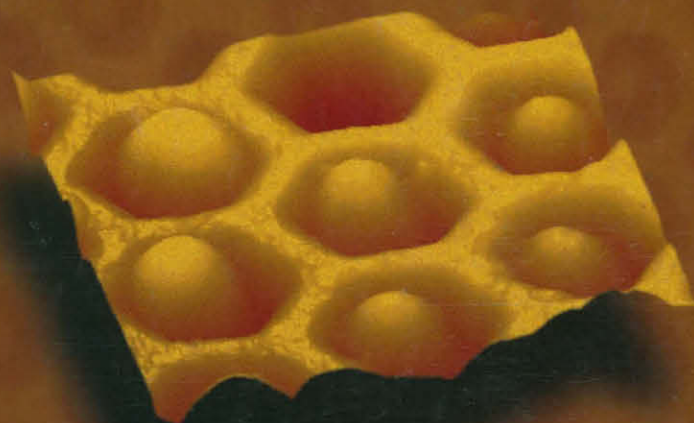


# Science

26 February 1999

Vol. 283 No. 5406  
Pages 1217-1404 \$8



*Gordon  
Research  
Conferences*



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



# QuikChange™

**SITE-DIRECTED MUTAGENESIS KIT\***

The fast, easy and efficient non-PCR site-directed mutagenesis method.

#### Near 100% Efficiency

- ▶ Highest efficiency method
- ▶ Eliminates background
- ▶ Mutations in virtually all transformants

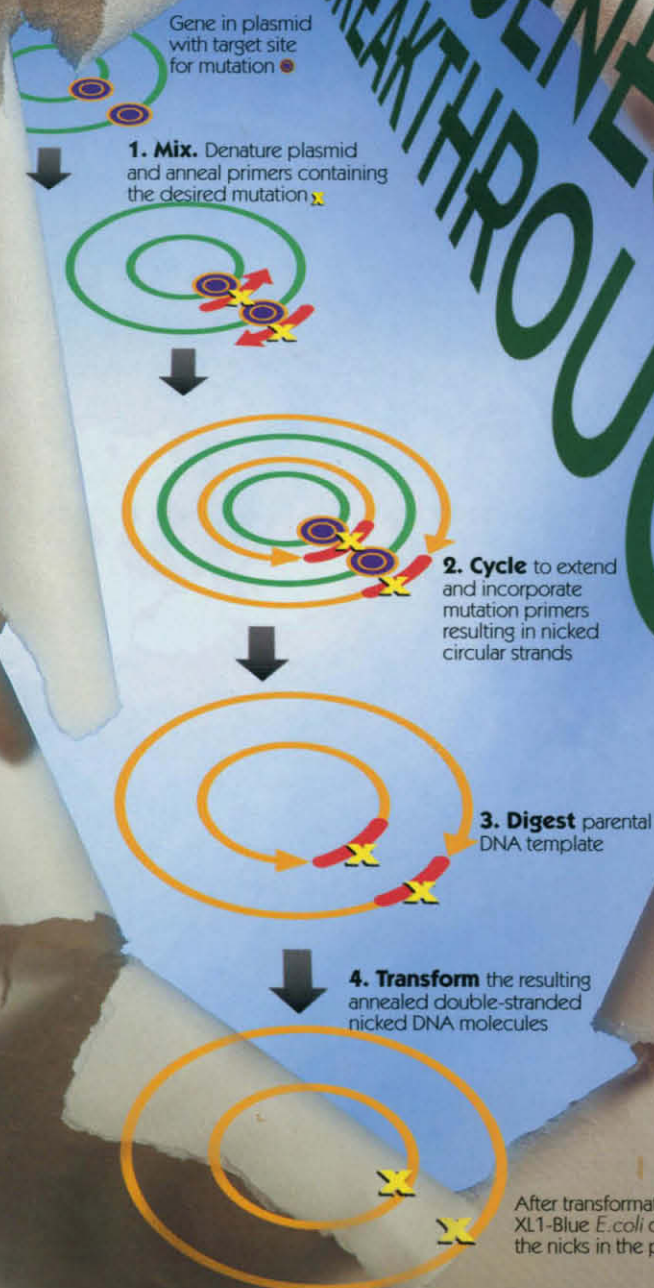
#### 150 Times More Accurate

- ▶ Extends without PCR
- ▶ Uses high-fidelity *Pfu* DNA polymerase
- ▶ Replicates only parental DNA
- ▶ Reduces second-site mutations 150-fold

#### Simple One-Day Procedure

- ▶ Eliminates single-stranded DNA templates, subcloning into specialized vectors, unique restriction sites and multiple transformations
- ▶ Cuts screening time in half

#### 1-DAY METHOD



**Change the Way You Do Mutagenesis!**

UNITED STATES:  
Stratagene Cloning Systems  
(800) 424-5444  
INTERNET MAIL:  
techservices@stratagene.com

AUSTRALIA: (02) 9417 7866  
AUSTRIA: (0222) 3 68 99 51  
BRAZIL: 11 5561-1771  
CANADA: 905-713-1201  
DENMARK: 86 10 10 55  
FRANCE: (01) 34 60 24 24  
GERMANY: (0130) 84 09 11  
HONG KONG: 578-5839  
ISRAEL: 03-5761520  
ITALY: 02-58.01.34.09  
JAPAN: (Furukoshi) (03)5684-1622  
(Toyoko) (03)3660-4819  
KOREA: (02)-556-0311  
MALAYSIA: 3-7031888  
NETHERLANDS: 033 495 00 94  
NEW ZEALAND: 9 443-5867  
NORWAY: 22 20 01 37  
PORTUGAL: 01-441 06 84  
SINGAPORE: 2730888  
SPAIN: 1 729 03 33  
SWEDEN: (8) 6800845  
SWITZERLAND: (061) 6 93 05 40  
THAILAND: (662) 308-0611  
UNITED KINGDOM: 0800 585370

OTHER COUNTRIES CALL  
STRATAGENE USA: (619) 535-5400

\*Patent pending

QuikChange™ Site-Directed Mutagenesis Kit catalog #200518



**STRATAGENE**

Circle No. 72 on Readers' Service Card

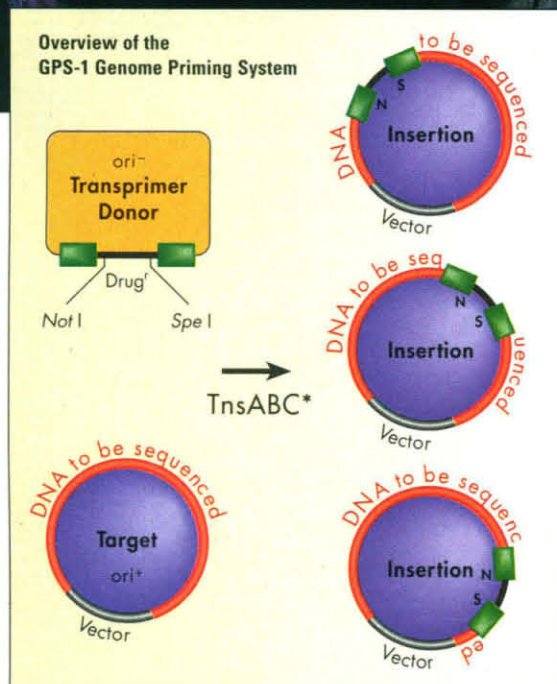


NEW  
ENGLAND  
BIOLABS

finally

the end of primer walking,  
random subcloning  
and nested deletions

#### Overview of the GPS-1 Genome Priming System



Transprimer is inserted randomly into the target DNA, generating a set of insertion products with only one Transprimer per molecule.

### choose **GPS™-1 Genome Priming System** and complete your sequencing project in no time.

New England Biolabs introduces GPS-1, a fast, *in vitro* Tn7 transposon-based method for generating a population of DNA sequencing templates containing primer-binding sites (Transprimer element) at randomly interspersed positions. Simply supply your DNA of interest (0.08 µg per 20 µl reaction mix), follow a short protocol, transform into *E. coli*, miniprep colonies and then sequence.

- Transprimer is inserted randomly into the target DNA: no "hot spots" for insertion
- High efficiency:  $10^3$ - $10^5$  insertion products recovered per reaction; entire protocol takes less than 90 minutes
- Unique rare-cutting restriction enzyme sites within Transprimer facilitate insert mapping
- DNA sequence can be obtained from both strands of target DNA using supplied primers
- Faster than primer walking, random subcloning and nested deletion methods

#### GPS-1 Genome Priming System

#7100 10 reactions **Special Introductory Price until 3/1/99**

Includes: pGPS1 (Kan<sup>r</sup>) and pGPS2 (Cam<sup>r</sup>) Transprimer donor plasmids, TnsABC\* Transposase, control target plasmid, sequencing primers for the two ends of the Transprimer, buffers and instruction manual.

For further information on GPS-1, visit [www.neb.com](http://www.neb.com) or call 1-800-NEB-LABS

- 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](mailto:info@neb.com)
- New England Biolabs Ltd., Canada Tel. (800) 387-1095 (905) 672-3370 Fax (905) 672-3414 email: [info@ca.neb.com](mailto:info@ca.neb.com)
- New England Biolabs GmbH, Federal Republic of Germany Tel. 0800/BIOLABS (06196) 3031 Fax (06196) 83639 email: [info@de.neb.com](mailto:info@de.neb.com)
- New England Biolabs (UK) Ltd. Tel. (0800) 31 84 86 (01462) 420616 Fax (01462) 421057 email: [info@uk.neb.com](mailto:info@uk.neb.com)

DISTRIBUTORS: Australia (07) 5594-0299; Belgium (0800)1 9815; Brazil (011) 366-3565; Denmark (39) 56 20 00; Finland (9) 584-121; France (1) 34 60 24 24; Greece (01) 5226547; Hong Kong 2649-9988; India (542) 311473; Israel (03) 9229013; Italy (02) 381951; Japan (03) 5820-9408; Korea (02) 556-0311; Mexico (5) 280-5691; Netherlands (033) 495 00 94; New Zealand 0800 807809; Norway 22 09 15 00; Singapore 4457927; Spain (03) 902 20 30 90; Sweden (08) 30 60 10; Switzerland (061) 486 80 80; Taiwan (02) 28802913

Circle No. 55 on Readers' Service Card

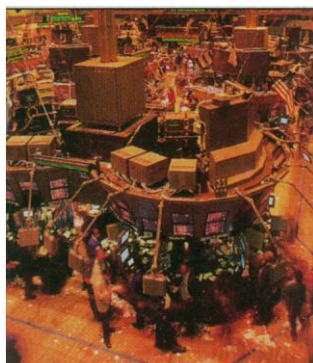
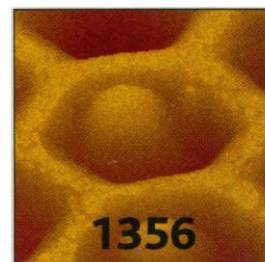
NEW ENGLAND  
**BioLabs** Inc.



# Science

www.sciencemag.org

**COVER** Atomic force micrograph image of a microsphere sensor array that was self-assembled onto the surface of an etched fiber optic bundle (well diameter, ~500 nm). Results from this study will be one of the presentations at the Gordon Research Conference on Combinatorial Chemistry that meets 4 to 9 July in Tilton, New Hampshire. The schedule of summer and international conferences begins on p. 1356. [Image: K. Michael, L. Taylor, D. Walt, Tufts University]



## 1244

The end of math on Wall Street?

## NEWS

### NEWS OF THE WEEK

- ▼1234 PUBLIC HEALTH: Bioterror Defense Initiative Injects Shot of Cash  
1279
- 1235 RADIOACTIVE WASTE: Yucca Mountain Panel Says DOE Lacks Data
- ▼1237 MATERIALS: Stress Profiling Gets the Best Out of Glass  
1295
- ▼1238 IMMUNOLOGY: *Chlamydia* Protein Linked to Heart Disease  
1335
- 1239 NEUROBIOLOGY: Fruit Fly Odor Receptors Found
- 1239 ARCHAEOLOGY: Kennewick Man Gets His Day in the Lab
- 1240 BIOLOGICAL RESOURCES: Culture Collections Seek Global Help

1241 CANADIAN BUDGET: Health Research Gets Fundamental Overhaul

1243 MICROBIAL GENOMICS: First Food-Borne Pathogen Sequenced

### NEWS FOCUS

1244 MATHEMATICS AND MONEY: Death by the Numbers

Can the Market Be Outwitted?

▼1247 CELL BIOLOGY: New Clues to How Proteins Link Up to Run the Cell  
1325

1250 CANCER THERAPY: Behind the Headlines of Endostatin's Ups and Downs

1252 SCIENCE INTERVIEW: China's Science Reforms: The View From the Top

## DEPARTMENTS

NETWATCH  
1223

THIS WEEK IN  
SCIENCE  
1225

SCIENCESCOPE  
1237

RANDOM SAMPLES  
1255

CONTACT SCIENCE  
1263

NEW PRODUCTS  
1353

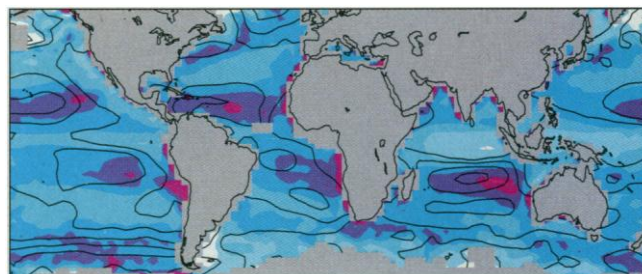
AAAS NEWS AND  
NOTES  
1355

GORDON RESEARCH  
CONFERENCES  
1356

## RESEARCH

### REPORTS

- 1290 Condensation of Carbon in Radioactive Supernova Gas D. D. Clayton, W. Liu, A. Dalgarno
- 1292 A Semiconductor-Based Photonic Memory Cell S. Zimmermann, A. Wixforth, J. P. Kotthaus, W. Wegscheider, M. Bichler
- ▼1295 Crack Arrest and Multiple Cracking in Glass Through the Use of Designed Residual Stress Profiles D. J. Green, R. Tandon, V. M. Sglavo  
1237
- 1297 High-Resolution Water Vapor Mapping from Interferometric Radar Measurements R. F. Hanssen, T. M. Weckwerth, H. A. Zebker, R. Klees
- ▼1299 Tropospheric Aerosol Climate Forcing in Clear-Sky Satellite Observations over the Oceans J. M. Haywood, V. Ramaswamy, B. J. Soden  
1273
- 1303 Lu-Hf Isotope Systematics of Garnet Pyroxenites from Beni Bousera, Morocco: Implications for Basalt Origin J. Blichert-Toft, F. Albarède, J. Kornprobst



## 1299

Keeping warm—keeping cool?

1306 Seismic Evidence for a Detached Indian Lithospheric Mantle Beneath Tibet G. Kosarev, R. Kind, S. V. Sobolev, X. Yuan, W. Hanka, S. Oreshin

1310 Evolutionary and Preservational Constraints on Origins of Biologic Groups: Divergence Times of Eutherian Mammals M. Foote, J. P. Hunter, C. M. Janis, J. J. Sepkoski Jr.

▼1314 The Density of Hydrous Magmatic Liquids F. A. Ochs III and R. A. Lange  
1275



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 © 1999 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): \$110 (\$62 allocated to subscription). Domestic institutional subscription (51 issues): \$325; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$90. 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.



EDITORIAL

- 1263 Experimental Technology

LETTERS

- 1265 Johns Hopkins Plagiarism Policies E. D. Miller. Phytolith Morphology D. R. Piperno, D. M. Pearsall, R. A. Benfer Jr., L. Kealhofer, Z. Zhao, Q. Jiang. A Small Misconception J. Severinghaus; W. S. Broecker. Green Revolutions B. D. Elder, T. Vos, M. Los Huertos; A. R. Portis Jr., X.-H. Zhang. A Dark Particle? A. Bottino. Recovering Seveso S. Garagna, P. G. Rubini, C. A. Redi, M. Zuccotti, A. Meriggi, R. Fanelli, S. Facchetti. Corrections and Clarifications

BOOKS ET AL.

- 1271 PALEOBIOLOGY: *The Adequacy of the Fossil Record* S. K. Donovan and C. R. C. Paul, Eds., reviewed by T. K. Baumiller

PERSPECTIVES

- 1272 BEHAVIOR: Communication Goes Multimodal S. Partan and P. Marler  
 ▼ 1273 CLIMATE CHANGE: Solving the Aerosol Puzzle J. T. Kiehl  
 ▼ 1275 GEOCHEMISTRY: A Slippery Problem with Explosive Consequences F. Spera

1272

Simplifying the complexities of animal communication



- 1277 BIOMEDICINE: A Gender Gap in Autoimmunity C. C. Whitacre, S. C. Reingold, P. A. O'Looney, and the Task Force on Gender, Multiple Sclerosis and Autoimmunity

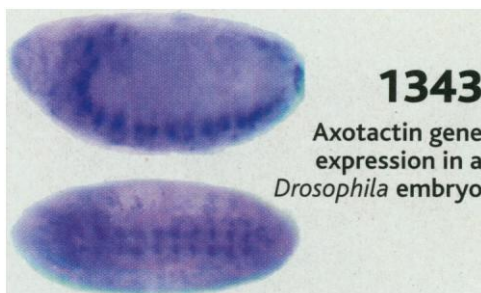
WEB SUPPLEMENT: Sex Differences in Autoimmune Disease: Focus on Multiple Sclerosis [www.sciencemag.org/feature/data/983519.shl](http://www.sciencemag.org/feature/data/983519.shl)

REVIEW

- ▼ 1279 POLICY: The Looming Threat of Bioterrorism D. A. Henderson

- 1317 Convergence of Transforming Growth Factor- $\beta$  and Vitamin D Signaling Pathways on SMAD Transcriptional Coactivators J. Yanagisawa, Y. Yanagi, Y. Masuhiro, M. Suzawa, M. Watanabe, K. Kashiwagi, T. Toriyabe, M. Kawabata, K. Miyazono, S. Kato  
 1321 p53- and ATM-Dependent Apoptosis Induced by Telomeres Lacking TRF2 J. Karlseder, D. Broccoli, Y. Dai, S. Hardy, T. de Lange  
 ▼ 1325 Function of WW Domains as Phosphoserine- or Phosphothreonine-Binding Modules P.-J. Lu, X. Z. Zhou, M. Shen, K. P. Lu  
 1328 Facilitation of Signal Onset and Termination by Adenylyl Cyclase K. Scholich, J. B. Mullenix, C. Wittpoth, H. M. Poppleton, S. C. Pierre, M. A. Lindorfer, J. C. Garrison, T. B. Patel  
 1332 Resolution of a Signal Transfer Region from a General Binding Domain in G $\beta$  for Stimulation of Phospholipase C- $\beta$ 2 E. Buck, J. Li, Y. Chen, G. Weng, S. Scarlata, R. Iyengar

- ▼ 1335 *Chlamydia* Infections and Heart Disease Linked Through Antigenic Mimicry K. Bachmaier, N. Neu, L. M. de la Maza, S. Pal, A. Hessel, J. M. Penninger  
 1339 Prion Domain Initiation of Amyloid Formation in Vitro from Native Ure2p K. L. Taylor, N. Cheng, R. W. Williams, A. C. Steven, R. B. Wickner  
 1343 A Glial-Neuronal Signaling Pathway Revealed by Mutations in a Neurexin-Related Protein L.-L. Yuan and B. Ganetzky



1343

Axotactin gene expression in a *Drosophila* embryo

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: \$8.00 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 \$4.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075/83 \$4.00. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

SCIENCE ONLINE  
[www.scienceonline.org](http://www.scienceonline.org)

SCIENCE  
 THE JOURNAL  
[www.sciencemag.org](http://www.sciencemag.org)

SCIENCENOW  
 DAILY NEWS SERVICE  
[www.sciencenow.org](http://www.sciencenow.org)

NEXT WAVE  
 WEEKLY CAREER UPDATES  
[www.nextwave.org](http://www.nextwave.org)

GRANTSNET  
 RESEARCH FUNDING DATABASE  
[www.grantsnet.org](http://www.grantsnet.org)

NEUROAIDS  
 EXPERIMENTAL WEB SITE  
[www.sciencemag.org/NAIDS](http://www.sciencemag.org/NAIDS)



**In the human genome race, we're helping centres around the world get the results they need, faster.**

Run faster, you win. Slow down, you lose: facts of life. And of life science. Whichever genome you're sequencing, winning means having the best, most innovative tools for the job.

