

# Science

27 August 1999

Vol. 285 No. 5432  
Pages 1317-1448 \$8



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

# STATISTICA '99

**STATISTICA** (automatically configures itself for Windows 98/NT) ■ A complete data analysis system with thousands of graphs integrated with all procedures ■ DDE, OLE client/server, customizable AutoTask toolbars ■ The largest selection of statistics and graphs in a single system; comprehensive implementations of: Exploratory techniques; multi-way tables/banners; nonparametrics; distribution fitting; regression; general nonlinear estimation; logit/probit; general ANCOVA/MANCOVA; GLM and Generalized LM; partial least squares analysis; variance components; discriminant; log-linear; correspondence; cluster, confirmatory/exploratory factor analysis; multidimensional scaling; classification trees; canonical correlation; item analysis/reliability; survival analysis; time series modeling/forecasting; structural equation modeling, Monte Carlo simulations; and much more ■ On-line comprehensive introductions/overviews, over 3 hours of multimedia step-by-step examples ■ Stats Advisor expert system ■ Workbooks with AutoOpen documents ■ Extensive data management facilities (fast spreadsheet of unlimited capacity with formulas, Drag-and-Drop, AutoFill, Auto-Recalculate, split-screen/variable-speed scrolling, advanced Clipboard support, DDE links, hot links to graphs, relational merge, data verification/cleaning) ■ Powerful *STATISTICA BASIC* language (professional development environment) with matrix operations, full graphics support, and interface to external programs ■ Batch command language, editable macros, "turn-key" automation ■ Open Architecture: custom-designed procedures can be added to toolbars ■ All output displayed in ScrollSheets" (customizable, presentation-quality tables with instant 2D/3D/multiple graphs) or word processor-style (unlimited) editor with text and graphs ■ Extremely large analysis designs (e.g., correlations up to 32,000x32,000) ■ Megafile Manager with up to 32,000 variables (8 Mb) per record ■ Unlimited file size; extended/quadruple precision; unmatched speed ■ Exchanges data/graphs with other applications via DDE, OLE, or extensive file import/export facilities (including ODBC access to virtually all databases and mainframe files) ■ Internet/HTML support ■ Hundreds of types of graphs ■ Facilities to custom-design new graph types and add them to menus or toolbars ■ Advanced drawing tools (e.g., editing of complex objects in 32x zoom mode), compound OLE documents, Multiple-Graph AutoLayout Wizard, page layout control; unmatched speed of graph redraw ■ Interactive rotation, perspective and cross-sections of 3D displays ■ Large selection of tools for graphical exploration: animated brushing, fitting/smoothing, spectral planes, projections, layered compressions ■ Price **\$1095**

**Quick STATISTICA** ■ A subset of *STATISTICA*; a selection of basic statistics and the full graphics capabilities of *STATISTICA* ■ Price **\$495**

**STATISTICA Neural Networks** (interfaces with but does not require *STATISTICA*) ■ The most comprehensive and user friendly NN application on the market ■ Unique Intelligent Problem Solver (IPS) network wizard ■ Endless array of statistics, charting options, network architectures and training algorithms ■ Price **\$795**

**STATISTICA Power Analysis** (interfaces with but does not require *STATISTICA*) ■ A comprehensive, extremely precise, and user-friendly research tool for analyzing all aspects of statistical power and sample size calculation ■ Price **\$495**

**STATISTICA Industrial/SPC Solutions** ■ A comprehensive selection of the most flexible, customizable tools for quality control and improvement applications (ISO 9000), including extensive implementations of: ■ **Quality Control Charts** Price **\$695** ■ **Process Analysis**\* Price **\$495** ■ **Design of Experiments**\* Price **\$495**

\*These add-on products require *STATISTICA*, *Quick STATISTICA*, or *QC Charts*.

**STATISTICA/Macintosh** ■ Quick version also available ■ Price **\$695**

**STATISTICA Enterprise Versions: SEWSS (SPC) and SENS** ■ Data warehouse integration, extensive groupware functionality.

Overseas prices 25% higher. Domestic sh/h \$12; 30-day money back guarantee.

