the border of a pentane ring from clip art. Several new lines became visible in it and could not be erased. A phone call to the program's tech support team helped fix the problem, however.

The program comes in three configurations, SmartDraw Standard, SmartDraw Professional, and SmartDraw Professional Plus, each of which vary primarily in the number of template libraries packaged with it. SmartDraw Professional is worth its asking price, primarily for its clip art templates and its ease in drawing scientific figures. However, the program's lack of support for sophisticated drawing features, such as gradient fills and text on paths, as well as its quirks in resizing objects, make it a less than comprehensive solution for scientific illustration.

—Kevin Ahern

Department of Biochemistry and Biophysics, Oregon State University, Corvallis, OR 97331, USA. E-mail: ahernk@ucs.orst.edu

Stratagene

For more information call
800-894-1304 or
circle 139
on the Reader Service Card
www.stratagene.com

PCR MUTAGENESIS KIT

The GeneMorph polymerase chain reaction (PCR) kit produces a broad spectrum of random mutations suitable for constructing mutant libraries for protein evolution and structure-function studies. The kit features Mutazyme DNA

polymerase, an error-prone DNA polymerase that produces all possible transition and transversion mutations with minimal bias.

It has distinctly different mutational spectra from that of *Taq* DNA polymerase. Errors are easily controlled and introduced during PCR at low, moderate, and high mutation frequencies using a single set of robust reaction conditions.

Ambion

For more information call
800-888-8804 or
circle 140
on the Reader Service Card
www.ambion.com

HIGH-THROUGHPUT RNA ISOLATION

The RNAqueous-96 RNA Isolation Kit is suitable for the isolation of total RNA from cells or tissue in a high-throughput, 96-well plate format. The kit provides high yields of pure RNA, free of

contaminating ribonucleases and genomic DNA, compatible with both real-time and end-point reverse transcriptase-polymerase chain reaction analysis. The kit is compatible with many high-throughput vacuum manifolds and centrifuges.

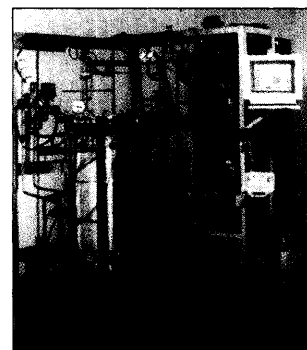
Pierre Guérin

For more information call
(33) 5 49 26 30 58 or
circle 141
on the Reader Service Card
www.pierregeruin.fr

BIOREACTORS

The new Classic line of bioreactors combines ease of installation and use with a patented impeller design that provides high oxygen transfer and thermal performance. The bioreactors are available in both laboratory and pilot plant sizes

and in both standard "S" design and the "G" design that complies with Good Manufacturing Practice standards of the U.S. Food and Drug Administration. The bioreactors are equally suitable for growth of bacterial or cell cultures. The Classic bioreactors come with an easy-to-use, Windows-based operator interface and software that optimizes batch, fed-batch, and continuous operation. The software includes cascade and control profiles, calculation of derived variables, sequence programming, and batch recipes. Laboratory models are available in sizes from 2.6 to 8 gallons and pilot plant models in sizes from 10.6 to 73 gallons. All models can be cleaned in place and sterilized by injection of steam into the vessel or jacket.



BD Biosciences

For more information call
800-343-2035 or
circle 142
on the Reader Service Card
www.bd.com

INVASION SYSTEMS

The BD BioCoat FluoroBlok Invasion System provides an integrated, automation-friendly cell culture insert system designed to automate the process of screening for tumor cell invasion with real-time fluorescence and nondestructive

sample detection. The system consists of a patented FluoroBlok membrane (8- μ m pore size) that blocks the transmission of light from 490 nm to 700 nm. The FluoroBlok membrane is uniformly coated with BD Matrigel Matrix, which serves as a reconstituted authentic basement membrane in vitro, providing a true barrier to noninvasive cells while presenting an appropriate protein structure for invading cells to penetrate and pass through the membrane.