MegaBACE™ 1000 sequencer is just one example. At leading sequencing facilities around the world, this production-scale sequencer routinely generates data at throughput levels that can't be matched.

We're building a winning partnership with our customers – a relationship dedicated to the supply of solutions to speed your decoding in human and other genome projects, and to accelerate your drug discovery programs. We're setting the standard for fluorescent sequencing; introducing energy transfer chemistries; we're ahead with production-scale systems. And you'll find us at the forefront of sequencing enzymology with Thermo Sequenase™ II.

Together, we're accelerating the development of innovative technologies and integrated systems that will help keep your research, and your business, out in front.

Because in some races, you just can't finish second. For more information, visit [www.apbiotech.com/win](http://www.apbiotech.com/win)

# How to win the human race

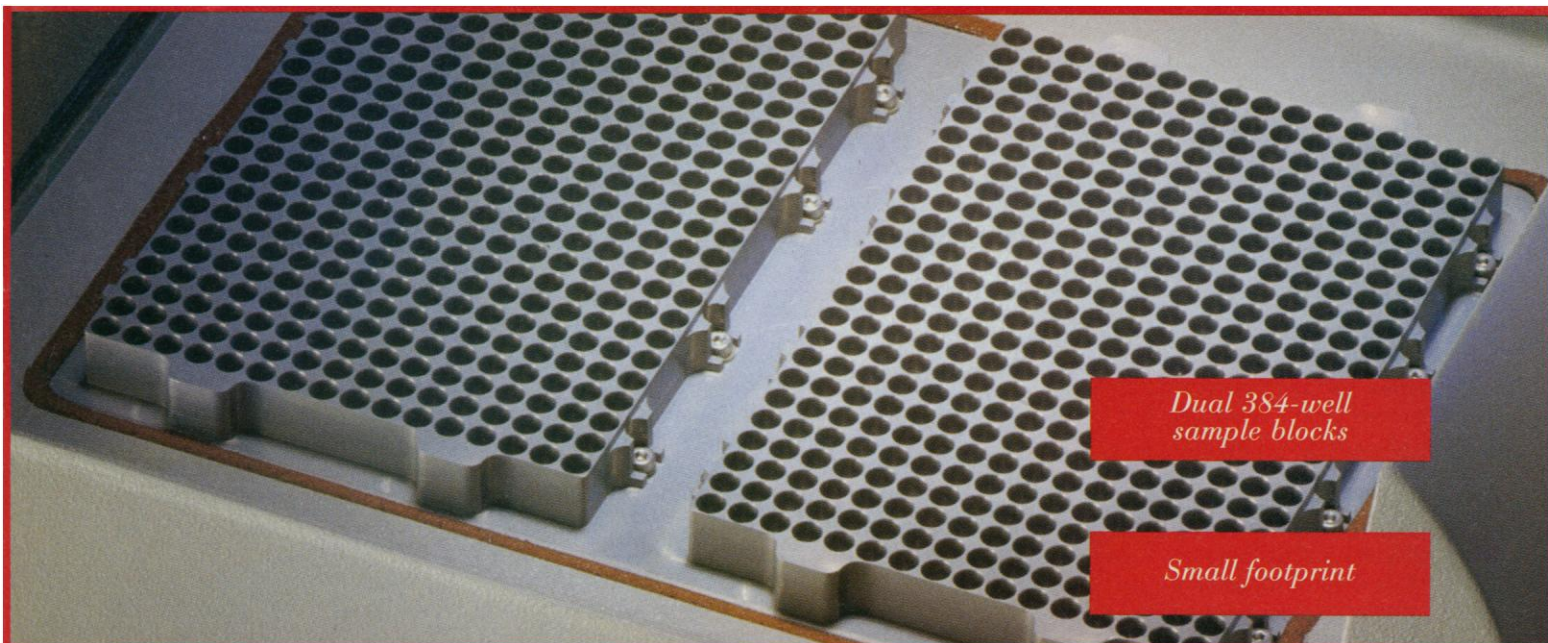


*amersham pharmacia biotech*

Amersham Pharmacia Biotech UK Limited, Amersham Place, Little Chalfont, Bucks HP8 4NP, England. UK. Tel: 0494 231200. Fax: 0494 231201. E-mail: [info@apbiotech.com](mailto:info@apbiotech.com). All goods and services are sold subject to the terms and conditions of sale of the company within the Amersham Pharmacia Biotech group, which apply to all products. These terms and conditions of sale are available on request.

Circle No. 67 on Readers' Service Card





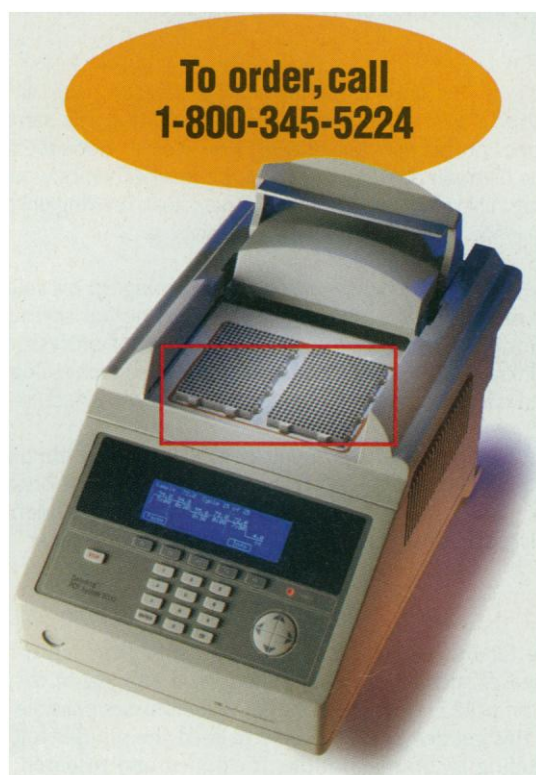
*Dual 384-well  
sample blocks*

*Small footprint*

**High throughput PCR.  
Within budget.  
Without compromise.**

*Reliable performance*

*Authorized for PCR*



**To order, call  
1-800-345-5224**

### **The new Dual 384-Well GeneAmp® PCR System 9700.**

You don't need more bench space to get higher PCR throughput. With a dual 384-well sample block, the GeneAmp® PCR System 9700 gives you 800% more sample capacity without a bigger base footprint.

That means you can run 768 samples in just 1351 square centimeters. And you can do it with the reliable thermal performance, intuitive programming, and affordability that make the GeneAmp PCR System 9700 the best price-performance value in thermal cycling today.

The new Dual 384-Well GeneAmp PCR System 9700 is ideally suited for a wide range of applications and is Authorized for PCR. In addition to the new dual 384-well sample block, the system accommodates standard 96-well sample blocks and other formats as they become available.

So, get more PCR per square centimeter. For information on the Dual 384-Well GeneAmp PCR System 9700, call PE Applied Biosystems at 1-800-345-5224. Outside the U.S., contact your local sales representative, or visit our website at [www.perkin-elmer.com](http://www.perkin-elmer.com).



*Interchangeable  
blocks make it  
easy to expand  
the capability of  
the GeneAmp PCR  
System 9700*

**PE Applied Biosystems**

Europe: Langen, Germany. Tel: 49 (0)6103 708 301 Fax: 49 (0)6103 708 310 Japan: Tokyo, Japan. Tel: (047) 380-8500 Fax: (047) 380-8505 Latin America: Miami, Florida. Tel: (305) 670 4350 Fax: (305) 670 4349 Australia: Melbourne, Australia. Tel: 1 800 033 747 Fax: 61 3 9212-8502



GeneAmp is a registered trademark of Roche Molecular Systems, Inc. Perkin-Elmer PCR reagents are developed and manufactured by Roche Molecular Systems, Inc., Branchburg, New Jersey, U.S.A. The PCR process is covered by patents owned by Hoffmann-La Roche, Inc. and F. Hoffmann-La Roche Ltd. Perkin-Elmer is a registered trademark and PE Applied Biosystems, PE, and Applied Biosystems are trademarks of The Perkin-Elmer Corporation. PE Applied Biosystems develops and manufactures its products in accordance with the ISO 9000 quality system requirements.



Circle No. 8 on Readers' Service Card



## CARBON DUST IN EXPLODING STARS

Carbon-based particles, such as graphite, diamond, and silicon carbide, have been found in meteorites. Isotopic analysis of some of these particles indicates that they may have formed in supernovae. One problem with these models is that carbon will react with oxygen to form carbon monoxide (CO) molecules, which makes it difficult to form carbon-based solids in the supernova except under specific circumstances. Clayton *et al.* (p. 1290) show that carbon-based solids can condense in supernovae without any special restrictions because energetic electrons and ions effectively circumvent the CO formation mechanism. This unequilibrated atomic carbon may then rapidly condense into solid particles that are eventually ejected from the supernova.

## LIGHT STORAGE

Optical signal processing would benefit from methods that would allow a light signal to be stored and retrieved at a later time; doing this directly (for example, with mirrors or an optical fiber loop) can require large setups and fixed delay times. Zimmermann *et al.* (p. 1292) show how a light pulse can be "stored" in a quantum well structure at 100 kelvin. A light pulse generates pairs of electrons and holes that are spatially separated; after delays as long as 30 microseconds (five orders of magnitude longer than the normal electron-hole pair decay time), a change in voltage across the well releases the charges, which reemits a light pulse. The authors suggest ways to increase the lifetimes and to achieve operation at room temperature.

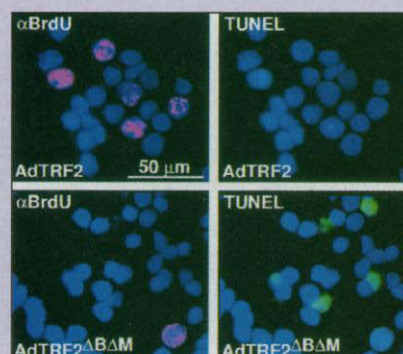
## ANTICIPATING A CERAMIC FAILURE

Glass can be cut (broken) to shape by first scoring its surface, but less extreme surface damage can still cause brittle materials like ceramics to fail catastrophically in structural applications. Worse still, the fracture strength can vary widely for the same material. Crack propagation can be slowed and failure strength variability reduced by adding fibers or whiskers, but this approach often reduces the materials' overall strength. Green *et al.* (p. 1295; see the news story by Hellemans) show that greater, less variable strength can be achieved in silica glass by modifying its surface stress profile through ion exchange. The material undergoes multiple cracking

before it fails, thus allowing examination and replacement, rather than failure without warning through a single crack.

## DEATH FROM (TELOMERE) EXPOSURE

Why are natural chromosome ends not detected by the checkpoints that search for DNA damage elsewhere in the genome? Karlseder *et al.* (p. 1321) show that, in mammalian cells,



a telomere binding protein, TRF2, appears to "hide" telomeres (repeat sequences at the ends of chromosomes) from these checkpoints. Inhibition of TRF2 resulted in rapid cell death by an apoptotic pathway that involved the checkpoint proteins p53 and ATM. These results suggest that telomere malfunction may induce apoptosis rather than senescence in certain cell types.

## FINDING CLOUDS BEFORE THEY FORM

Why do thunderstorms form in one place and not another along a weather front? The reason may reflect subtle variations in the distribution of water vapor in the atmosphere. Water vapor is also one of Earth's major greenhouse gases and is important in controlling temperatures and global climate. Hanssen *et al.* (p. 1297) show how radar interferometry can be used to map these distributions of water vapor in the atmosphere and discuss the effects of variations on cloud formation and the dynamics of weather fronts.

## HOLDING UP TIBET

The continent-continent collision between India and Asia about 50 million years ago created the high-standing Tibetan Plateau. Kosarev *et al.* (p. 1306) imaged the structure of the crust and uppermost mantle

across the plateau using teleseismic *P* waves that were converted by changes in structural features into *S* waves. These images allow them to infer a continuous north-dipping structure within the Indian lithosphere that may be related to stable subduction and a discontinuous, south-dipping structure within the Asian lithosphere that suggests a weak region that is being broken up by the collision. These structures suggest that the rheology and composition of the Indian lithosphere are different from the Asian lithosphere.

## MISSING WHAT WASN'T THERE?

Molecular clock estimates of the divergence times of major animal groups can be much older than the earliest fossil record. Foote *et al.* (p. 1310) present a model of the origination, evolution, and preservation of species aimed at evaluating whether this missing gap is likely. Preservation is calibrated on the basis of the known fossil record. They apply their approach specifically to the placental mammals, for which one molecular divergence time of 120 million years ago is much greater than the fossil evidence of first appearance about 70 million years ago. The analysis suggests that such an early origination is unlikely; one possible explanation is that the rates of molecular evolution are accelerated during speciation events.

## MORE PREDICTABLE MAGMAS

A little bit of water in a magma can alter its density and viscosity and thus the dynamics of magma ascent and mixing. Ochs and Lange (p. 1314; see the Perspective by Spera) measured the density of three hydrous silicate melts and, using previous measurements on anhydrous melts, they determined that the density of a water-enriched melt is independent of the melt composition, water speciation, and concentration of water. This independence will allow geologists to model the magmatic processes of hydrothermal systems without specific information on the composition of the magma.

## SMAD3 SIGNAL JUNCTION

The peptide growth factor, transforming growth factor- $\beta$  (TGF- $\beta$ ), and the steroid hormone vitamin D can have cooperative effects on gene transcription. Yanagisawa *et al.* (p. 1317) provide evidence for a molecular basis for such effects. The Smad3 protein binds to and is phosphoryl-

CONTINUED ON PAGE 1227



# Make time stand still

WITH **RNAlater™**

RNAlater™ eliminates the need to immediately process or snap-freeze tissue samples for RNA isolation

Rapidly inactivates RNases in solid tissue samples

RNA is stable in tissues stored for weeks at 25°C, months at 4°C, or indefinitely at -20°C

Thaw and refreeze tissue samples without RNA degradation

No more freezing and grinding

Dissect and weigh tissues at room temperature

Perfect for field collection and clinical samples

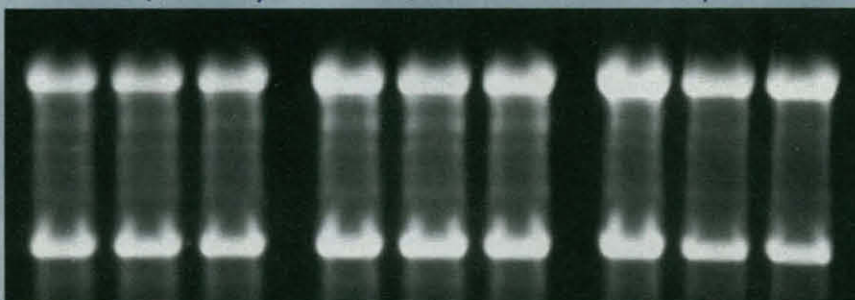
Ship samples at room temperature

## No more quick-freezing of samples to preserve RNA

Tissue stored at 37°C for 1 day

Tissue stored at RT for 1 week

Tissue stored at 4°C for 1 month



Mouse Liver RNA   Mouse Spleen RNA   Mouse Kidney RNA   Mouse Liver RNA   Mouse Spleen RNA   Mouse Kidney RNA   Mouse Liver RNA   Mouse Spleen RNA   Mouse Kidney RNA

## DO YOU ISOLATE RNA FROM TISSUE?

RNAlater™ rapidly inactivates RNases and stabilizes RNA in tissues for subsequent RNA isolation.

Ambion's novel Tissue Collection:RNA Stabilization Solution, RNAlater™, is an aqueous, non-toxic, room temperature reagent that replaces liquid nitrogen for tissue collection prior to RNA isolation. Simply harvest tissues and submerge them in RNAlater. Store tissues for weeks at 25°C, months at 4°C or indefinitely at -20°C without jeopardizing the quality or quantity of RNA obtained from subsequent RNA isolation. Because RNAlater immediately inactivates RNases, RNA yield may even increase.

Once saturated in RNAlater, tissues can be dissected and weighed at room temperature then returned to RNAlater or placed at -80°C for archival storage. RNA in tissue remains intact after 10 freeze/thaw cycles. RNAlater is compatible with all RNA isolation procedures tested.

Use RNAlater and eliminate the rush of tissue harvesting, the worry of long-term tissue storage and the difficulty of freezing and grinding tissue in liquid nitrogen.

For more information, see the 1999 Ambion Product Catalog, call Technical Service, or visit the Ambion website at <http://www.ambion.com/ProdInfo/rnalater.html>.

U.S. (800)888-8804

Canada (800)445-1161

For a complete list of distributors visit our website, <http://www.ambion.com>

### Order Today

100 ml	Catalog # 7020	\$ 50.00
500 ml	Catalog # 7021	\$ 175.00

**Ambion®**

THE RNA COMPANY™

Ambion, Inc. • 2130 Woodward St. • Austin, TX 78744-1832 • tel(512)651-0200 • fax(512)651-0201 • email: [moinfo@ambion.com](mailto:moinfo@ambion.com) • [www.ambion.com](http://www.ambion.com)

Circle No. 69 on Readers' Service Card

## THIS WEEK IN SCIENCE

CONTINUED FROM PAGE 1223

ated by the activated TGF- $\beta$  receptor. Smad3 then forms a complex with Smad4, which is translocated to the nucleus. In the nucleus, SMADs act as transcription factors or coactivators of transcription. The vitamin D receptor is a nuclear receptor that acts, along with coactivators, as a transcription factor when the vitamin is bound. Smad3 (but not other SMADs) was shown to interact with a member of the steroid receptor coactivator-1 family. This interaction may account for the observed effects of the TGF- $\beta$  pathway in the stimulation of transcriptional activation initiated by vitamin D.

### RECOGNIZING THREONINE AND SERINE PHOSPHORYLATION

Various proteins that participate in intracellular signaling pathways contain WW domains, which are characterized by the presence of two tryptophan (W) residues and bind to proline-rich sequences in some protein binding partners. Lu *et al.* (p. 1325; see the news story by Barinaga) analyzed the function of WW domains in the peptidyl-prolyl isomerase Pin1, which binds specifically to certain proteins that are phosphorylated during mitosis, and the ubiquitin ligase Nedd4, which binds and ubiquitinates substrates in a phosphorylation-dependent manner. They find that the WW domains of these proteins bind to certain proteins and peptides phosphorylated on serine or threonine residues but not their dephosphorylated counterparts. In a yeast assay, the function of human Pin1 was lost if mutations were made in the WW domain. Thus, WW domains apparently can specifically recognize proteins phosphorylated on serine or threonine residues, much like SH2 (Src-homology 2) domains recognize proteins phosphorylated on tyrosine.