**STATISTICA has received the highest rating in EVERY comparative review of statistics software in which it was featured, since its first release in 1993.**

Circle No. 45 on Readers' Service Card



**StatSoft**

Interactive WEB site:  
**www.statsoft.com**

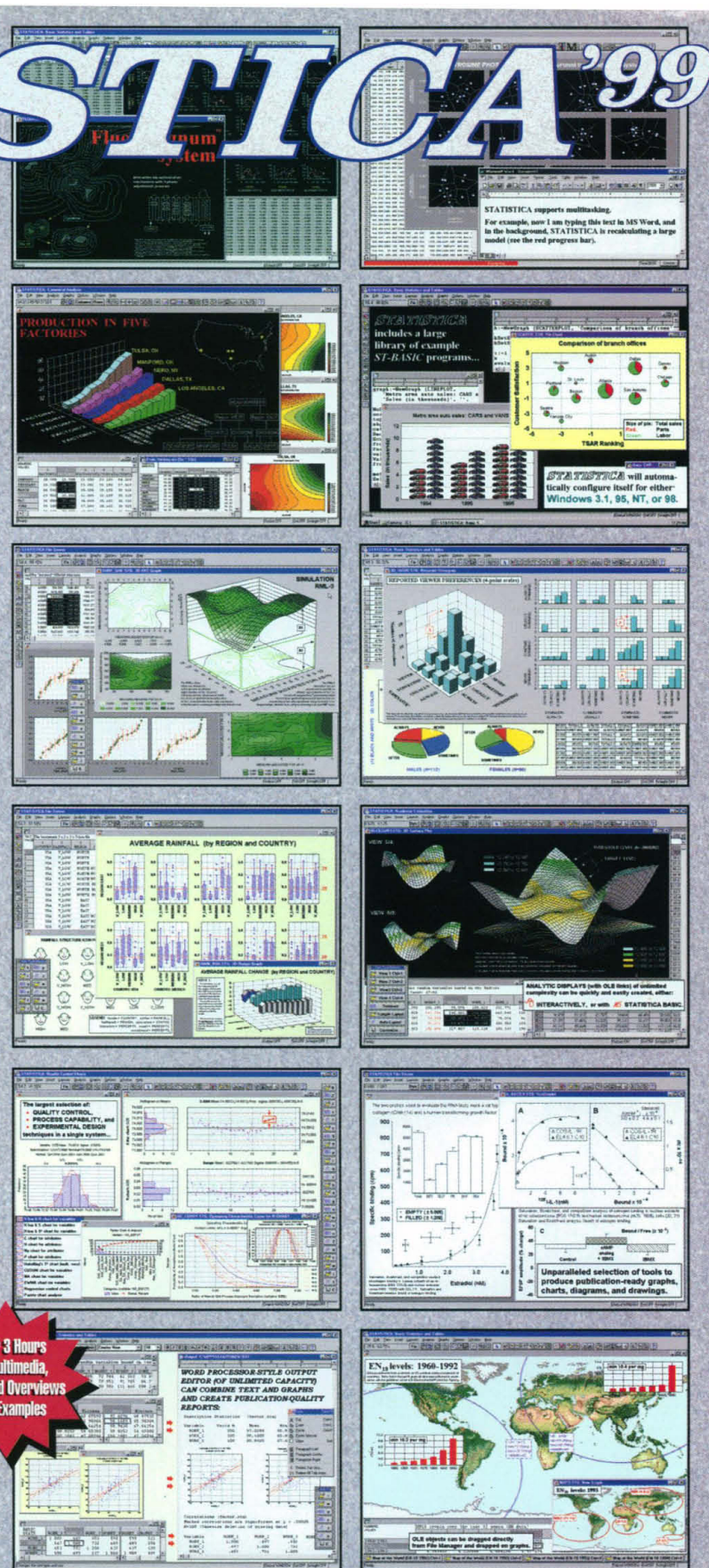
**2300 East 14th Street • Tulsa, OK 74104 • USA • (918) 749-1119 • Fax: (918) 749-2217 • e-mail: info@statsoft.com • WEB: http://www.statsoft.com**

StatSoft GmbH (Hamburg, Germany), ph: +49-40-468866-0, fax: +49-40-468866-77  
 StatSoft Polska Sp. z o.o. (Krakow, Poland), ph: +48-0601-414151, fax: +48-012-4225100  
 StatSoft Pacific Pty Ltd. (Melbourne, Australia), ph: +613-9521-4833, fax: +613-9521-4288  
 StatSoft Brazil Ltda. (Sao Paulo, Brazil), ph: +55-11-441-4870, fax: +55-11-4227-4293  
 StatSoft Scandinavia AB (Uppsala, Sweden), ph: +46-18-21-00-45, fax: +46-18-21-00-39  
 StatSoft Benelux (Groningen, Netherlands), ph: +31-50-526-7310, fax: +31-50-527-7665  
 StatSoft Portugal Lda. (Alges, Portugal), ph: +35-01-411-2580, fax: +35-01-411-2580  
 StatSoft Southern Africa (Pty) Ltd. (Midrand, S. Africa), ph: +27-11-651-5311, fax: +27-11-651-5296