CONTINUED ON PAGE 1560

Because the FluoroBlok membrane blocks the fluorescence of labeled cells that have not invaded through the membrane, only those cells that appear on the underside of the membrane are quantitated in real time by fluorescence, providing a signal that can be indirectly correlated to cell number. The system is suitable for use in the drug discovery process of pharmaceutical secondary cell-based screening of prospective antimetastatic compounds.

PanVera

For more information call
800-791-1400 or
circle 143
on the Reader Service Card
www.panvera.com

LABELED DNA MARKERS

Load 'n Glo Markers are labeled DNA size markers developed for use primarily in nonradioactive Southern blot applications. The markers are available labeled with biotin, digoxin, dinitrophenyl, or fluorescein. The markers are formulated to allow visualization through ethidium bromide staining of the gel or enzymatic detection of the specific epitope after blotting to a membrane.

Precision

For more information call
800-621-8820 or
circle 144
on the Reader Service Card
www.precisionsci.com

QUIET CENTRIFUGE

The Duraforce 100 centrifuge features a maintenance-free induction motor that generates only 57 dBA at maximum speed. It has a bench footprint of only 15 inches by 18 inches, but a tube capacity of 12 5-ml, 7-ml, or 10-ml blood tubes in the sealed, swing-out rotor. It is constructed of rugged steel, and all sealed accessories are certified for aerosol containment. A digital imbalance detection system and double-lid interlock system offer an extra measure of protection.

Bangs Laboratories

For more information call
800-387-0672 or
circle 145
on the Reader Service Card
www.bangslabs.com

COATED BEADS

The QuantumPlex product line includes beads coated with goat anti-mouse IgG and streptavidin available in 4.4 and 5.5 micron sizes. Each kit consists of 5 or 10 bead sets, dyed with varying amounts of Starfire Red dye and suitable for use with any flow cytometer. Goat anti-mouse IgG coating permits conjugation of mouse monoclonal antibody, and streptavidin allows binding of biotinylated ligands. A 10-bead kit allows users to detect up to 20 analytes per sample or analyze 10 samples for two analytes.

ICN Biomedicals

For more information call
800-854-0530 or
circle 146
on the Reader Service Card
www.icnbiomed.com

MYCOPLASMA REMOVAL AGENT

Mycoplasma Removal Agent kills a variety of mycoplasma species in culture by inhibiting mycoplasma DNA gyrase. Cytotoxicity of this antibiotic is low and cell toxicity is rare when used at the recommended concentration of 0.5 µg/ml. Each vial can decontaminate up to 25 cultures.

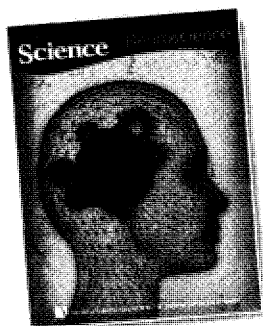
Metallized Products

For more information call
781-729-8300 or
circle 147
on the Reader Service Card
www.webmpi.com

SUPER-INSULATING FILMS

A line of thin-film insulating materials combines light weight, thermal reflectivity, moisture resistance, and flexibility. NRC-2 Super Insulating Films are made from polyester film with a heavy, high-purity aluminum coating on one or two sides to provide a flexible, moisture-resistant thermal barrier.

The Best of Science—Neuroscience



The most important and comprehensive neuroscience research in one complete volume

Full-text articles and reports straight from the pages of *Science*—complete and unabridged

Special introduction from Floyd E. Bloom, former Editor-in-Chief of *Science*

The Best of Science—Neuroscience brings you the best work we've published in this field. These full-text articles and reports comprise the most comprehensive collection of neuroscience research ever available from *Science*—all in one limited-edition breakthrough volume essential to every reference desk and shelf.