### SMALLER SIGNALS FOR G PROTEINS?

Binding of ligands to receptors on the cell surface leads to activation of signals within the cell that can be transmitted through protein-protein interactions. In the case of receptors coupled to G proteins (heterotrimeric guanine nucleotide binding proteins), G protein  $\beta\gamma$  subunits can interact with and activate effectors such as phospholipase C- $\beta$ 2 (PLC- $\beta$ 2). Buck *et al.* (p. 1332) analyzed the effects of peptides from the G $\beta$  subunit on activity of PLC- $\beta$ 2 and showed that distinct regions could be identified that con-

tributed primarily to signal transfer or to general protein binding. The demonstration that a small region of the G $\beta$  protein can activate PLC- $\beta$ 2 with efficacy similar to that of the complete protein suggests that it may be possible to synthesize small agonists or antagonists that would modulate such signaling through G proteins.

### ANTIGEN MIMICRY IN CHLAMYDIA INFECTIONS

Heart disease is the major killer in Western society, and *Chlamydia* infections often correlate with the disease. Myocarditis can also be caused experimentally by injecting mice with the myosin heavy chain from the heart. Bachmaier *et al.* (p. 1335; see the news story by Gura) found that the "autoaggressive" peptide of myosin resembled a peptide found in many types of *Chlamydia*. The *Chlamydia* peptide or whole organisms induced cardiac inflammation similar to the myosin peptide and stimulated the generation of CD4<sup>+</sup> T cells and antibodies that were specific for heart myosin. T cells from mice with heart disease induced by the *Chlamydia* peptides could transfer heart disease to fresh mice. Thus, a local *Chlamydia* infection can lead to systemic activation of an autoimmune response through molecular mimicry that can trigger organ-specific inflammation of the heart.

### YEAST AMYLOID ANALOGS

Several human diseases are thought to be propagated by infectious proteins known as prions. In yeast, similar prion-like phenomena have also been found. Taylor *et al.* (p. 1339) now confirm and extend the prion-like character of the Ure2 protein by showing that it can form amyloid-like structures in vitro. Such amyloid structures are a hallmark of prion diseases in animals.

### GLIAL CONNECTIONS

Glial cells can exert direct effects on neuronal activity, but factors that exert such influence have been hard to pinpoint. Yuan and Ganetzky (p. 1343) report that, in *Drosophila*, the *axo* gene encodes a member of the neurexin superfamily of neuronal cell surface proteins that is secreted by glial cells. Mutants lacking the *axo* gene undergo paralysis at higher temperatures that is associated with defective axonal signal conduction.



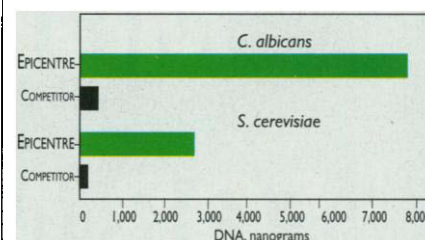
## How To Get Up To 10 Times More Yeast DNA In 40 Minutes

### MasterPure™ Yeast DNA Purification Kit

Efficiently crack open yeast cells and recover PCR-ready high-molecular-weight DNA without lengthy procedures, organic extractions or lyticase treatment...

The MasterPure Yeast DNA Purification Kit provides:

- **Quality.** Isolate intact PCR-ready DNA in 40-50 kb range.
- **Increased yields.** About 10 times higher than other kits for both *Saccharomyces* and *Candida albicans*.
- **Easy 40-minute protocol.** Simply heat-treat in Lysis Solution, precipitate protein, and isopropanol precipitate. Requires no spheroplasting.
- **Flexible.** Easily adjust procedure for small or large samples.



DNA yields from 1.5 ml cultures of *S. cerevisiae* and *C. albicans* using various yeast DNA purification kits. DNA was quantitated specifically with Hoechst fluorescent dye 33258, which gives minimal fluorescence with RNA. The data represent the average of two experiments with duplicate extractions in each experiment.



**EPICENTRE®**

...when you need to be sure of the quality

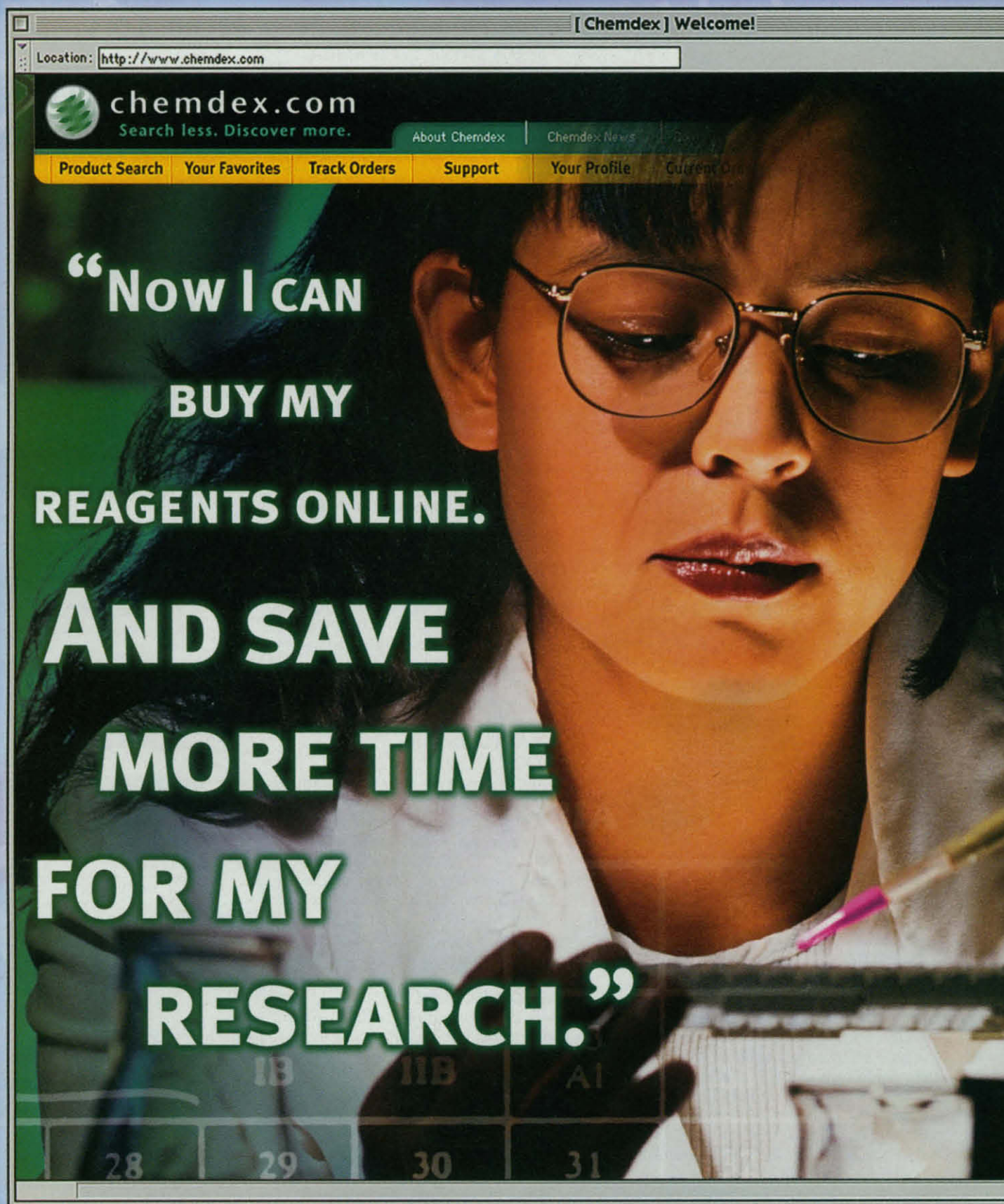
**800-284-8474**

[www.epicentre.com](http://www.epicentre.com)  
[techhelp@epicentre.com](mailto:techhelp@epicentre.com)

MasterPure and Epicentre are trademarks of Epicentre Technologies.

Circle No. 44 on Readers' Service Card





The background of the advertisement features a close-up of a female scientist with dark hair and glasses, wearing a white lab coat. She is holding a pink pipette and looking down at it. The entire scene is overlaid with a screenshot of the Chemdex website. The website's header includes the Chemdex logo, the tagline "Search less. Discover more.", and navigation links for "About Chemdex", "Chemdex News", "Product Search", "Your Favorites", "Track Orders", "Support", "Your Profile", and "Current Orders". The address bar shows "http://www.chemdex.com". The main content area of the website displays a quote from a user. The background of the advertisement is a blue grid with faint chemical symbols and numbers.

[ Chemdex ] Welcome!

Location: <http://www.chemdex.com>

**chemdex.com**  
Search less. Discover more.

About Chemdex | Chemdex News

Product Search | Your Favorites | Track Orders | Support | Your Profile | Current Orders

**“Now I can  
buy my  
reagents online.  
And save  
more time  
for my  
research.”**





## Announcing chemdex.com

The Faster, Easier Way to Purchase  
Biological and Chemical Reagents.

---

Spend less time searching for reagents and more time pursuing your research. When you purchase your reagents through chemdex.com, you get:

- The world's largest source of biological and chemical reagents for life science research
- Ordering with the click of a mouse—in a secure environment
- The suppliers you know—and trust
- A powerful, precision search engine to quickly find what you need

**Purchase your reagents faster. Easier. ONLINE.**

At [www.chemdex.com](http://www.chemdex.com).



## chemdex.com

Search less.  
Discover more.

Chemdex Corporation • 3950 Fabian Way, Palo Alto, CA 94303 • 650-813-0300

© 1999 Chemdex Corporation. Chemdex is a registered trademark of Chemdex Corporation.

Circle No. 34 on Readers' Service Card

EDITOR-IN-CHIEF  
**Floyd E. Bloom**

EDITOR  
**Ellis Rubinstein**

MANAGING EDITOR  
**Monica M. Bradford**

## EDITORIAL

DEPUTY MANAGING EDITORS: Richard B. Gallagher (Biological Sciences), R. Brooks Hanson (Physical Sciences), Katrina L. Keller (Compass); SUPERVISING SENIOR EDITORS Linda J. Miller, Phillip D. Szuroni; SENIOR EDITORS Gilbert J. Chin, Pamela J. Hines, Barbara Jasny, Paula A. Kiberstis, L. Bryan Ray; ASSOCIATE EDITORS Lisa D. Chong, Beverly A. Purnell, Linda R. Rowan; EDITORIAL SUPPORT Candace Gallery, Amy Herda, Carolyn Kyle, Elise Laffman, Patricia M. Moore, Anita Wynn; ADMINISTRATIVE SUPPORT Sylvia Kihara

## SCIENCE'S COMPASS:

SENIOR EDITORS/PERSPECTIVES Orla Smith, Julia Uppenbrink; ASSOCIATE BOOK REVIEW EDITOR Sherman J. Suter; CONTRIBUTING EDITORS

PUBLISHER  
**Richard S. Nicholson**

ASSOCIATE PUBLISHER  
**Beth Rosner**

MEMBERSHIP/CIRCULATION DIRECTOR  
**Michael Spinella**

## MEMBERSHIP/CIRCULATION

SUBSCRIPTION SERVICES: 202-326-6417

DEPUTY DIRECTOR Marlene Zendell; MEMBER SERVICES: MANAGER Michael Lung; SUPERVISOR Mary Curry; REPRESENTATIVES Laurie Baker, Pat Butler, Christine Ford, Mari Pope, Jantell Smith; MARKETING: MANAGER Scott Oser; COORDINATOR Lauri Sirois; EUROPE MANAGER Jane Pennington; ASSOCIATE Ruth Jackson; RESEARCH: MANAGER Renuka Chander; BUSINESS AND FINANCE: MANAGER Dwight Theall; ASSISTANT Susan Maxim; COMPUTER SPECIALIST Charles Munson

## FINANCE AND ADVERTISING

BUSINESS AND FINANCE: BUSINESS MANAGER Deborah Rivera-Wienhold; SENIOR ANALYST Randy Yi; FINANCIAL ANALYST Lisa Donovan RIGHTS AND PERMISSIONS: ASSOCIATE Lincoln Richman; ASSISTANT Emilie David MARKETING: DIRECTOR John Meyers; ASSOCIATES Allison Pritchard, Chris Harbaugh ELECTRONIC MEDIA: MANAGER David Gillikin; COMPUTER SPECIALIST Wendy Green; PRODUCTION ASSOCIATES Mark Croatti, Ellen McGuire

Kevin Ahern, Richard Peters, Robert Sikorski, David F. Voss; ASSISTANTS Brent Gendleman, Jeffrey Hearn; INFORMATION SPECIALIST Janet Kegg; LETTERS AND TECHNICAL COMMENTS: EDITOR Christine Gilbert; ASSOCIATE EDITOR Steven S. Lapham; ASSISTANT Charlene King

## NEWS

NEWS EDITOR Colin Norman; FEATURES EDITOR Tim Appenzeller; DEPUTY NEWS EDITORS Elizabeth Culotta (contributing editor), Jean Marx, Jeffrey Mervis, Richard Stone; NEWS WRITERS Martin Enserink, Michael Hagmann (intern), Constance Holden, Jocelyn Kaiser, Richard A. Kerr, David Kestenbaum, Andrew Lawler, David Malachuk, Eliot Marshall, Elizabeth Pennisi, Robert F. Service, Gretchen Vogel BUREAUS: BERKELEY, CA Marcia Barinaga (contributing correspondent); SAN DIEGO, CA Jon Cohen; CHICAGO, IL James Glanz; COPY EDITORS Linda B. Felaco, Daniel T. Helgerman; CONTRIBUTING CORRESPONDENTS Barry A. Cipra, Ann Gibbons, Charles C. Mann, Anne Simon Moffat, Virginia Morell, Evelyn Strauss, Gary Taubes, Ingrid Wickelgren; ADMINISTRATIVE SUPPORT Scherraine Mack, Fannie Groom

## EDITING AND PROOFREADING:

DIRECTOR Dawn McCoy; SUPERVISOR Cara Tate; SENIOR COPY EDITORS Cay Butler, Harry Jach, Barbara Ordway, Christine M. Pearce; COPY EDITORS: Jeffrey E. Cook, Etta Kavanagh, Jason Llewellyn, Joshua Marcy; COPY DESK: Joi S. Granger, Monique Martineau, Ellen E. Murphy, Beverly Shields; ASSISTANT Kathy Libal

## PRODUCTION

DIRECTOR James Landry; MANAGER Wendy K. Shank; ASSISTANT

## PRODUCT ADVERTISING

NATIONAL SALES MANAGER NORTHEAST AND E. CANADA Richard Teeling: 973-904-9774, FAX 973-904-9701 • MIDWEST/ SOUTHEAST Elizabeth Mosko: 773-665-1150, FAX 773-665-2129 • WEST COAST/W. CANADA Neil Boylan: 415-673-9265, FAX 415-673-9267 • MID ATLANTIC AND U.S. INSIDE SALES Christopher Breslin: 202-326-6544, FAX 202-682-0816 • INTERNET SALES Laura Tellez: 202-326-6599, FAX 202-682-0816 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) 1-260-297-530, FAX (44) 1-260-271-022 JAPAN Masah Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852 • TRAFFIC MANAGER Carol Maddox; SALES ASSOCIATES Sheila Myers, Sandra Walls; ADMINISTRATIVE SUPPORT Jessica Tierney

## RECRUITMENT ADVERTISING

SALES AND PRODUCTION OPERATIONS MANAGER Terri Seiter Azie U.S.: SALES MANAGER Gabrielle Boguslawski: 718-491-1607, FAX 202-289-6742; SALES SUPERVISOR Daryl Anderson; SALES REPRESENTATIVES Troy Benitez, Beth Dwyer, Bren Peters-Minnis, Kristin West-apher; ASSISTANTS Erika Bryant, Kathleen Clark; Christina Geiger PRODUCTION: SENIOR ASSOCIATE Jennifer Rankin; ASSOCIATE Elizabeth Lenox COPY EDITOR/PROOFREADER Chris Filiatreau U.K./EUROPE: SALES MANAGER Debbie Cummings; SALES EXECUTIVE Sabine Lenuud; ASSISTANT Elisabeth Py: (44) 1-223-326-5000, FAX (44) 1-223-326-532 AUSTRALIA/NEW ZEALAND: Keith Sandell: (61) 02-9922-2977, FAX (61) 02-9922-1100 JAPAN: Masah Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852

## DEPUTY EDITORS

Philip H. Abelson (*Engineering and Applied Sciences*); John I. Brauman (*Physical Sciences*); Thomas R. Cech (*Biological Sciences*)

## BOARD OF REVIEWING EDITORS

Frederick W. Alt  
Children's Hospital, Boston  
Don L. Anderson  
California Institute of Technology  
Michael Ashburner  
University of Cambridge  
Frank S. Bates  
Univ. of Minnesota, Minneapolis  
Stephen J. Benkovic  
Pennsylvania State University  
Alan Bernstein  
Mount Sinai Hospital, Toronto  
Michael J. Bevan  
University of Washington, Seattle  
Seth Blair  
University of Wisconsin, Madison  
David E. Bloom  
Harvard Institute for International Development  
Piet Borst  
The Netherlands Cancer Institute  
Henry R. Bourne  
Univ. of California, San Francisco  
James J. Bull  
University of Texas at Austin  
Kathryn Calame  
Columbia Univ., College of Physicians & Surgeons  
Dennis W. Choi  
Washington Univ. School of Medicine, St. Louis  
Joanne Chory  
The Salk Institute

David Clapham  
Children's Hospital, Boston  
Adrienne E. Clarke  
University of Melbourne, Parkville  
F. Fleming Crim  
University of Wisconsin, Madison  
Paul J. Crutzen  
Max-Planck-Institut für Chemie  
James E. Dahlberg  
University of Wisconsin Medical School, Madison  
Robert Desimone  
National Institute of Mental Health, NIH  
Hans Eklund  
Swedish Univ. of Agricultural Sciences, Uppsala  
Paul T. Englund  
Johns Hopkins University School of Medicine  
G. Ertl  
Max-Planck-Gesellschaft  
Richard G. Fairbanks  
Lamont-Doherty Earth Observatory  
Douglas T. Fearon  
University of Cambridge  
Harry A. Fozzard  
The University of Chicago  
Roger I. M. Glass  
Centers for Disease Control  
Peter N. Goodfellow  
SmithKline Beecham, UK  
Jack F. Greenblatt  
University of Toronto

Peter Gruss  
Max Planck Institute of Biophysical Chemistry  
Philip C. Hanawalt  
Stanford University  
Paul Harvey  
University of Oxford  
M. P. Hassell  
Imperial College at Silwood Park  
Nobutaka Hirokawa  
University of Tokyo  
Tsukuru Horio  
Kyoto University  
Susan D. Iversen  
University of Oxford  
Eric F. Johnson  
The Scripps Research Institute  
Hans Kende  
Michigan State University  
Elliott Kieff  
Harvard University  
Jeffrey T. Kiehl  
National Center for Atmospheric Research, Boulder  
Judith Kimple  
University of Wisconsin, Madison  
Stephen M. Kosslyn  
Harvard University  
Michael LaBarbera  
The University of Chicago  
Antonio Lanzavecchia  
Basel Institute for Immunology  
Nicole Le Douarin  
Institut d'Embryologie Cellulaire et Moléculaire du CNRS