StatSoft France (Paris, France), ph: +33-01-45-185-999, fax: +33-01-45-185-285  
 StatSoft Italia srl (Padova, Italy), ph: +39-49-893-4654, fax: +39-49-893-2897  
 StatSoft Taiwan (Taipei, Taiwan), ph: +886-2-2579-8592, fax: +886-2-2579-8075  
 StatSoft Ltd. (London, UK), ph: +44-1234-341226, fax: +44-1234-341622  
 StatSoft Korea (Seoul, Korea), ph: +82-2-783-5875, fax: +82-2-783-5874  
 StatSoft Japan Inc. (Tokyo, Japan), ph: +81-3-5475-7751, fax: +81-3-5475-7752  
 StatSoft Russia (Moscow, Russia), ph: +7-95-916-8838, fax: +7-95-916-0393  
 StatSoft Espana, ph: +35-01-411-3107, fax: +35-01-411-2580

STATISTICA and StatSoft are trademarks of StatSoft, Inc.

Copyright StatSoft, Inc. 1999



Over 3 Hours  
of Multimedia,  
Animated Overviews  
and Examples

# BL21<sup>™</sup> CODON PLUS<sup>™</sup> COMPETENT CELLS

## Solving your protein expression problems

**W**hen you need to produce recombinant protein, an *E. coli* expression system is always your first choice because it is fast, simple and provides extremely high yields. The only problem is when it doesn't work. One common reason for failure is that the ratio of codons used in the heterologous gene product is different than the available tRNAs in *E. coli*. This is called codon bias. Low or nonexistent protein synthesis, early termination and misincorporation of amino acids in the expressed protein are common symptoms of this problem.

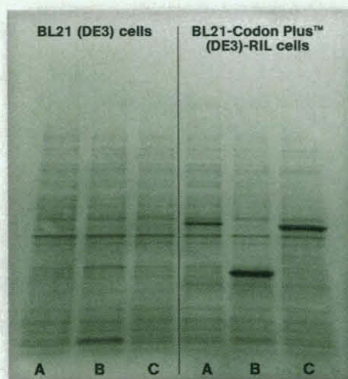
To solve this problem, Stratagene has created the BL21-CodonPlus<sup>™</sup>-RIL strains\*. These *E. coli* strains contain extra copies of the *E. coli* argU, ileY, and leuW tRNA genes. These particular codons are frequently used in other species, but infrequently used in *E. coli*. This modification

allows for a high-level expression of proteins that are difficult to express in conventional *E. coli* hosts due to the codon bias of the gene of interest.

The BL21-CodonPlus-RIL strains can eliminate the need to move the gene of interest into eukaryotic expression systems or perform tedious site-directed mutagenesis to correct the codon bias.

- Eliminate expression problems caused by codon bias
- Protease deficient for high-yield protein expression
- Use with all *E. coli* systems – T7, tac or lac promoters
- Simply the best cells for protein expression!

Visit our website at  
[www.stratagene.com](http://www.stratagene.com)  
for more details!



Cultures containing expression vectors with one of three different proteins (A, B or C) were induced at mid-log growth with IPTG. Cell lysates were separated by SDS-PAGE and visualized with Coomassie blue staining.

**STRATAGENE USA and CANADA**  
ORDER: (800) 424-5444  
TECHNICAL SERVICES: 800-894-1304  
FAX: 512-321-3128

**STRATAGENE EUROPE**  
United Kingdom, Switzerland, Belgium,  
Germany and The Netherlands  
ORDER: 00800 7000 7000  
TECHNICAL SERVICES: 00800 7400 7400  
FAX: 00800 7001 7001  
Austria  
ORDER: 0660 312 526  
TECHNICAL SERVICES: 017 956 7036  
FAX: 0660 312 527

**INTERNET**  
EMAIL: [techservices@stratagene.com](mailto:techservices@stratagene.com)  
WEBSITE: [www.stratagene.com](http://www.stratagene.com)  
\*Patents pending

BL21-CodonPlus<sup>™</sup>(DE3)-RIL Competent Cells CATALOG #230245  
BL21-CodonPlus<sup>™</sup>-RIL Competent Cell CATALOG #230240



# Science

www.sciencemag.org

**COVER** Forelimb bones (longest, ~19 cm) and jaw (~8 cm) of a new partial hominoid skeleton from an ~15-million-year-old site at Kipsaramon, Kenya, superimposed on a digital elevation model of western Kenya and eastern Uganda. The skeleton represents a new genus, *Equatorius*, and will help clarify the origins of the group that includes humans and the living great apes. [Photos: Steven C. Ward]