Science
Discover the Future

**AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE**



YES! Please send me my copy of *The Best of Science—Neuroscience* as soon as possible to address below.

☐ AAAS Member Price

AAAS Membership Number (required)

US.....\$19.95 \$17.45 Outside US.....\$23.95 \$21.95

☐ Non-Member/Institution Price

US.....\$29.95 \$27.95 Outside US.....\$33.95 \$31.95

Name _____
Address _____
City _____ State/Province _____ Zip/Postal Code _____
Email _____
Phone _____

Payment Method:

Please send me _____ copies of *The Best of Science—Neuroscience*.

☐ Check Enclosed for \$ _____.

☐ Please charge \$ _____ to my credit card.

☐ VISA ☐ MasterCard ☐ American Express

Credit Card No. _____ Expiration Date _____

Signature _____ Date _____

Place this form in an envelope and mail to:

Neuroscience Compendium • AAAS • 1200 New York Avenue NW;
Room 1209 • Washington, DC 20005

Or FAST FAX your order to us at 202-842-1065. (Credit Card Only.) Prices listed include shipping and handling. Please allow 6-8 weeks for delivery.

er. Featuring a crinkled finish to minimize conductive heat transfer and thermal short circuiting in multilayering applications, these 25-gauge thin films are highly reflective and conformable and will not outgas in a vacuum. Suited for cryogenic, aerospace, medical device, protective garment, and energy management applications, they are available in a variety of formats.

Vision Engineering

For more information call
860-355-3776 or
circle 148
on the Reader Service Card
www.visioneng.com

MICROSCOPE EYEPIECE FOR USE WITH GLASSES

The ISIS accessory replaces traditional eyepieces on binocular stereo and research microscopes. Without any loss in resolution, ISIS offers a substantial increase in the distance between a user's eyes and the microscope itself. The 38-mm viewing distance allows operators to wear prescription or safety glasses and to avoid physical contact with the unit. With traditional microscope eyepieces, the slightest movement of one's pupil results in losses in the field of vision. ISIS overcomes the typical requirement of users to precisely align their eyes with the center of each eyepiece, offering optimal viewing regardless of the pupil's position relative to the eyepiece. ISIS slides into the host microscope tubes in the same fashion as the original eyepieces. ISIS can be retrofitted to microscopes manufactured by Leica, Nikon, Olympus, Wild, Zeiss, and others.



Barnstead/Thermolyne

For more information call
319-556-2241 or
circle 149
on the Reader Service Card
www.barnstead.com

DRY HEAT BATH

The DIGI-BLOCK dry-bath provides safe, dry heat for a variety of clinical and general chemistry applications. The unit has interchangeable blocks to accommodate test tubes, microcentrifuge tubes, and cuvettes with an aluminum plate under the blocks to ensure even heat distribution. A thermometer and calibration block enable users to calibrate the digital display against a reference thermometer traceable to the National Institute of Standards and Technology.

Electron Microscopy Sciences

For more information call
215-646-1566 or
circle 150
on the Reader Service Card
www.emsdiasum.com

LITERATURE

A Galaxy of Products for Microscopy and Histology is a catalog with a line of research and clinical-related products for the fields of microscopy, histology, neuroscience, cell biology, anatomy, materials science, and more. Items include tissue processors and tissue slicers, digital cameras and software, microwave ovens, vacuum equipment, critical-point dryers, cryogenics supplies, diamond knives, tweezers, microtomy tools, chemical and embedding kits, 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.

TRI Reagent® Solutions For TOTAL RNA ISOLATION

The classic single-step method has been significantly improved to provide higher yields, a shorter protocol and higher quality RNA from difficult sources! (Anal. Biochem. 225:163. 1995. Biotechniques. 19:942. 1995.)