Norman L. Letvin  
Beth Israel Hospital, Boston  
Harvey F. Lodish  
Whitehead Institute for Biomedical Research  
Richard Losick  
Harvard University  
Seth Marder  
University of Arizona  
Diane Mathis  
Institut de Chimie Biologique, Strasbourg  
Susan K. McConnell  
Stanford University  
Anthony R. Means  
Duke University Medical Center  
Stanley Meisel  
University of California, Davis  
Douglas A. Melton  
Harvard University  
Andrew Murray  
Univ. of California, San Francisco  
Elizabeth G. Nabel  
The Univ. of Michigan Medical Center  
Shigetada Nakanishi  
Kyoto University  
Kim Nasmyth  
Research Institute of Molecular Pathology, Vienna  
Roger A. Nicoll  
Univ. of California, San Francisco  
Staffan Normark  
Swedish Institute for Infectious Disease Control  
Kiyotaka Okada  
Kyoto University

MANAGER Elizabeth A. Harman; ASSOCIATES Vicki J. Jorgensen, Tara L. Kelly, Jessica K. Moshell, Rebecca Thomas

## ART

DESIGN DIRECTOR Amy Decker Henry; ART DIRECTOR C. Faber Smith; ASSOCIATE ART DIRECTOR Elizabeth Carroll; SCIENTIFIC ILLUSTRATOR Katharine Sutliff; GRAPHICS ASSOCIATES Holly Bishop, Preston Morrighan, Darcel Pugh, Patricia M. Riehn; PHOTO RESEARCHER Leslie Blizard

## SCIENCE INTERNATIONAL

### EUROPE

ASSOCIATE EDITORS Stella M. Hurtle, Ian S. Osborne, Peter Stern; EDITORIAL ASSOCIATE Belinda Holden NEWS: EDITOR Daniel Clery; CONTRIBUTING CORRESPONDENTS Michael Balter (Paris) Robert Koenig (Bern); UK EDITOR, SCIENCE'S NEXT WAVE John MacFarlane; ADMINISTRATIVE SUPPORT Janet Mumford, Liz Ellis

### ASIA

JAPAN NEWS BUREAU: Dennis Normile (contributing correspondent); CHINA REPRESENTATIVE Hao Xin; INDIA CORRESPONDENT Pallava Bagla (contributing correspondent)

## SCIENCENOW: www.sciencenow.org

EDITOR Erik Stokstad

## SCIENCE'S NEXT WAVE: www.nextwave.org

MANAGING EDITOR Wendy Yee; SENIOR EDITOR Nicole Ruediger WRITER Melissa Merti; CANADA EDITOR Charles Boulakia; ASSISTANT Suzanne Moore

## AAAS BOARD OF DIRECTORS

RETIRING PRESIDENT, CHAIR M. R. C. Greenwood  
PRESIDENT Stephen Jay Gould  
PRESIDENT-ELECT Mary Lowe Good  
TREASURER William T. Golden  
EXECUTIVE OFFICER Richard S. Nicholson

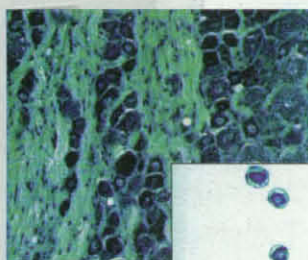
Lewis M. Branscomb; Robert D. Goldman; Alice S. Huang; Sheila Jasanoff; Sally Gregory Goldstedt; Marcia C. Linn; Neena B. Schwartz; David E. Shaw

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.

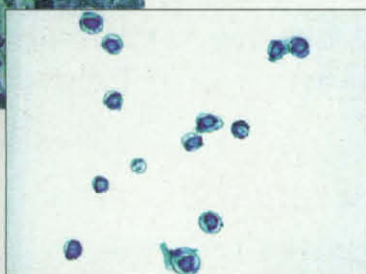
The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of 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.



# Now, You Can Microdissect a Single Cell.



Before transfer,  
Nissl stained



Single cell transfers of small DRG Neurons

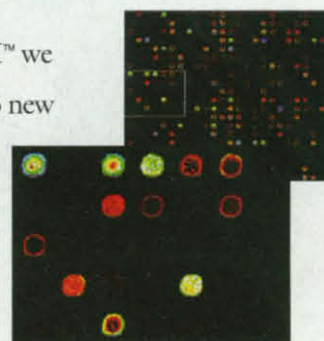
With our new PixCell II™ we have opened the door to new

possibilities in microdissection† and molecular diagnostics. Now, for the first time, you can precisely and rapidly extract a *single cell*, or groups of specific cells.

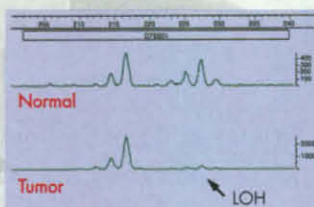
Plus, PixCell II is fast, microdissections take only minutes. Our proprietary and unique optical design ensures that PixCell II is

non-damaging to tissue, preserving the exact morphology of both dissected cells and surrounding tissue.

Visit [www.arctur.com](http://www.arctur.com) to find out how PixCell II can dramatically accelerate your research.



cDNA microarrays of DRG Neurons



Loss of heterozygosity in tumor  
colorectal tissue



PixCell II accelerates research in:

- Nucleic Acid Analysis
  - Gene Expression
  - Loss of Heterozygosity
  - Micro-Satellite Instability
- Proteomics
  - 2D Protein Gels
  - Western Blotting



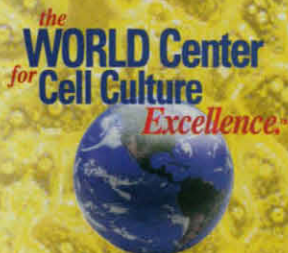
ARCTURUS

*Advancing Molecular Diagnostics In Medical Research.™*



**BIO WHITTAKER**

A **CAMBREX** Company



**Standardize  
Your Research!  
Call Your Clonetics®  
Technical Specialist  
Today.**

For Technical Information:  
US & Canada (800) 852-5663  
All other locations:  
(301) 898-7025 ext. 7510

**"Ask About Our New  
User Discount"**

**TO PLACE AN ORDER CALL:**  
(800) 344-6618  
FAX: (301) 845-1008  
E-MAIL: [cs@biowhittaker.com](mailto:cs@biowhittaker.com)  
Internet:  
[www.biowhittaker.com](http://www.biowhittaker.com), or  
[www.clonetics.com](http://www.clonetics.com)



©1999 BioWhittaker, Inc., A Cambrex Company.  
All rights reserved.



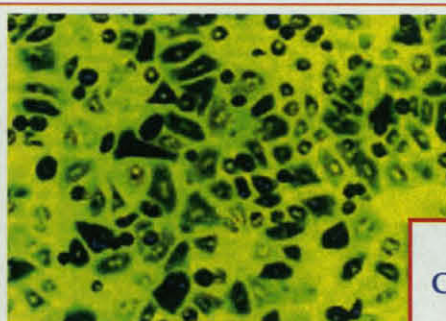
# *Announcing* **Clonetics® Normal Human Cryopreserved Hepatocytes!**

## ***Applications:***

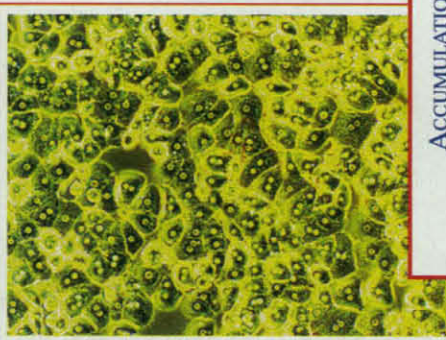
- Drug Metabolism Testing
- Toxicology Studies
- Drug Discovery
- Basic Research
- Transfection

## ***Hepatocyte Features:***

- Available Cryopreserved or Plated
- Serologically Negative for Hepatitis B and C, and Syphilis
- Multiple Lots Available, Expressing Various Enzyme Profiles
- Available with Clonetics Hepatocyte Culture Medium (HCM™)
- Tested for P450 Enzyme Activity after 4-5 Days of Culture
  - CYP1A1/1A2 (EROD; induced w/3-Methylcholanthrene)
  - CYP3A4 (Induced w/Rifampicin)
  - CYP2C9 (Basal Activity)
- ECOD
- Uncoupled Phase II 7-Hydroxycoumarin conjugation
- Albumin Expression



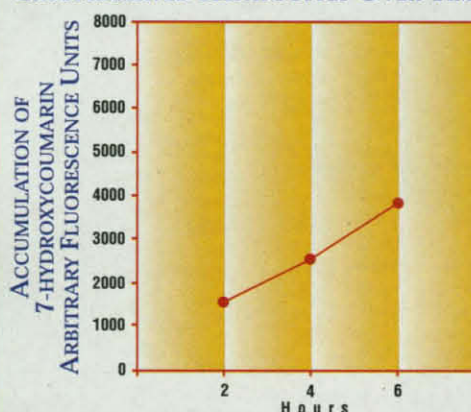
▲ Albumin Staining: after 1 day of culture.



▲ Human Hepatocytes plated on collagen in HCM.

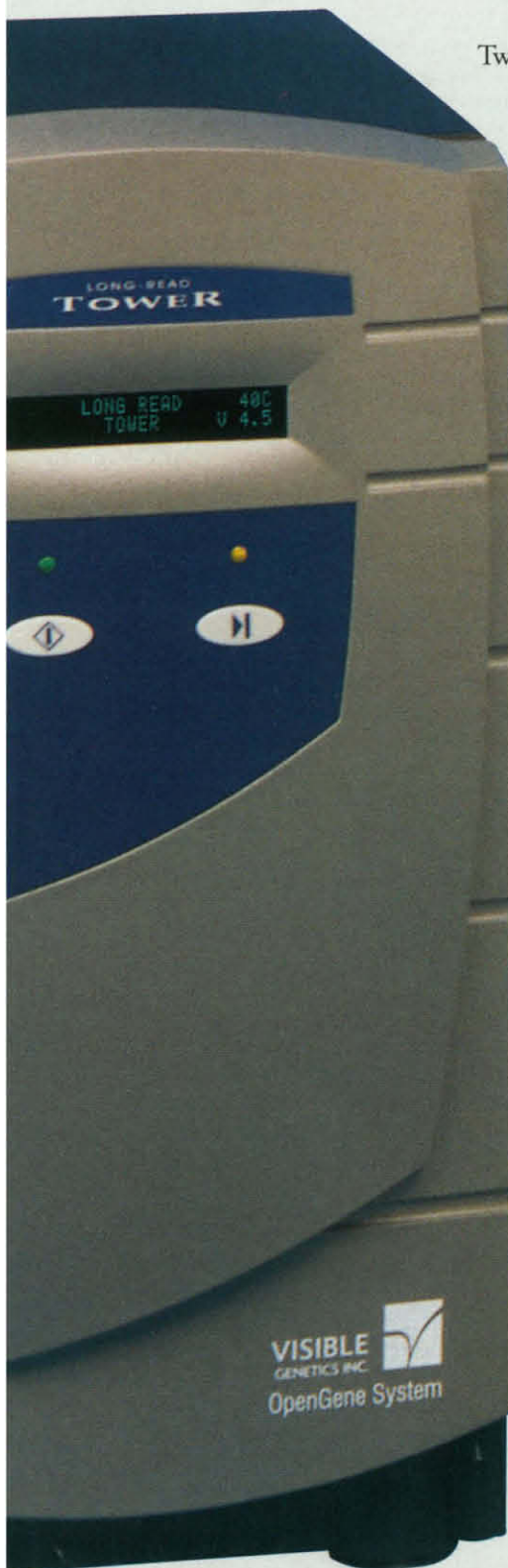
Circle No. 13 on Readers' Service Card

**ECOD ACTIVITY OF NORMAL HUMAN  
CRYOPRESERVED HEPATOCYTES OVER TIME**





# The Long-Read Tower™ Automated DNA Sequencing System. The **smartest** way to get results.



Two sequencers in one.... sounds pretty smart, doesn't it?  
For optimum flexibility, the 2-dye Long-Read Tower is the smartest choice in automated DNA sequencing today.

## Flexible and fast

400 bases in just over 30 minutes with the standard MicroCel™ cassette or 1000 bases in under 4 hours with the new Long-Read MicroCel™ cassette.

Disposable MicroCel cassettes are filled and polymerized in under 4 minutes and run at least 3 times faster than comparable competitive systems.

## Powerful Analysis Software

A palette of software analysis tools simplifies data interpretation, storage and reporting.

## Value

Contact your local VGI representative to discuss one of our very smart purchasing options.

**1000 bases in under 4 hours**



For research purposes only. Not for use in diagnostic procedures.  
Circle No. 40 on Readers' Service Card



How smart is the **OpenGene** system? Very.  
For example, GeneObjects software is based on the bright idea that it's a lot more useful if it thinks along with you. For example, you can compare a sample's sequence to databases with thousands of possible matches. In seconds, the software will identify the best fit. What's more, databases are optimized for HLA sequence-based typing, HIV genotyping and HPV applications. If the **OpenGene** system by Visible Genetics sounds extraordinarily smart, it is. And it comes at an equally attractive, intelligent price. Give us a call and we'd be pleased to arrange a demonstration.

700 Bay St., #1000  
Toronto, ON Canada M5G 1Z6

[www.visgen.com](http://www.visgen.com)  
[info@visgen.com](mailto:info@visgen.com)

N. America: Tel. 416-813-3240  
Fax 416-813-3262  
Toll Free: 1-888-463-6844

Europe: Tel. 33 (0)1 60 87 13 00  
Fax 33 (0)1 60 87 13 01

\*For research purposes only. Not for use in diagnostic procedures.

**VISIBLE  
GENETICS INC.**



GPS Coordinates: N 43° 39.530, W 079° 23.190,



Any workstation can do graphics.  
Only one is specifically designed to make you say,

# It's alive!

STARTING  
@  
\$3,395

Introducing our newest line of visual workstations. The operating system is Windows NT®. And the computer is pure Silicon Graphics®. Featuring our Integrated Visual Computing (IVC) architecture with the Cobalt™ graphics chipset, these breakthrough machines move graphics data six times faster than AGP 2X-based workstations\*—a massive 3.2GB per second. Plus, I/O bandwidth is up to 12 times greater than other PC workstations.\*\* Finally, you can get the outrageous 2D, 3D and digital media performance you expect from Silicon Graphics— for about the price of a mere clone. The Silicon Graphics 320™



workstation starts at just \$3,395. Or choose the Silicon Graphics 540™ workstation! Starting at \$5,995, and supporting up to four Intel® Pentium® II Xeon™ processors, it's the most scalable Windows NT workstation around. Either way, your computer will scream. And so will you.



#### Silicon Graphics 320 Visual Workstation

- Silicon Graphics Integrated Visual Computing architecture with Cobalt graphics chipset
- Supports up to two Intel® Pentium® II processors (up to 450MHz)
- Integrated 10/100 Ethernet, IEEE-1394,† USB and professional video I/O
- Ultra ATA or optional Ultra2 SCSI drives up to 28GB total capacity
- Microsoft® Windows NT® Workstation 4.0
- Add the SuperWide™ 17.3" Silicon Graphics 1600SW™ digital flat panel monitor (shown) for only \$2,495



To get information, find a local reseller or to order, call 1 888 SGI-6315 or visit us at [www.sgi.com/go/visual](http://www.sgi.com/go/visual)

\*Bandwidth based on graphics to main memory. \*\*I/O bandwidth as compared to 32-bit PCI. †For information on the 1999 availability of the Silicon Graphics 540 workstation, please call 1 888 SGI-6315. ‡Requires additional software under Windows NT Workstation 4.0. Prices quoted are for U.S. only.  
©1999 Silicon Graphics, Inc. All rights reserved. Silicon Graphics is a registered trademark, and the Silicon Graphics logo, Silicon Graphics 320, Silicon Graphics 540, SuperWide, Cobalt and Silicon Graphics 1600SW are trademarks, of Silicon Graphics, Inc. Intel, the Intel Inside logo, and Pentium are registered trademarks, and Pentium II Xeon is a trademark, of Intel Corporation. Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. All other trademarks are property of their respective owners.

Circle No. 14 on Readers' Service Card



# PCR optimization in one single experiment



The determination of the right annealing temperature is crucial for establishing a new PCR experiment. The new all-round genius **Mastercycler® gradient** is an innovative, compact thermal cycler for even the most demanding PCR\* applications. Its gradient function enables a temperature gradient of up to 20 °C to be generated across the block, thus optimizing the annealing, denaturation, or extension temperature in one single experiment. Its 96-position all-in-one universal block can accommodate 96 x 0.2 ml tubes, 77 x 0.5 ml tubes, or one 96-well plate – without block exchange.

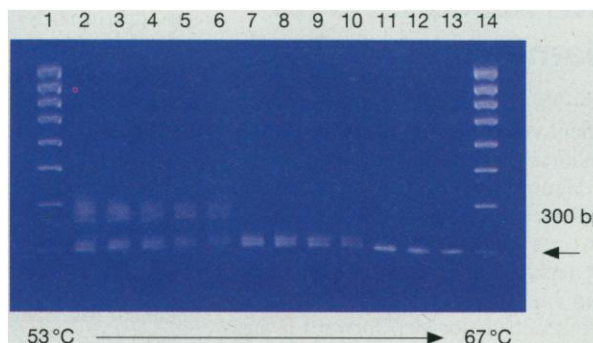
The exact block homogeneity ensures reproducible results. Variable, high incubation speeds as well as time and temperature increments for hot-start, touch-down, and long PCR provide maximum programming flexibility.

The **Mastercycler® personal** is designed to meet personal applications. Its 25-position all-in-one universal block holds 25 x 0.2 ml tubes, 16 x 0.5 ml tubes, or one microplate in a 5 x 5 grid.

Personal memory cards for 10 individually developed protocols allow an easy and comfortable method transfer between both Mastercycler models.

Circle No. 16 on Readers' Service Card

Of course, both Mastercyclers are licensed and authorized for PCR.



● Experimental determination of optimal annealing temperature. The calculated primer annealing temperature was 56.5 °C, the actual annealing temperature is 63.5 °C. The ribosomal spacer region of mycoplasmas from H9 cell cultures was amplified.

\*PCR (Polymerase Chain Reaction) is protected by patent. The patent is held by Hoffmann-La Roche. Practice of the patented Polymerase Chain Reaction (PCR) process requires a license. The Eppendorf Thermal Cyclers are Authorized Thermal Cyclers and may be used with PCR licenses available from the Perkin-Elmer Corporation. Their use with Authorized Reagents also provides a limited PCR license in accordance with the label rights accompanying such reagents.

**eppendorf**



Eppendorf – Netheler – Hinz GmbH · 22331 Hamburg · Germany · Phone (+49) 40-53801-0 · Fax (+49) 40-53801-556  
website: [www.eppendorf.com](http://www.eppendorf.com) · e-mail: [eppendorf@eppendorf.com](mailto:eppendorf@eppendorf.com)

Eppendorf Scientific, Inc. · One Cantiague Road · Westbury, NY 11590-0207 · USA · Phone 800-421-9988 or 516-876-6800 · Fax 516-876-8599  
website: [www.eppendorfsi.com](http://www.eppendorfsi.com) · e-mail: [eppendorf@eppendorfsi.com](mailto:eppendorf@eppendorfsi.com)

eppendorf® is a registered trademark.



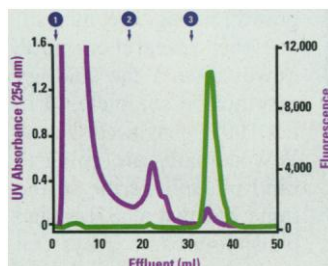
# Gripping 6xHis Protein Purification

**TALON™ Metal Affinity Resin and Columns**

**METAL AFFINITY RESIN**



**TALON Resin provides higher protein yield with improved purity.** 6xHis-GFP was purified using TALON and the leading Ni<sup>2+</sup>-based resin. **Lanes 1 & 5:** flowthrough. **Lane 4:** lysate. **Lanes 2 & 6:** wash pH 7.0. **Lanes 3 & 7:** eluate. Note TALON's improved resolution and yield compared to the competitor.



**High recovery and efficient separation of 6xHis-GFPuv with TALON Superflow Resin.** 6xHis-GFPuv was purified using FPLC from a cell extract of 900 mg of cells. **Arrow 1:** flowthrough. **Arrow 2:** wash. **Arrow 3:** elution with 150 mM imidazole. Green line corresponds to GFPuv fluorescence.

Get superior protein purification with **TALON**, a state-of-the-art immobilized metal affinity resin for the purification of histidine-tagged proteins. TALON utilizes cobalt and a proprietary tetradentate chelator\* for greater resolution and yields than nickel-based IMAC resins. **TALON Superflow™** has exceptional mechanical stability and superior flow characteristics for one-step purification in production-scale and FPLC applications. **TALONspin™** Columns are available for rapid purification of smaller amounts of protein. Also try **CLONTECH's Monoclonal Antibodies†** (mAb) and mAb conjugates for the specific detection of His-tagged proteins. Call and order today!

\* Patent pending

† Not available in Germany.

In Germany please contact **CLONTECH GmbH** • Tel: 06221 34170 Fax: 06221 303511

In the UK please contact **CLONTECH UK Ltd.** • Tel: 01256 476500 Fax: 01256 476499

In Japan please contact **CLONTECH Japan Ltd.** • Tel: 03 3523 9777 Fax: 03 3523 9781

Australia: 61 7 3375 1188 ■ Austria and Eastern Europe: 43 1 889 1819 ■ Belgium/Luxembourg: 0 800 1 9815 ■ Canada: Now call CLONTECH direct • 800 662 2566 ■ China: BEIJING YUANGPING BIOTECH • 86 10 68187551; GENE CO. LTD. • 021 6474 8700; SINO-AMERICAN BIOTECH CO. • 86 21 6402 2371 ■ Czech Republic: 420 19 7265214 ■ Egypt: 202 349 8311 ■ Finland: 358 9708 596 19 ■ France: 33134 602424 ■ Germany: CLONTECH GmbH • 49 6221 34170 ■ Greece: 301 51 53882 ■ Hong Kong: 852 2646 6101 ■ Hungary: 36 1 280 3728 ■ India: 91 11 54 21714 ■ Israel: 972 4 9960595 ■ Italy: 39 55 5 001871 ■ Japan: CLONTECH Japan Ltd. • 81 3 3523 9777 ■ Korea: 82 2 556 0311 ■ Malaysia: 603 777 2611 ■ Mexico: 525 281 4718 ■ The Netherlands: 31 33 495 00 94 ■ Norway: 47 22 421 520 ■ Portugal: 351 361 36 20 ■ Scandinavia: 46 8 728 00 65 ■ Singapore: 65 775 7284 ■ Spain: 34 9 1 630 0379 ■ Switzerland: 41 61 272 3924 ■ Taiwan: 886 2 27202215 ■ Thailand: 662 530 3804 4 ■ Turkey: 90 216 385 6321 ■ United Kingdom: CLONTECH UK Ltd. • 44 1256 476500 rev. 2/1/99

**CLONTECH**  
NOW YOU CAN.

1020 East Meadow Circle, Palo Alto, California 94303 USA

Tel: 800-662-2566 (CLON) 650-424-8222 • Fax: 800-424-1350 650-424-1088

E-mail: products@clontech.com orders@clontech.com • Internet: www.clontech.com

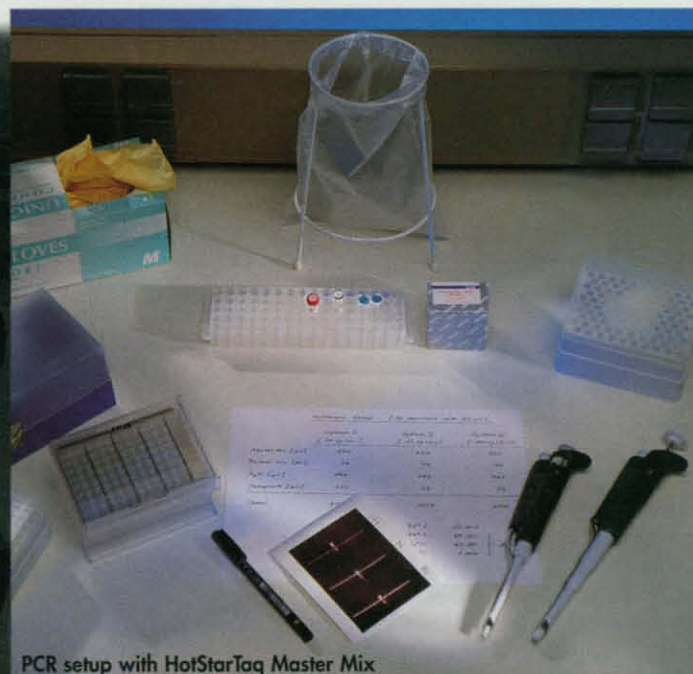
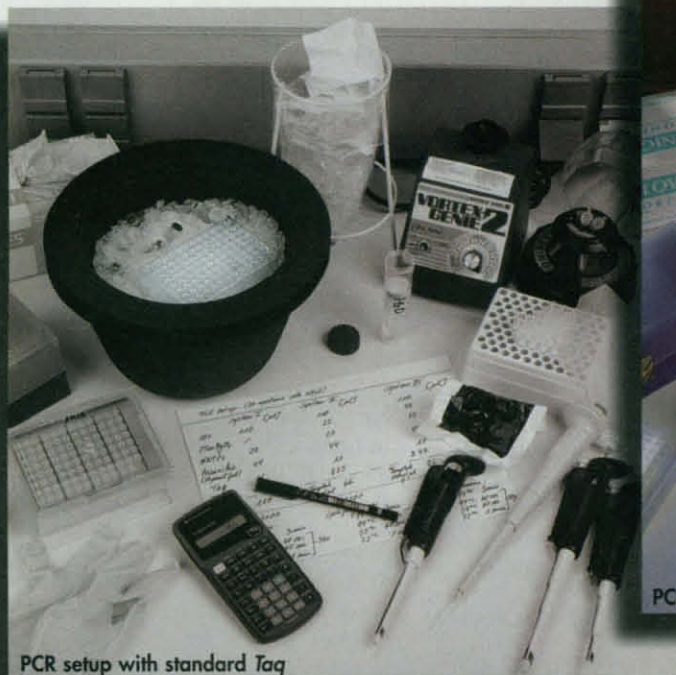
© 1998, CLONTECH Laboratories, Inc.

(AD96523)

Circle No. 66 on Readers' Service Card



# Simplify all your PCR with the **HotStarTaq™** Master Mix Kit



## No ice. No mess. No wasted time!

NEW

The **HotStarTaq™** Master Mix Kit is the only ready-to-use solution to simplify all your PCR applications. This premixed solution containing HotStarTaq DNA Polymerase, optimized QIAGEN® PCR Buffer, and dNTPs provides:

### ✓ Easy setup

Set up your reactions at the bench at room temperature. The premixed solution eliminates lengthy calculations and reduces pipetting — so you save time and minimize the risk of error or contamination.

### ✓ Robust amplification in all applications

Use HotStarTaq Master Mix for all your PCR applications. Little or no optimization is needed, even with previously optimized systems.

### ✓ High PCR specificity

Increase your specificity with hot-start PCR. HotStarTaq DNA Polymerase combined with QIAGEN PCR Buffer ensures high specificity in the first cycle and throughout your PCR.

Ease of use and high specificity make HotStarTaq Master Mix the ideal solution both for projects involving large numbers of samples and for your most demanding applications.

**High specificity in an easy-to-use format —  
let the HotStarTaq Master Mix Kit simplify all your PCR!**

The HotStarTaq Master Mix Kit is sold under licensing arrangements with F. Hoffmann-La Roche Ltd, Roche Molecular Systems, Inc. and The Perkin-Elmer Corporation. 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.

<http://www.qiagen.com>

Germany:

QIAGEN GmbH

Tel. 02103-892-240

Fax 02103-892-255

USA:

QIAGEN Inc.

Tel. 800-426-8157

Fax 800-718-2056

Australia:

QIAGEN Pty Ltd

Tel. 03-9489-3666

Fax 03-9489-3888

Canada:

QIAGEN Inc.

Tel. 800-572-9613

Fax 905-501-0373

France:

QIAGEN S. A.

Tel. 01-60-920-930

Fax 01-60-920-925

Japan:

QIAGEN K.K.

Tel. 03-5805-7261

Fax 03-5805-7263

Switzerland:

QIAGEN AG

Tel. 061-319-30-31

Fax 061-319-30-33

UK:

QIAGEN Ltd.

Tel. 01293-422-999

Fax 01293-422-922

DISTRIBUTORS: Austria/Hungary/Slovenia Austria (01) 889 18 19 Belgium/Luxemburg 0800-1-9815 Brazil (11) 543 1455 or 0800 55 1321 Central & South America USA (305) 828-3818 China (852) 2896-6283 Czech Republic (02) 4447 1239 Denmark 43 86 87 88 Finland (09)-804 551 Greece (01)-643 61 38 India (011)-542 1714 Israel 02. 584 1111 Italy (055) 500 1871 Korea (02) 924-86 97 Malaysia (03)-7312099 Mexico USA (661) 294-7940 The Netherlands (033)-4950094 New Zealand (09) 980 6700 or 0800 933 966 Norway 22 90 00 00 Poland (071) 51 41 06 or 51 54 20 Portugal (1)-751 6000 Singapore 445 7927 Slovak Republic (07) 54 01 336 South Africa (021) 615166 Spain (93) 902.20.30.90 Sweden (08) 621 34 00 Taiwan (02) 2880 2913 Thailand (02) 412-5672 In other countries contact: QIAGEN GmbH, Germany

Circle No. 71 on Readers' Service Card





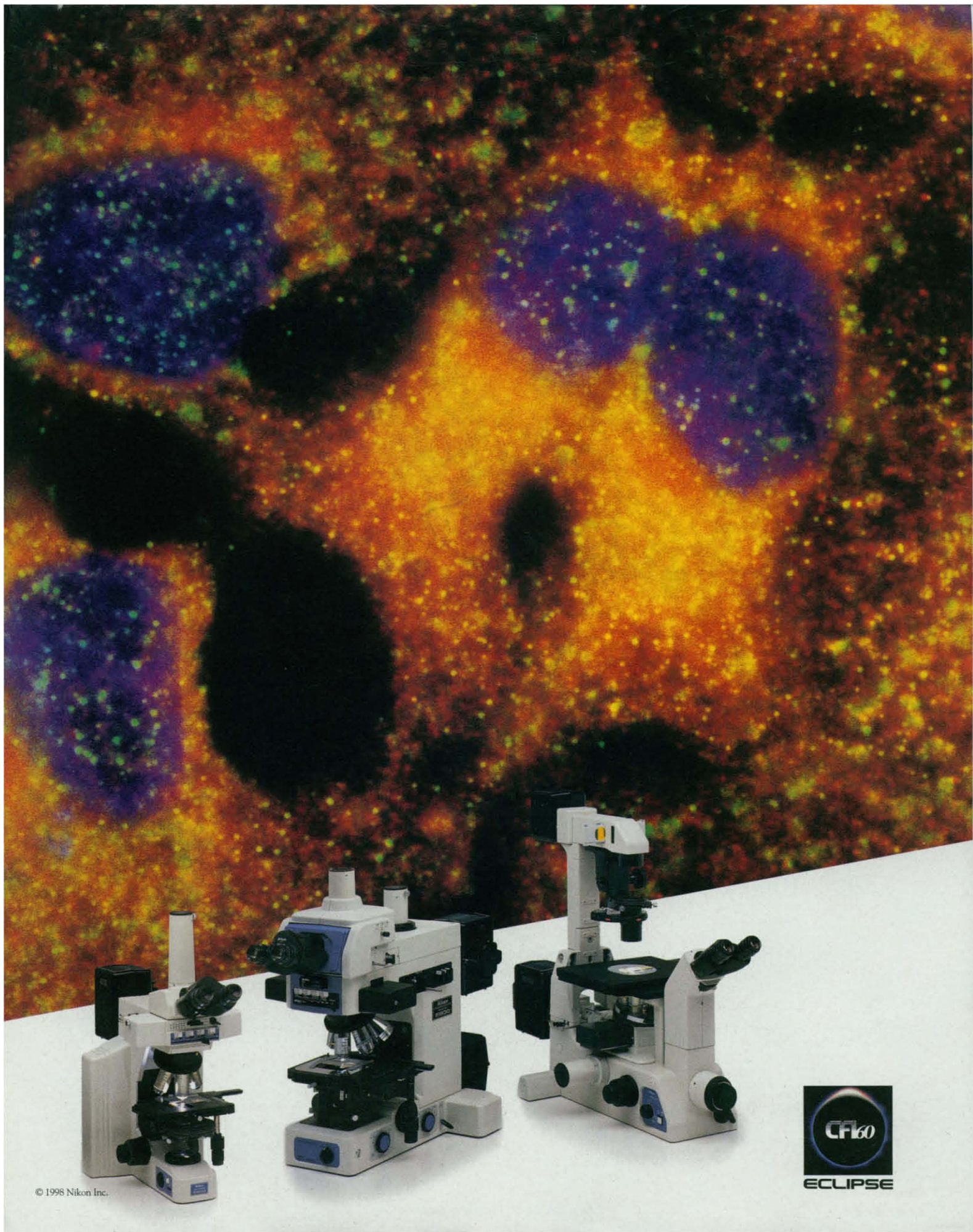


As they work to advance science,  
labs around the world use our  
filters and filter-based systems  
1,000,000 times a day.

pure science™

It's our total dedication to improving productivity, whether you're developing assays or decontaminating fluids. It's our focus on fitting a system to your application, from designing screening plates compatible with your robots to customizing lab water systems to your particular process. And finally, it's our expertise in microbiology, biochemistry and analytical science, as well as the knowledge reflected in the design of our products, the clarity of our manuals, the substance of protocols, and the breadth of our live and on-line support. Put our pure science to work for you. **Call 1-800-MILLIPORE.**  
Or visit [www.millipore.com](http://www.millipore.com)

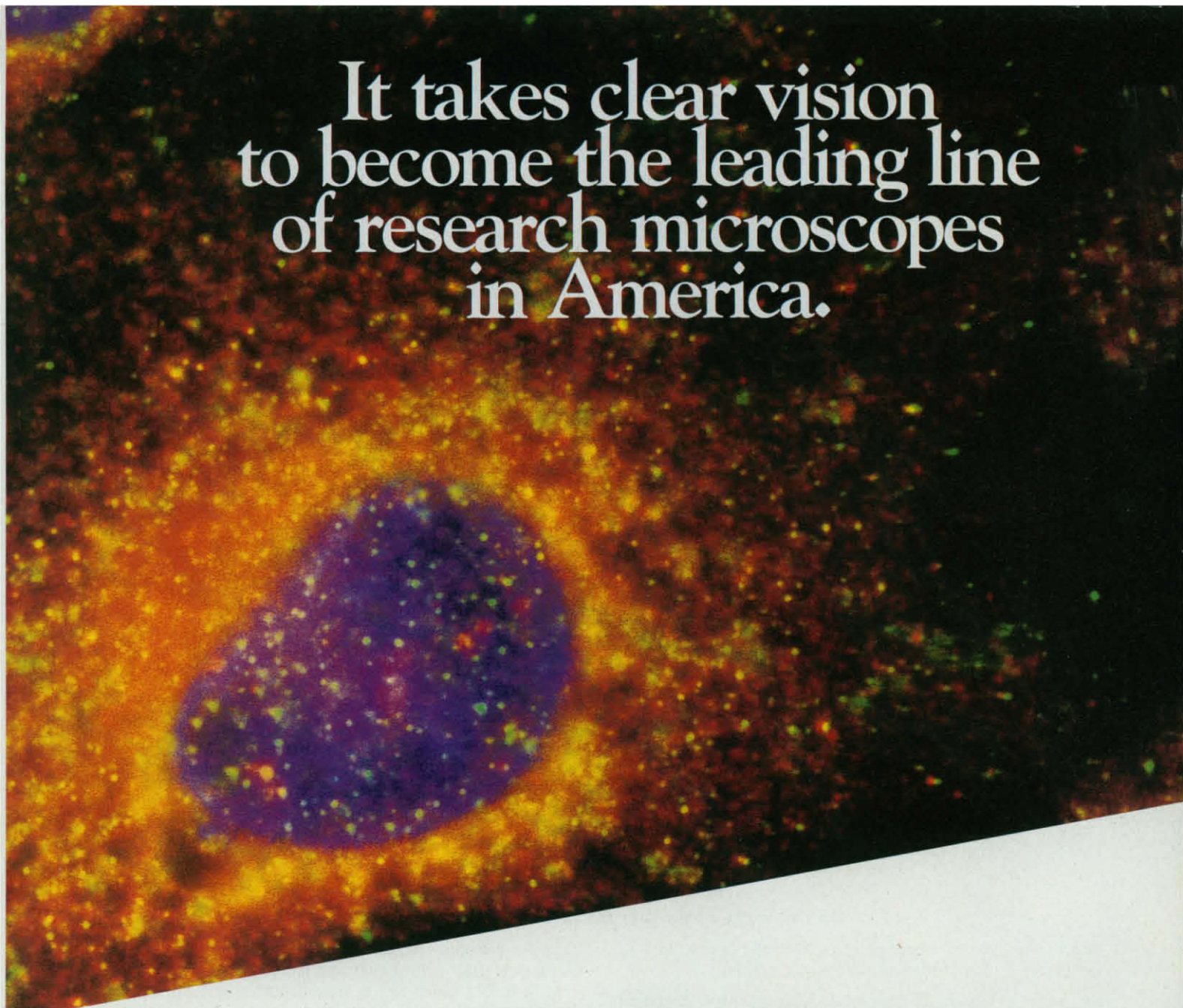




© 1998 Nikon Inc.







# It takes clear vision to become the leading line of research microscopes in America.

## And Nikon's vision has revolutionized microscopy.

The vision is Eclipse. The technology is groundbreaking. Eclipse microscopes, with their CFI60™ optical system, redefine infinity with the longest working distances, highest numerical apertures, and widest magnification range and documentation field sizes ever. Eclipse microscopes have proven themselves in research facilities across the country.