TRI REAGENT® TRI REAGENT® LS TRI REAGENT® BD
• for cells and tissues • for liquid samples • for whole blood and plasma

MRC

MOLECULAR RESEARCH CENTER, INC.
5645 Montgomery Rd.
Cincinnati, OH 45212
Phone: 513-841-0900
888-841-0900
Fax: 513-841-0080
E-mail: info@mrcgene.com

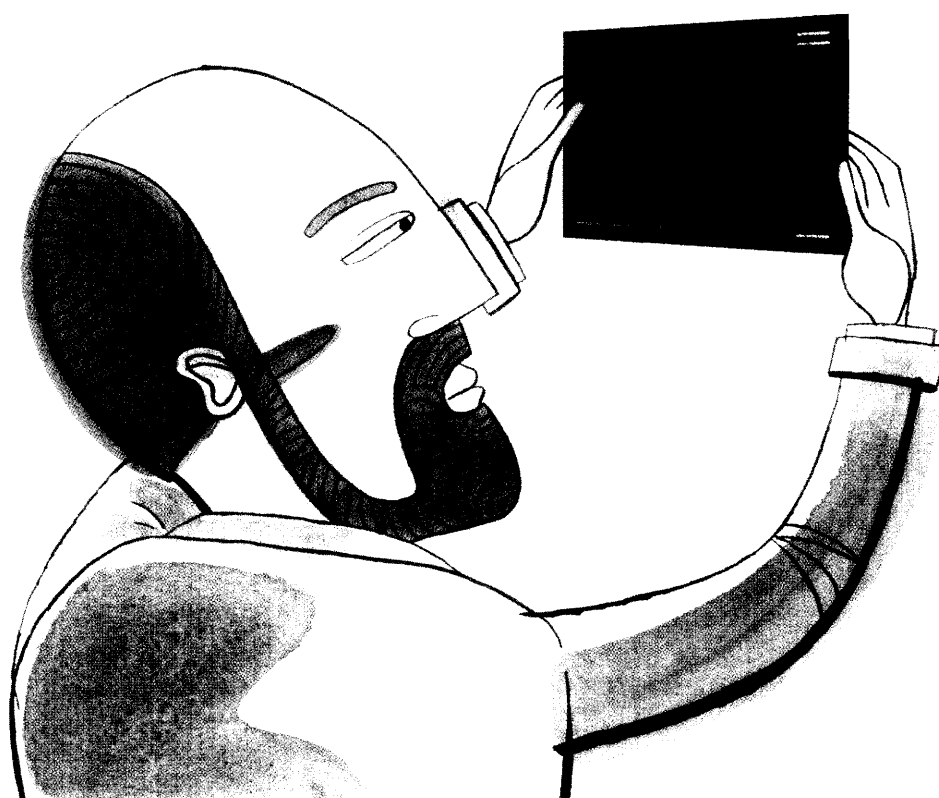
Visit our website at:
<http://www.mrcgene.com>



- Can be used to simultaneously isolate RNA, DNA and proteins.
 - Isolates high quality RNA in less than one hour.
- Costs less than \$1 per sample (100 mg tissue or 10⁷ cells; 0.1 - 0.8 mg of total RNA)
 - Effective with cells, tissues, liquid samples and blood.
- Isolated RNA is ready for Northern blotting, RT-PCR, and other applications.

International distributors available in the following countries: Australia, Austria, Benelux, Canada, China, France, Germany, Greece, Hong Kong, India, Indonesia, Israel, Italy, Japan, South Korea, Malaysia, Philippines, Poland, Singapore, Spain, Switzerland, Taiwan, Turkey, United Kingdom, Vietnam. See our website for information. Unlisted countries, contact MRC at the US phone: (513) 841-0900.

Our Search Engine



Nothing in Life Science escapes the notice of our news team. Dedicated science journalists and 40 Trends and Current Opinion editors deliver coverage that's focused, relevant, and written with you in mind. Updated daily from New York and London. Stop searching for news. Visit news.bmn.com - make it part of your working day.

BioMedNet
news
news.bmn.com

Circle No. 23 on Readers' Service Card