**In fact, the Eclipse E800™ and TE300/200™ are America's number one selling research microscopes in their class.\***

And you can rely on all the Eclipse microscopes to meet the most diverse observation and imaging requirements, with

better clarity than ever before. Experience the clear vision of Eclipse for yourself. To schedule a demonstration of either the E800, E600, or the inverted TE300/200, call us at: **1-800-52-NIKON, ext. 330.**

### The vision continues...

New high-tech advancements continue to be developed including our new physiology workstation, the Eclipse E600FN™ with its unique, easy-to-position, focusing nosepiece. Or, check out the ultimate in digital microscope automation, the new Eclipse E1000™.

[www.nikonusa.com](http://www.nikonusa.com)

\*Based on the Opto-Precision Instruments Association's (OPIA) Fourth Qtr. 1997, U.S.A. Microscope Survey

**Nikon**

**Redefining Infinity**

Circle No. 33 on Readers' Service Card



It does  
all the

routine

stuff so

you can

do all the

cool

stuff!



### On the verge of another breakthrough in bioscience?

Need some serious assistance to match the hectic pace of molecular biology protocols and experiments?

Get a new Assistant! The Molecular Biology Assistant 2000™ System. The next revolution in tailored solutions from Perkin-Elmer. With crowded bench space, and changing work areas, this compact and innovative productivity tool is ready—when and where you are. For instant help computing concentration and amounts of biomolecules—in the units needed for setup. For finding the volumes needed for microplate or tube dilutions in a flash. For quick OD<sub>260</sub> checks, finding concentrations of DNA and protein solutions. For running quantitative colorimetric analysis from stored standard curves.

Conversions are no problem...they are dynamic: picomoles, ODU's, and copy number all in context for the next step.

Experienced and insightful assistance for designing and using new oligos. Intuitive and truly fun to use? Finally! With a bright color touch screen and graphical display. And personalizable. Your specific absorbance-based methods and curves are stored...with names you create...on top level buttons in the folder you choose. Your local currency, your local time/date convention, your style. Even a time-stamped log of your day's work for reference. Job done.

To get this talented new Assistant started in your lab next week, **order one risk-free for 30 days by calling 1-877-MORE-MBA.** And visit [www.perkin-elmer.com/mba2000](http://www.perkin-elmer.com/mba2000) for a free T-shirt offer and to see how much of the routine stuff it will do, so you can do the cool stuff. Start planning that next discovery experiment—now!

Circle No 57 For Literature Only  
Circle No 58 For a Sales Call



### Get MORE Connected.

The lines of advanced communication are OPEN. It's the Perkin-Elmer commitment to building relationships by sharing information and solving problems together. So no matter how far-reaching your needs, our worldwide support and service teams will take you where you need to go. Experience MORE of what PE can do for you. For the location nearest you, or a complete listing of our worldwide offices, visit us at [www.perkin-elmer.com](http://www.perkin-elmer.com). E-MAIL us at [info@perkin-elmer.com](mailto:info@perkin-elmer.com). Or, in the U.S., call 1-800-762-4000 or fax 1-203-762-4228.

Perkin-Elmer is a registered trademark and MBA 2000 is a trademark of The Perkin-Elmer Corporation.

**PERKIN ELMER**

Look to us. And see more.





# I N N O V A T I O N



## 3-D Data Maps Enhance the 4th Dimension: Time.

The new ultra-sensitive Finnigan LCQ™ DECA takes you to a new dimension in complex analyses with 3-D MS/MS Data Maps. This powerful new technique draws together Finnigan's technology innovations in several areas: ultra-sensitive MS<sup>n</sup> analysis, intelligent instrument control and advanced data reduction and display.

The LCQ DECA's state-of-the art MS<sup>n</sup> ion trap mass analyzer generates structural data of unparalleled sensitivity and specificity. Efficient data acquisition is enabled with Finnigan's proprietary *Intelligent Data Dependent* techniques, and elegant data analysis utilizing the 3-D MS/MS Data Browser. These outstanding innovative technologies typically reduce analysis time from hours to minutes!

The ultra-sensitive LCQ DECA builds upon our classic LCQ, the most successful LC/MS of all time. It adds an order of magnitude in performance to the ruggedness and reliability that you've come to expect.

For details on how the LCQ DECA can improve analyses in your laboratory, call your nearest ThermoQuest representative, or visit our website.

[www.finnigan.com](http://www.finnigan.com)



The Finnigan LCQ DECA includes unique data reduction tools for managing and interpreting multi-stage MS/MS data.



ThermoQuest

Australia Tel. (61) 2 9898 9000 • Austria Tel. (43) 1 333 50340 • Belgium Tel. (32) 3 8250670 • Canada Tel. (800) 721 4620 • France Tel. (33) 1 6918 8810 • Germany Tel. (49) 6103 4080 • Italy Tel. (39) 02 950 59226 • Japan Tel. (81) 3 3372 3001  
Netherlands Tel. (31) 76 587 8722 • People's Republic of China Tel. (86) 10 6841 8790 • Spain Tel. (34) 91 6574930 • Sweden Tel. (46) 8 6820101 • United Kingdom Tel. (44) 01442 233555 • U.S.A. Tel. (800) 532 4752

Circle No. 9 on Readers' Service Card





# CHECK OUT THE BIOCOT® ADVANTAGES!

There's never been a better time to try BIOCOT® Cellware! Now available with Collagen I, Gelatin, Poly-D-Lysine or Poly-L-Lysine — in a variety of tissue culture vessels! Researchers can now spend more of their valuable time *performing* experiments instead of preparing for them. Get the BIOCOT advantages...now at a price you can afford!

## WIDE SELECTION

BIOCOT Cellware is offered in a wide assortment of tissue culture vessels — from FALCON® clear polystyrene Multiwell™ plates to a variety of dishes and flasks. Also available are FALCON® 96-well and 384-well assay plates in solid white opaque and black and white opaque with clear bottoms.

## CUSTOM PRODUCTS

Looking for a special coating or vessel? We can 'Custom Coat' to meet your individual needs. Please contact our Technical Services Department for details.

For More Information, Visit Our Web Site...  
[www.bd.com/labware](http://www.bd.com/labware)



### ✓ Ready-To-Use Convenience

Save labor and increase productivity by spending more of your valuable time performing experiments instead of preparing for them.

### ✓ Reliable Performance

Improve cell attachment and increase proliferation rates for a variety of normal and transformed cells.

### ✓ Room Temperature Stability

Too little space in your cold room is no longer a problem! Our proprietary formulation and manufacturing techniques result in products that are stable at room temperature.

### ✓ Quality Assurance Testing

Products are thoroughly tested and guaranteed to perform as claimed so you can use them with complete confidence.

### ✓ Lot-To-Lot Consistency

Highly controlled production environment and validated manufacturing procedures assure product uniformity and cell culture performance.

### ✓ Affordable Pricing

Our automated production facility and improved packaging have enabled us to achieve significant cost savings—savings we have passed on to our customers by substantially reducing list prices!

Order BIOCOT® products from your authorized distributor or call us directly at 1-800-343-2035.

**BECTON  
DICKINSON**

Becton Dickinson Labware  
Two Oak Park • Bedford, MA 01730 USA  
Fax: (800) 743-6200 • e-mail: [mail@bd.bd.com](mailto:mail@bd.bd.com)

Circle No. 46 on Readers' Service Card





# New Insights



## Get a new perspective on your PCR:

- ♦ High speed thermal cycling in glass capillaries (30 cycles in 20 minutes!)
- ♦ Realtime on-line fluorescence monitoring
- ♦ Highly accurate quantification during log-linear PCR phase
- ♦ Mutation detection with continuous monitoring of hybridization kinetics

# LightCycler™

PCR perfected!

ROCHE MOLECULAR BIOCHEMICALS

Licensed from Idaho Technology, Inc.

Internet: <http://biochem.roche.com>. Austria (01) 277 870; Australia (02) 9899 7999; Belgium (02) 247 4930; Canada (450) 686 7050 (800) 361 2070; Denmark 45 16 09 50; France 04 76 76 30 86; Germany (0621) 759 85 68; Italy 039 247 4109-4181; Japan 03 5443-5284; Netherlands (036) 53 94 911; Spain (93) 201 4411; Sweden (08) 404 88 00; Switzerland (0 41) 799 61 61; United Kingdom (0800) 521 578; USA (800) 428 5433

LightCycler™ is a trademark of and licensed from Idaho Technology, Inc.

© 1999 Roche Diagnostics. All rights reserved

Circle No. 30 on Readers' Service Card

Roche





# FALCON<sup>®</sup> HTS FluoroBlok<sup>™</sup> Inserts

**DIFFERENT FOR WHAT YOU CAN SEE.**

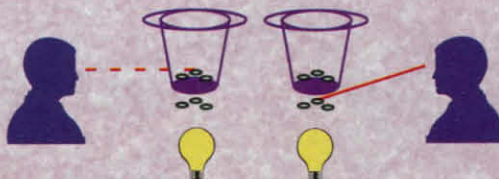
**DIFFERENT FOR WHAT YOU CAN'T SEE.**

Now you can detect cell migration and invasion in one homogeneous fluorescence assay system!

FALCON<sup>®</sup> HTS FluoroBlok<sup>™</sup> Inserts save time and labor in chemotaxis, cell migration and invasion assays by automating your assay detection with fluorescence. Get rapid data collection without the need for plate washing or tedious, manual cell scraping and counting. And with FALCON HTS FluoroBlok Inserts you can chart migration of cells and molecules in real time without dismantling or destroying the insert. For more information contact your local Becton Dickinson Labware Representative today, or call 1-800-343-2035!



*Fluorescently labeled cells above the membrane are made invisible by the exclusive FluoroBlok<sup>™</sup> light opaque membrane.*



*Once labeled cells migrate through the membrane, they are no longer shielded from the light source and are now easily detected with a fluorescence plate reader.*

**BECTON  
DICKINSON**

For More Information, Visit Our Web Site...[www.bd.com/labware](http://www.bd.com/labware) or call 1-800-343-2035

Circle No. 47 on Readers' Service Card



For 12-liter  
processing you  
could buy two  
centrifuges.

Or just get  
one with a  
bigger bottle.

**SORVALL®**

**Introducing the SORVALL® RC12BP™ Total Processing Solution** – the first lowspeed centrifuge to offer a 12-liter capacity. Designed specifically for large-scale batch processing, the **RC12BP** system not only gives you twice the capacity of other centrifuges, but also helps maximize production efficiency while increasing the ease of GMP compliance.

The new, ergonomically designed **RC12BP** centrifuge lets you process 12-liter batches at up to 7,333 x g, while occupying about the same amount of floor space as a 6-liter instrument – but with a lower deck height and shorter reach. It also enhances separation quality through features like SORVALL's Accumulated Centrifugal Effect (**ACE**) system that maintains reproducible total centrifugal effect from run to run, and instrument to instrument. Plus, there's Minimal Sample Resuspension (**MSR**), and a hot-gas bypass system for improved temperature control and reduced moisture accumulation.

The **H-12000** rotor holds up to six 2-liter polypropylene bottles featuring tapered bottoms to hold pellets more securely. And for safer transport, the system offers a six-place bottle rack.

For easy, automatic data logging, you can network up to 16 SORVALL **RC12BP** and **RC3BP** centrifuges, using our **WatchLog Network Plus™ Software** and a standard PC. Also, you can quickly link batches to their run conditions with **BarTrace™** Barcoding Packaging.

Call Kendro Laboratory Products today, and double your pelleting capacity – with one total processing solution.



Visit us at Pittcon '99  
Booth #1304

©1999 Kendro Laboratory Products, L.P. All Rights Reserved.



 **Kendro**  
Laboratory Products

*A worldwide company  
formed by the merger of  
Heraeus Instruments  
and Sorvall.*

Circle No. 38 on Readers' Service Card

Offices worldwide. In the US, call 1-800-522-SPIN, Fax 203-270-2210.  
In Europe, 49 (6181) 35-300, Fax 49 (6181) 35-59 44.  
In Asia Pacific, 203-270-2080, Fax 203-270-2210.  
Or contact your local Kendro Laboratory Products Representative.  
[www.kendro.com](http://www.kendro.com)



# Plot it! Analyze it! Fit it!

## Solutions for Chemists

Today's chemists rely on software from SPSS Science to graph, fit and analyze their chemical data — accurately and efficiently. Discover why these award-winning packages have already made their way into the efforts of more than 100,000 researchers worldwide.

### SIGMAPLOT 5.0 THE TECHNICAL GRAPHING STANDARD

SigmaPlot® is an easy-to-use technical graphics and data analysis software that enables you to create the exact graph for lab notebooks and journals. SigmaPlot provides the data analysis tools you need to analyze reaction kinetics or other chemical data easily — from basic statistics to advanced mathematical calculations. Choose from over 100 built-in equations or create your own to curve-fit data using the Regression Wizard or plot them instantly with the Function Wizard. *Invoke Microsoft® Excel in-place activation and add the power of SigmaPlot directly to Excel.* Automate repetitive reports of your experiments with SigmaPlot's new macro language and macro recorder.

### TABLECURVE 2D 4.0 AND TABLECURVE 3D 3.0 FIT THOUSANDS OF EQUATIONS IN SECONDS

Save precious research time by taking endless trial and error out of curve fitting. TableCurve® 2D and 3D let you visually discover the best equation for your data — instantly! Graphically review results to find the best-fit equation. Output publication-quality graphs, image files, data files or generate ready-to-use program code. Use TableCurve 2D for XY data and TableCurve 3D for XYZ data.

### PEAKFIT 4.0 AUTOMATED PEAK SEPARATION AND ANALYSIS

PeakFit® finds, fits and separates overlapping peaks in spectroscopy and chromatography data that even sophisticated instruments miss. Its state-of-the-art nonlinear curve-fitting techniques are fully automated so you can show any characteristic of each peak quickly and accurately — at a fraction of the cost and with much less effort.

## Try it FREE!

Visit our Web site for product details and FREE software:

**[www.spss.com/software/science](http://www.spss.com/software/science)**

SPSS Inc., 233 S. Wacker Drive, 11th Floor  
Chicago, IL 60606-6307  
+312.651.3000; Fax: +312.651.3668  
Toll-free: 1.800.621.1393; Fax: 1.800.841.0064  
Distributors worldwide: <http://www.spss.com/order/>

SPSS Science Software GmbH  
Schimmelbuschstrasse 25  
40699 Erkrath, Germany  
+49 (0) 2104.9540; Fax: +49 (0) 2104.95410  
France: +0800.90.37.55; UK: +0800.894982

**Call Today!**  
**(800) 345-4740**

**SPSS science**

YSFAD-0299

Circle No.54 on Readers' Service Card

A4740

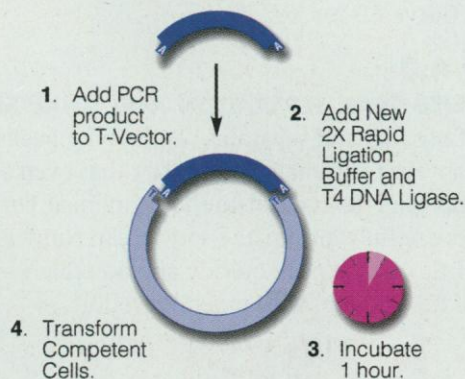


# A REAL CHOICE IN TA CLONING

- ✓ **Performance**
- ✓ **Convenience**
- ✓ **Value**

**T**-Vectors revolutionized the efficiency and simplicity of cloning PCR products. Promega's broad range of T-Vector solutions takes PCR cloning to a new level. Our innovative T-Vector design improves the ease of using the cloned PCR products in a wide range of applications including sequencing. Promega's T-Vector technology provides the fastest route to high-performance PCR product cloning.

**Now, Ligate Promega T-Vectors in Just One Hour!**

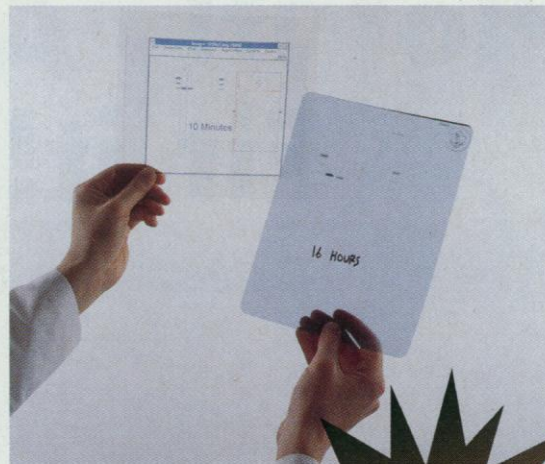


Contact your local Promega Branch  
Office or Distributor for your FREE  
PCR-Cloning Brochure.  
**Phone 608-274-4330 or  
800-356-9526**



**WWW.promega.com/amplification/**

Licensed under one or both of U.S. Pat. No. 5,487,993 and Eur. Pat. No. 0 550 693



## WHY WAIT?

**\$27,978\***

### Instant Autoradiography

Packard's new InstantImager<sup>®</sup> directly images and quantitates radioactivity from gels, blots, membranes, TLC plates and tissue slices. There are no X-Ray films or phosphor screens to expose and process. Just load your sample, point and click with the mouse, and you will get instant results.

In just seconds you'll know if your experiment has succeeded; in minutes, you'll get reliable quantitative data. The InstantImager is 100 times faster than X-ray film and ten times faster than phosphor screens.

The patented Microchannel Array Detector (MICAD) images <sup>14</sup>C, <sup>35</sup>S, <sup>32</sup>P and <sup>125</sup>I activity, and other beta and gamma emitting radioisotopes, in real time. This revolutionary process achieves results with true nuclear counting statistical accuracy within minutes instead of days.

Hard to imagine? Just look at the example above of a Southern Blot from Prof. E. Southern's laboratory, University of Oxford, UK. On the right is a conventional X-ray film after a 16 hour exposure. On the left is the same sample imaged in just ten minutes.

So why wait? Experience similar productivity gains in your lab. Call Packard today and ask for the InstantImager!

\* Prices will vary outside the U.S.A. due to exchange rates, freight, duties, and local service.



**Packard Instrument Company**  
800 Research Parkway Meriden, CT 06450 U.S.A.  
Tel: 203-238-2351 Toll Free: 1-800-323-1891  
FAX: 203-639-2172 Web Site: <http://www.packardinst.com>  
Email: [webmaster@packardinst.com](mailto:webmaster@packardinst.com)

**Packard International Offices:**  
Australia 03-9543-4266 or 1 800 335 638; Austria 43-1-2702504;  
Belgium 32(0)2/481.85.30; Canada 1-800-387-9559;  
Central Europe 43 456 2230 015; Denmark 45-43909023 or 45-43907151;  
France (33) 1 46.86.27.75; Germany (49) 6103 385-151;  
Italy 39-2-33910796; Japan 81-3-3866-5850; Netherlands 31-50-549 1296;  
Russia 7-095-259-9632; Switzerland (01) 481 69 44;  
United Kingdom 44 (0)118 9844981

Circle No.31 on Readers' Service Card

Circle No.74 on Readers' Service Card



# New Incubator, blah, blah, blah ...



... Forma's new Direct Heat CO<sub>2</sub> Incubator  
is anything but blah.

For complete details, please contact us.

- E-mail: [fmarketing@forma.com](mailto:fmarketing@forma.com)
- Fax: 740-374-1817
- Phone: 800-848-3080, Ext. 1851



## **Forma Scientific, Inc.**

Box 649 • Marietta, OH 45750  
740-373-4763 • Fax: 740-373-6770  
USA and Canada 1-800-848-3080  
International Distributors Worldwide  
An ISO 9001 Company  
<http://www.forma.com>

*Forma Scientific is a subsidiary of  
ThermoQuest Corporation, a public subsidiary of  
Thermo Instrument Systems Inc.,  
a Thermo Electron Company.*



# We are experts in connective tissue research

**Diabetic Nephropathy**

**NEW** Urinary type-IV collagen kit

**Rheumatoid Arthritis**

**Coming soon!** MMP-3 kit

**Cancer Invasion & Metastasis**

**MONOCLONAL ANTIBODIES** for Immunohistochemistry, Western blotting:

**NEW** MMP-10, MMP-13, MT1-MMP, MT2-MMP, MT3-MMP,  
active MMP-1, active MMP-7, Cathepsin K

**ENZYME IMMUNOASSAYS**... Kits and Custom assays:

MMP-1, MMP-2, MMP-7, MMP-8, MMP-9, MMP-13, TIMP-1, TIMP-2, LM, TM, sIV-C

For more information at <http://www.fuji-chemi.co.jp>

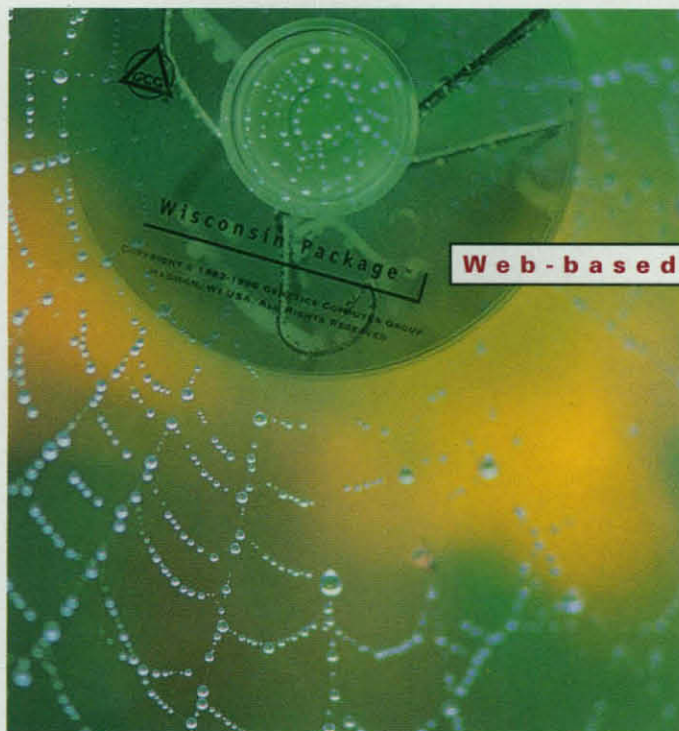


**FUJI CHEMICAL INDUSTRIES, LTD.**

530 Chokelji, Takaoka, Toyama 933-8511, Japan  
FAX: +81-766-26-4437 E-mail: toriyama@fuji-chemi.co.jp

**We Desire to Cooperate with You in Your Research and Diagnostic Fields.**

Circle No.48 on Readers' Service Card



## SeqWeb™

Understanding the code of life is a challenge ...  
your software shouldn't be.

**Web-based Sequence Analysis**

**NEW!**  
**VERSION 1.1**  
▶ ADDED PROGRAMS - PROTEIN ANALYSIS,  
MOTIF AND DATABASE SEARCHING  
▶ EXTENDABLE - ADD OTHER GCG OR  
THIRD-PARTY PROGRAMS  
▶ BATCH AND APACHE  
SERVER SUPPORT

GCG's web interface provides easy access to a core set of programs in the Wisconsin Package™, the global standard in sequence analysis software. SeqWeb eliminates the need to know program commands and operating system specifics, letting you concentrate on your data and results - perfect for both new and experienced users.

- ▶ Easily access the Wisconsin Package via a Netscape® or Internet Explorer® web browser on your local intranet.
- ▶ Retrieve sequence files on your desktop as well as access group project data on the server.
- ▶ Utilize your site's standard and proprietary databases. Research results contain links to databases on the Internet and your local intranet.
- ▶ Find full, context-sensitive help available online.



**Genetics Computer Group**

Solutions for Discovery Research



An Oxford  
Molecular  
Company

**USA**

tel: (608) 231-5200  
e-mail: seqweb@gcg.com

**Europe**

tel: +44 1865 784600  
e-mail: sales@oxmol.co.uk

**Worldwide**

tel: (800) 876-9994  
<http://www.gcg.com/products/seqweb.html>

© Genetics Computer Group, 1999. GCG, GCG logo, SeqWeb, and Wisconsin Package are trademarks of Genetics Computer Group. Oxford Molecular is a trademark of Oxford Molecular Ltd.

Circle No.29 on Readers' Service Card



# Nytran<sup>®</sup> SuPerCharge

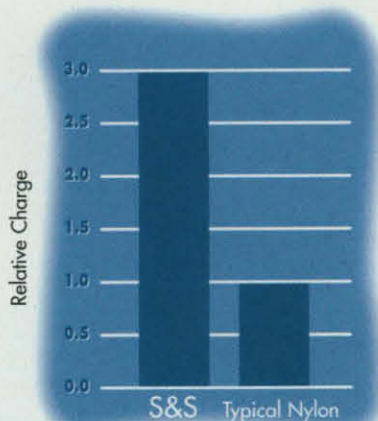
NYLON TRANSFER MEMBRANE

**NEW!**

## Clearly Better Blotting Demands A Clearly Better Membrane

Introducing a Breakthrough in Nylon Membrane Manufacturing  
Nytran<sup>®</sup> SuPerCharge

Nytran SuPerCharge vs. Typical Nylon

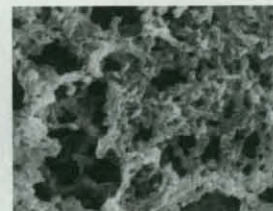


Binding Ratio of a Negatively Charged  
Dye to the Membrane Surface

► **Highest Positive Charge**

► **Consistent Membrane Morphology**

► **Low Background**



SEMs showing uniform pore size and distribution in Nytran SuPerCharge membranes (left) and inconsistent pore size and uneven distribution in typical nylon membranes (right).

### LIMITED TIME SPECIAL OFFER!

Description	Qty/Pk	Item#	Price
81.5 mm circles	50	416206	\$55/pk
30.1 x 60.1 cm sheets	5	416207	\$115/pk

To order contact your S&S distributor or call S&S at  
**1-800-245-4024**

Clearly *better*  
**Blotting**

**Schleicher & Schuell**

Headquarters: Schleicher & Schuell GmbH • P.O. Box 4, D-37582 Dassel • Germany • Tel +49-5561-791-0 • Fax +49-5561-791-536 • [filtration@s-und-s.de](mailto:filtration@s-und-s.de)  
USA Headquarters: Schleicher & Schuell Inc. • 10 Optical Avenue • Keene N.H. 03431 USA • Tel (603) 352-3810 • Fax (603) 357-7700 • [techserv@s-and-s.com](mailto:techserv@s-and-s.com)

Other Subsidiaries of Schleicher & Schuell GmbH, Dassel/Germany include the Netherlands, Switzerland, France, Belgium, Hungary, Italy and Great Britain.

Circle No.43 on Readers' Service Card

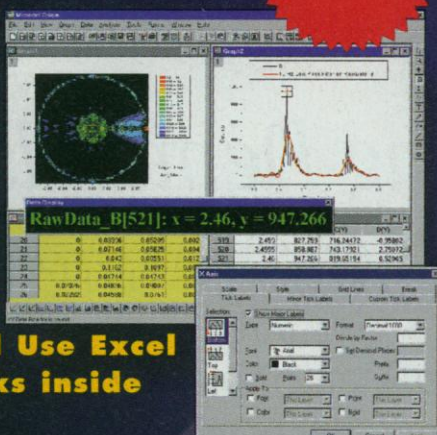


# ORIGIN<sup>®</sup>

Data Analysis and Technical Graphics

PITTCON  
Booth #6744

- **Easy To Use!**
- **High-Performance!**
- **Unparalleled Speed!**
- **Flexible and Reliable!**



## Open and Use Excel Workbooks inside Origin

Use Origin's data analysis capabilities to perform analysis directly on your Excel data, and Origin's graphing power to create graphs right from your Excel worksheets. You can even drag and drop data from Excel to instantly create an Origin graph. Excel workbooks can be saved as part of the Origin project or as a link.

## Origin Works With Your Data

Import a broad range of file types, from ASCII data to Mathematica<sup>®</sup> matrices. Import data from LabTech<sup>™</sup>, LabView<sup>™</sup>, TestPoint<sup>™</sup>, and other acquisition software. Customize your own routine for any ASCII or binary file.

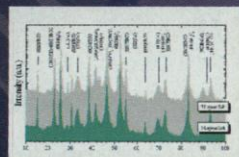
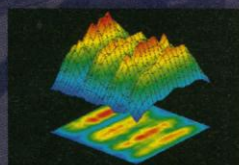
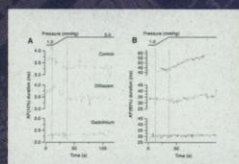
## An Analysis Tool for Every Task

Origin includes a rich set of the essential data analysis tools you need - all intuitively designed for your ease of use. Select from linear or nonlinear curve fitting, FFT, frequency-domain digital filtering, baseline and peak analysis, summary statistics, ANOVA, algebraic transformations, calculus, smoothing, or other tools to analyze your data.

# Microcal<sup>®</sup>

Circle No.21 on Readers' Service Card

Download our demo at [www.microcal.com](http://www.microcal.com)  
or Call 1-800-969-7720 for a FREE demo CD!



*"...Origin's stronger mathematical underpinnings and powerful scripting language will make it the preferred choice for many technical users."*

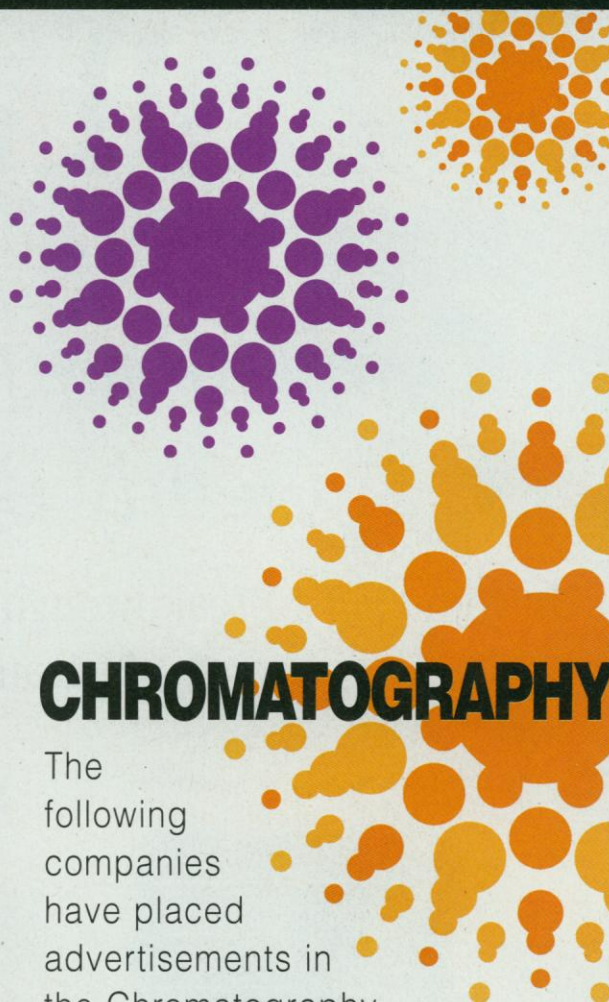
Dr. Barry Simon, Ph. D.  
PC Magazine,  
January 20, 1998



Microcal Software, Inc One Roundhouse Plaza Northampton, MA 01060 USA  
TEL: 413-586-2013 FAX: 413-585-0126 EMAIL: [info@microcal.com](mailto:info@microcal.com)

Origin is a trademark of Microcal. All other brand and product names are trademarks of their respective owners. NSTL makes no recommendation or endorsement of any product.

## ADVERTISER DIRECTORY



# CHROMATOGRAPHY

The following companies have placed advertisements in the Chromatography Advertising Supplement.

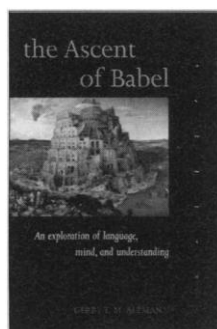
Amersham	
Pharmacia Biotech .....	1373
Bio-Rad Laboratories .....	1368
Hamilton Company .....	1370
Isco .....	1371

Turn to Page 1369

**Science**  
[www.scienceonline.org](http://www.scienceonline.org)



# Pursue

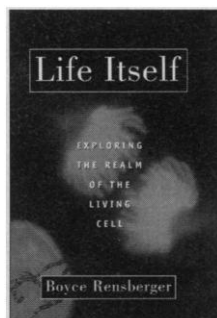


## **The Ascent of Babel**

**An Exploration of Language, Mind, and Understanding**  
GERRY T. M. ALTMANN

Psycholinguist Gerry Altmann takes us on a journey of discovery, illuminating how, through the workings of the brain, we use language to reach out and touch each other's minds.

April 1999 304 pp. \$17.95



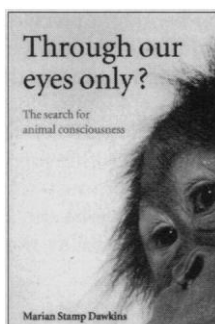
## **Life Itself**

**Exploring the Realm of the Living Cell**

BOYCE RENSBERGER

"*Life Itself* is a wonderfully readable digest of everything currently known about the mechanisms by which living cells perform their myriad tasks."—*The New York Times Book Review*

1998 304 pp. \$15.95



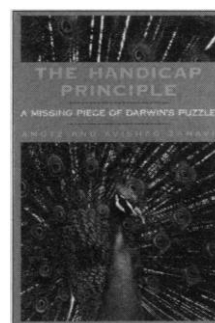
## **Through Our Eyes Only?**

**The Search for Animal Consciousness**

MARIAN STAMP DAWKINS

"An impressive compendium of brilliantly lucid descriptions of reliable observations of the intricacy of animal behavior."—*Times Higher Education Supplement*

1998 206 pp. \$15.95



## **The Handicap Principle**

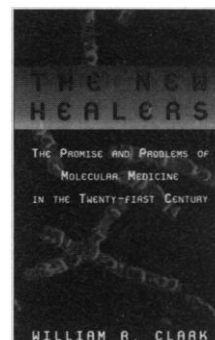
**A Missing Piece of Darwin's Puzzle**

AMOTZ ZAHAVI and AVISHAG ZAHAVI

With NA'AMA ELY, MELVIN PATRICK ELY, and AMIR BALABAN

Amotz and Avishag Zahavi offer a unifying theory that brilliantly explains many aspects of animal signaling and holds up a mirror in which human behaviors take on new significance.

April 1999 304 pp. \$16.95



## **The New Healers**

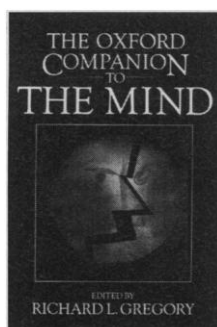
**The Promise and Problems of Molecular Medicine in the Twenty-First Century**

WILLIAM R. CLARK

"William Clark...has made a tough new science a pleasure to understand....A noble story, well told."—Gerald Weissmann, author of *Democracy and DNA*

March 1999 256 pp. \$14.95

# knowledge.

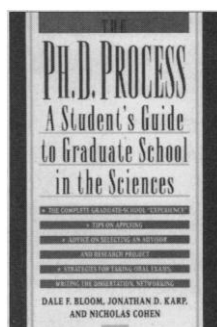


## **The Oxford Companion to the Mind**

Edited by RICHARD L. GREGORY  
With the assistance of  
O. L. ZANGWILL

"A masterful compilation in one volume of virtually every important aspect of mind, brain and consciousness."

—*Washington Post Book World*  
1999 880 pp. \$26.50

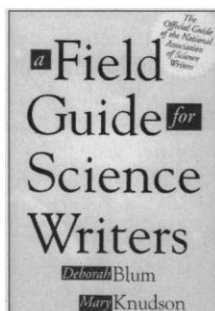


## **The Ph.D. Process**

**A Student's Guide to Graduate School in the Sciences**

DALE F. BLOOM, JONATHAN D. KARP, and NICHOLAS COHEN  
Drawing upon the insights of current and former students, this book offers the informed, practical advice a "best friend" would give about each stage of the graduate school experience.

1999 224 pp. \$16.95

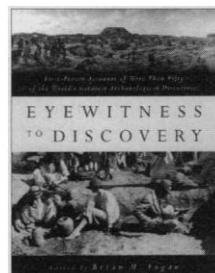


## **A Field Guide for Science Writers**

Edited by DEBORAH BLUM and MARY KNUDSON

"This knowledgeable group of writers and editors points readers to the best sources and stories, discusses investigative reporting, tells how to pitch finished articles to editors, and much more."

—*Science News*  
1998 304 pp. \$13.95



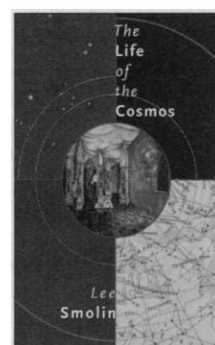
## **Eyewitness to Discovery**

**First-Person Accounts of More Than Fifty of the World's Greatest Archaeological Discoveries**

Edited by BRIAN M. FAGAN

"This volume will awaken interest in rediscovery of the past or feed the curiosity of those already hooked."—*Scientific American*

1999 512 pp.; 12 color photos, 56 halftones, 1 map \$22.50



## **The Life of the Cosmos**

LEE SMOLIN

"[Smolin's] argument is as mentally thrilling as shooting Niagara in a dishpan, plunging the reader into a dizzying no-man's land between physics and metaphysics."—*The Washington Post*

1999 368 pp. \$16.95

## New paperbacks from Oxford.

At better bookstores. To charge, call 1-800-451-7556 (9-5, m-f est). [www.oup-usa.org](http://www.oup-usa.org)

OXFORD PAPERBACKS - OXFORD UNIVERSITY PRESS

Circle No.62 on Readers' Service Card



# Detection Technology Begins and Ends With

# KPL

KPL introduces our new line of Detector™ Kits that provide you with fast, sensitive detection without radioactivity!



## COOL ASSAYS

### RNA Detector™ Northern

Non-isotopic Northern blot that rivals <sup>32</sup>P

### DNA Detector™ Southern

Chemiluminescent detection of Southern blots and colony lifts

### DNA Detector™ In Situ

Fluorescent and chromagenic *in situ* hybridization systems

### Express Detector™ Nickel-HRP

Direct detection of recombinant his-tagged proteins

### Protein Detector™

Chromagenic and chemiluminescent Western blot and ELISA systems

## HOT RESULTS



- Sensitivity equivalent to radioactivity in a fraction of the time
- Complete kits reduce preparation and optimization time

## SPECIAL OFFER:

Celebrate our 20th anniversary and receive 20% off when you purchase any of the Detector™ kits listed here. First time orders only. Call 1-800-638-3167 (U.S.) or 301-948-7755 for more information and a free catalog.

Kirkegaard & Perry  
Laboratories

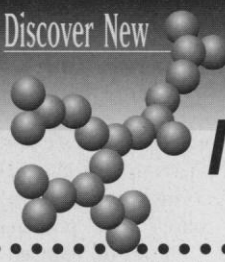
KPL

## 20 Years of Detection Expertise

2 Cessna Ct., Gaithersburg, MD 20879-4174, U.S.A.  
800-638-3167 (U.S.) or 301-948-7755  
Fax: 301-948-0169  
www.kpl.com

Circle No. 42 on Readers' Service Card

Discover New Effective Drugs For Human Cancer



## The Metastatic Models

- The most direct route to the clinic for your candidate cancer drug is via MetaMouse®.
- Small molecule, protein & gene drug evaluation/development.
- Orthotopic (same-organ) human tumor transplantation to nude or SCID mice.
- Evaluate *real* human tumors for response—all tumor types available.
- Metastasis/Angiogenesis/Apoptosis/Growth/Invasion.
- Contract drug evaluation on all tumor models available, or ship.

Wang, X. et al. *Cancer Research*, 54, 4726-28, 1994.  
Holzman, D. *Journal of the National Cancer Institute* 88, 396-397, 1996.  
Chishima, T. et al. *Cancer Research*, 57, 2042-2047, 1997.  
Yang, M. et al. *Cancer Research*, 58, 4217-4221, 1998.  
An, Z. et al. *Clinical and Experimental Metastasis*, 15, 184-195, 1997.  
Hoffman, R., J. *Cellular biochem*, 56, 1-4, 1994.

# METAMOUSE®

The realistic models for cancer drug discovery/development

EU Patent 0437486

JP Patent 2664261

US Patent 5,491,284 and 5,569,812

Tel-(800) META-MOUSE • Tel-(619) 654-2555 • Fax-(619) 268-4175 • E-Mail-all@anticancer.com  
USA/Canada http://www.anticancer.com

7917 Ostrow Street

ANTICANCER  
INCORPORATED

San Diego, CA 92111, USA

Circle No. 53 on Readers' Service Card

## 1999 FACS Meeting Announcements

### Second Annual Meeting on the Experimental Therapeutics of Human Cancer

June 17-19, 1999  
Hood College, Frederick, MD

Organizing Committee: C Allegra, R Klausner, E Liu,  
D Lowy, Y Pommier, E Sausville, C Takimoto,  
G Vande Woude, R Wittes

### Fifteenth Annual Meeting on Oncogenes and Tumor Suppressors: Signal Transduction and Cell Cycle Regulation in Cancer

June 22-26, 1999, Hood College, Frederick, MD

Organizing Committee: A Balmain, D Morrison, S Parsons,  
T Roberts, K Vousden

For information and online registration,  
please visit our web site at <http://www.fasci.org>  
or contact Margaret Fanning, FACS,  
P.O. Box 249, Libertytown, MD 21762  
fax 301-898-9173  
email: [margaret@fasci.org](mailto:margaret@fasci.org)

Circle No. 22 on Readers' Service Card





## Success Right Out of The Box



Our attention to detail gives you results right out of the box. If you're searching for protein targets, mass profiling or deciphering the Proteome, you need the Genomic Solutions Investigator™ System.

### 2-D Gel Electrophoresis For Proteome Analysis.

We provide the complete package — from major components to the accessories that everyone else forgets. Ultra-pure chemicals. Pre-cast gels. Duracryl™ Preparative accessories. Image analysis. Blotting. Power supplies. Running devices. Stains. Standards. Sample prep. EVERYTHING. Not only that, but the technical expertise and support that comes only from being dedicated to 2-D electrophoresis. Success right out of the box.

Get your box now. Contact Genomic Solutions at 800-848-5235, or fax 734-975-4812. Ask for our new catalog!

**GENOMIC  
SOLUTIONS**


22 Alpha Road, Chelmsford, MA 01824-4171 USA  
Europe 01480 474 344  
[www.genomicsolutions.com](http://www.genomicsolutions.com)

Circle No. 61 on Readers' Service Card

## Low-cost Spectrofluorometers

### Does Your Fluorescence System Get Glowing Reports?

Still stuck on the same old wavelength? Consider a low-cost, high-sensitivity spectrofluorometer system that provides full emission spectra with a 2048-element linear CCD-array detector. Our miniature, modular systems provide an attractive alternative to bulky, expensive and less flexible single-wavelength fluorometers.

- Configure your system for applications such as chemical analysis, medical diagnostics and environmental monitoring.
- Choose from sampling optics such as cuvette holders, fiber optic immersion probes and long-path flow cells.
- Build fully integrated small-footprint fluorescence systems for less than \$5,000. 

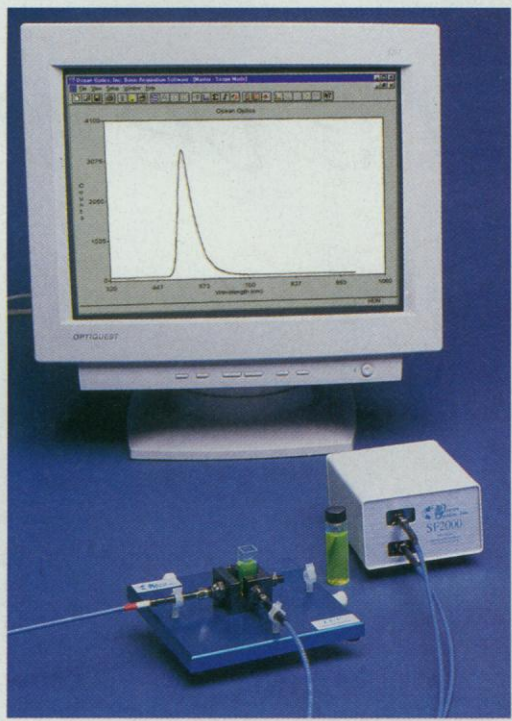
*Multiple-wavelength Fluorescence Systems for Laboratory  
and Process Applications ...*

**Call 1-877-001-GLOW Toll-free**  
**That's 1-877-664-4569 for**  
**Fluorescence System Solutions!**



**Ocean  
Optics, Inc.**

Tel: (727) 733-2447  
Fax: (727) 733-3962  
E-mail: [Info@OceanOptics.com](mailto:Info@OceanOptics.com)  
Web: [www.OceanOptics.com](http://www.OceanOptics.com)



Circle No. 49 on Readers' Service Card



*For three decades  
the forefront of innovation  
and other products  
biomedical research*

*Today, we've made  
in the science of laboratory  
animal housing...*



*des, we've been at  
ovations in cages  
in support of  
ch.*

*de a quantum leap  
boratory  
with One Cage.<sup>TM</sup>*



# Introducing The Only One Cage

*At last: The first cost-efficient, space-efficient, time-efficient answer to universal housing for all species of rodents.*



Now you can house more animals per square foot, maximize available space, streamline animal care, and greatly reduce costs. At the same time, you can insure all-critical compliance with both the Animal Welfare Act and the ILAR Guide recommendations.

One Cage makes it possible to house all your rodents in one system. The revolutionary design features one cage with one feeder, one water bottle, one filter top (no wire bar lid required), and only One Rack™ that will accommodate 112 complete units.

## Examples of how THE GUIDE\* recommendations apply to the One Cage™ System

Number of animals recommended per cage based on 80 sq. inches of usable floor area, 7-3/4" interior cage height:

MICE (>25g.) 

HAMSTERS (>100g.) 

RATS (200-400g.) 

GUINEA PIGS (≤350g.) 

\*Based on the Animal Welfare Act of 1966 as amended 1985 and the Guide for the Care and Use of Laboratory Animals, Institute of Laboratory Animal Resources, Commission of Life Sciences, National Research Council, National Academy Press, 1996.



With One Cage, 560 mice, 448 hamsters, 224 rats, or 112 guinea pigs can be housed in a single rack. This represents up to a 273% increase in animal populations. (A facility housing 2,200 rats would require 37 racks housing 30 cages with 60 rats per rack (based on old-style racks). Compare this to 10 One Cage racks housing 224 rats per rack.)

You can house more rodents in less space while meeting interior cage height and floor space requirements.

Cleaning and handling multiple cage sizes, wire bar lids, filter



# e<sup>TM</sup> System



tops, water bottles, and racks is extremely labor intensive and time consuming. With One Cage, there are fewer components to deal with.

The Micro-Isolator SP<sup>TM</sup> Filter Top includes a cage lock with yellow indicator allowing you to see at a glance if it is properly secured to the cage. The wire bar lid is eliminated for faster cage changes.



The filter replacement device provides quick and easy exchange of filters. The clear plastic modular delivery system provides greater visibility of food and water for easy inspection.

## *With One Cage, you can:*

- House more animals in less space at less cost.
- Be in full compliance with The Guide and prepared for the arrival of new animal care policies.
- Streamline your work while improving your level of care.
- Simplify purchasing and cut down on inventory a reduction in turnaround units.
- Eliminate wire bar lids.

When you look at the options, there's no contest. It's One Cage.

## lab products inc

a **BioMedic** company

Lab Products, Inc., 742 Sussex Ave.  
P.O. Box 639, Seaford, DE 19973  
302.628.430 • 800.526.0469  
FAX 302.628.4309  
[www.labproductsinc.com](http://www.labproductsinc.com)



One Cage, One Rack and Micro-Isolator SP are trademarks of Lab Products, Inc. Patents pending.  
© Bio Medic Corporation 1999. Made in USA.

Circle No. 39 on Readers' Service Card



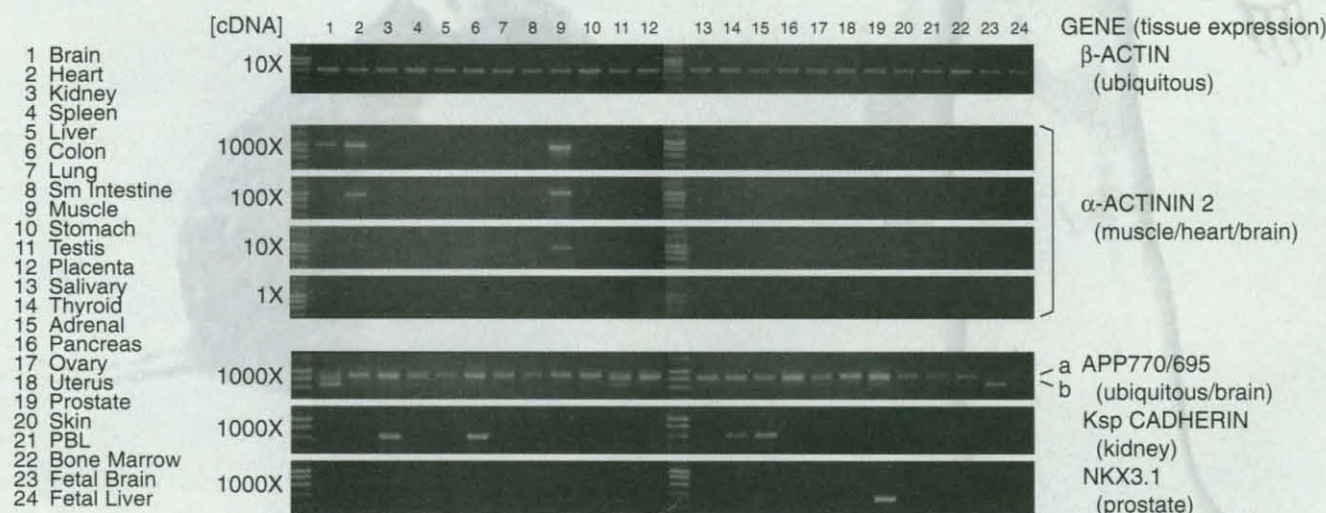
# RAPID-SCAN™

## GENE EXPRESSION PANEL

### Comprehensive Gene Expression Profile in Just *Three* Hours!

Semi-Quantitative, PCR-Based Analysis of High-Quality,  
First Strand cDNAs from 24-Individual Human or Mouse Tissues  
(Arrayed on a 96-well Plate / Normalized Against  $\beta$ -actin  
mRNA / Covering a 4-log Dilution of Each cDNA)

**Just do a PCR reaction and run an agarose gel!**



**No Radiolabeling of Probe / No Blot Hybridization /**

**No Filter Washing / No Phosphoimaging or Autoradiogram Exposure**



## OriGene Technologies, Inc.

#### INTERNATIONAL DISTRIBUTORS

France, Clinisciences,  
(tel) +33 1 42 53 14 53 (fax) +33 1 46 56 97 33  
Germany and Benelux Countries, Eurogentec,  
(tel) +33 1 42 53 14 53 (fax) +32 4 365 5103  
Italy,  
(tel) +39 02 580134 50 (fax) +39 02 580134 38

For all other countries, call 301 340 3188

United Kingdom, Cambridge Bioscience,  
(tel) +44 (1223) 316855 (fax) +44 (1223) 360732  
Spain +93 404 52 08, Sweden +46 08 30 60 10  
Switzerland +41 061 795 96 10

6 Taft Court, Suite 300  
Rockville, Maryland 20850

To Order Call 1-888-267-4436

Phone: 301-340-3188

Fax: 301-340-9254

e-mail: [custsupport@origene.com](mailto:custsupport@origene.com)

Internet: <http://www.origene.com>

Circle No. 56 on Readers' Service Card



# NEW PRODUCTS

## SOLID-PHASE EXTRACTION PLATES

The ISOLUTE-96 is a 96-well plate for high throughput solid phase extraction (SPE). The plate comprises 96 individual SPE wells, each containing 25, 50, or 100 mg of SPE sorbent. A comprehensive range of plates is available containing the full range of ISOLUTE silica-based sorbents as well as a high capacity resin. The range includes small bed masses optimized for minimum elution volumes, often less than 100  $\mu$ l. Method development plates are also available for acidic and basic drugs.

### Jones Chromatography

For more information call +44 (0) 1443 816991 or **circle 143** on the Reader Service Card

## TWO-DIMENSIONAL GEL ANALYSIS

AlphaMatch 2D is a two-dimensional gel analysis software package for personal computers. It provides a comprehensive set of tools, including automation of spot detection, background subtraction, measurement, and spot matching between gels. Features include 8-, 12-, or 16-bit TIFF image capture, intensity calibration, automatic spot and peak detection, automatic spot measuring with adjustable detection parameters, manual spot and peak editing, and a full set of data table controls. It also features a reference gel library, multi-user functions, and library linking.

### Alpha Innotech

For more information call 800-795-5556 or **circle 144** on the Reader Service Card

## GEL DESTAINING BAGS

Gel Destaining Bags provide an efficient, time-saving, and economical method of removing stains from gels and eliminating hazardous materials from solutions prior to disposing of them in the sink. These bags are made of filtration material and are filled with activated charcoal. They are effective in absorbing Coomassie blue, ethidium bromide, and other biological dyes. The user simply immerses the bag into the vessel that contains the gel and the solution. The activated charcoal absorbs the stain. Following destaining, the bags can be discarded in the trash and the destaining solution reused. The bags can al-

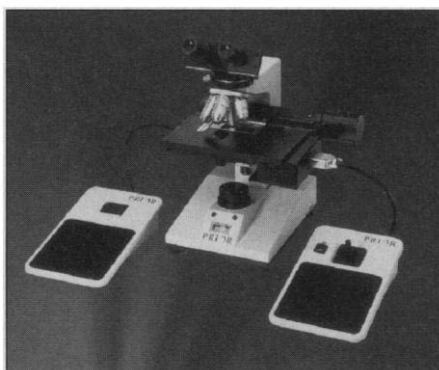
### Bel-Art Products

For more information call 800-4BELART or **circle 145** on the Reader Service Card

so absorb at least 10 mg of ethidium bromide. To remove this chemical, a bag is immersed in the solution overnight, then disposed of properly. The remaining solution is safe to pour into the sink.

## MOTORIZED STAGE SYSTEM

The ErgoScan Motorized Stage system improves the ergonomics of virtually any microscope by eliminating the stretching for focus knobs and manual turning of stage controls. All the stage movements and focus mechanisms are controlled by a low resistance proportional joystick and simple hand roller. The controls are easy to operate, precise, and quiet. The ErgoScan stage mounts quickly and easily to virtually any microscope. The stage has a travel range of 3 inches by 1.75 inches and accommo-



dates 1 inch by 3 inch slides. The system includes a controller with two-axis joystick, a motorized stage, a control box with integral rollover control, focus drives, an adapter, and a power supply.

## ENZYME SYSTEMS FOR POLYMERASE CHAIN REACTION

AdvanTaq DNA Polymerase is a thermostable, sensitive, and robust reagent suitable for use in all routine polymerase chain reaction (PCR) applications. It is available by itself or as part of an enzyme system. AdvanTaq Plus DNA Polymerase combines AdvanTaq with TaqStart Antibody, which provides a built-in hot start for increased specificity and yield. The Advan-

### CLONTECH Laboratories

For more information call 800-662-2566 or **circle 147** on the Reader Service Card

tage 2 PCR Polymerase Mix is designed for applications that involve longer, complex templates or require increased fidelity and higher PCR performance. The mix contains AdvanTaq, a proofreading polymerase, and TaqStart Antibody, making it suitable for PCR-based cloning strategies such as cDNA library amplification and PCR-based cDNA subtraction.

## LITERATURE

*Laboratory Chemicals Catalog 1999-2000* features more than 2500 products to solve problems in analysis, synthesis, storage, safety, and laboratory cleaning. New products highlighted in the catalog include a line of nonhazardous cleaning solutions, organic-free hydrochloric acid for environmental analysis, high purity solvents packaged in convenient containers, and easy-to-use spill cleanup kits.

*Fluorescence Filter Selection Guide for Microscopy* is a 16-page brochure presenting a large selection of stock filters and sets. It contains technical support sections, ranging from directions for choosing the right filter set, optimizing lamps, and detectors to a fluorophore reference table of more than 140 dyes and recommended filter sets.

### Omega Optical

For more information call 802-254-2690 or **circle 149** on the Reader Service Card

*Kimble PlasticWare* is a catalog describing a recently released line of primarily reusable products manufactured from a variety of plastic resins. Products include beakers, cylinders, flasks, cones, staining jars, watch glasses, transfer pipettes, and disposable culture tubes.

### Kimble/Kontes

For more information call 609-692-8500 or **circle 150** on the Reader Service Card

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.



# DRUG DISCOVERY TOOLS



Contact us for our complete product listing or for  
help with a novel reagent specific for your needs.

- Human Integrins Beta 1, 3, 5
- Functional Extracellular Matrix
- Antibodies to Integrins, MMPs and TIMPs
- Integrin Purification Gels

Visit [www.chemicon.com](http://www.chemicon.com) • Phone: (909) 676-8080 • (800) 437-7500

Fax: (909) 676-9209 • E-Mail: [custserv@chemicon.com](mailto:custserv@chemicon.com)

CHEMICON International, Ltd • (44) 181 8630 415  
CHEMICON International, Germany • (49) 6192 2959 55

**CHEMICON**  
International, Inc.

Circle No. 63 on Readers' Service Card