**1338**

Bees do it best

## DEPARTMENTS

**NETWATCH**  
1323

**THIS WEEK IN  
SCIENCE**  
1325

**SCIENCE SCOPE**  
1337

**RANDOM SAMPLES**  
1351

**CONTACT SCIENCE**  
1353

**NEW PRODUCTS**  
1415

**AAAS NEWS AND  
NOTES**  
1417



AMERICAN  
ASSOCIATION FOR THE  
ADVANCEMENT OF  
SCIENCE

## NEWS

### NEWS OF THE WEEK

- 1334 **EARTHQUAKES:** In Turkey, Havoc From a Falling-Domino Fault
- ▼ 1335 **PALEOANTHROPOLOGY:** Kenyan Skeleton Shakes Ape Family Tree  
1382
- 1337 **RESEARCH RISKS:** California Probes Prison Teens Study
- 1338 **MATHEMATICS:** Proving the Perfection of the Honeycomb
- ▼ 1339 **DEVELOPMENTAL BIOLOGY:** Selenium's Role in Infertility Explained  
1393
- 1339 **NEUROBIOLOGY:** New Role Found for the Hippocampus
- 1341 **CHINA:** Academy Seeks to Tap University Elites

### NEWS FOCUS

- 1342 **PHYSICS:** Wiggling and Undulating Out of an X-ray Shortage  
Ribosome Finally Begins to Yield Its Complete Structure  
Upgrade Brings Hope to Berkeley's Advanced Light Source  
The Automated Approach to Protein Structure
- 1346 **CHEMISTRY:** Brazil Lobbies for First Nobel
- 1347 **INTERNATIONAL BOTANICAL CONGRESS:** New Ways to Glean Medicines From Plants
- 1349 **ASTRONOMY:** Subaru Sees an Unruly Pair



**1342**

A magnet for biologists

## RESEARCH

### REPORTS

- 1373 **Temperature Dependence of the Half-Integer Magnetic Flux Quantum**  
J. R. Kirtley, C. C. Tsuei, K. A. Moler
- 1375 **Inhibition of Crystallite Growth in the Sol-Gel Synthesis of Nanocrystalline Metal Oxides** N.-L. Wu, S.-Y. Wang, I. A. Rusakova
- ▼ 1377 **Asteroidal Water Within Fluid Inclusion-Bearing Halite in an H5 Chondrite, Monahans (1998)**  
1364  
1380  
M. E. Zolensky, R. J. Bodnar, E. K. Gibson Jr., L. E. Nyquist, Y. Reese, C.-Y. Shih, H. Wiesmann
- ▼ 1380 **Origin of Graphitic Carbon and Pentlandite in Matrix Olivines in the Allende Meteorite** A. J. Brearley  
1364  
1377
- ▼ 1382 ***Equatorius*: A New Hominoid Genus from the Middle Miocene of Kenya**  
1335  
S. Ward, B. Brown, A. Hill, J. Kelley, W. Downs
- 1386 **Fossil Plants and Global Warming at the Triassic-Jurassic Boundary** J. C. McElwain, D. J. Beerling, F. I. Woodward
- 1390 **Gene Expression Profile of Aging and Its Retardation by Caloric Restriction**  
C.-K. Lee, R. G. Klopp, R. Weindruch, T. A. Prolla
- ▼ 1393 **Dual Function of the Selenoprotein PHGPx During Sperm Maturation**  
1339  
F. Ursini, S. Heim, M. Kiess, M. Maiorino, A. Roveri, J. Wissing, L. Flohé

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

- 1353 **Future U.S. Technology Leadership?**

## LETTERS

- 1355 **Darwin in Kansas** G. B. Dyson. **Ethane on Pluto?** D. P. Cruikshank, C. de Bergh, S. Douté, T. R. Geballe, T. C. Owen, E. Quirico, T. L. Roush, B. Schmitt. **Increasing Food Availability** P. Cavalli. **High-Altitude Tubers** H. Flores. **Polite Disagreement** I. Tattersall and J. H. Schwartz. **Artiodactyl Nuclear DNA Study** C. A. Matthee. **Cold Fusion Prediction** R. L. Garwin. **Growing Metallic Whiskers: Alternative Interpretation** T. El-Raghy and M. W. Barsoum. **Minority Data** W. Y. Velez. **Rankings of Research-Active Departments** V. H. Crespi

## POLICY FORUM

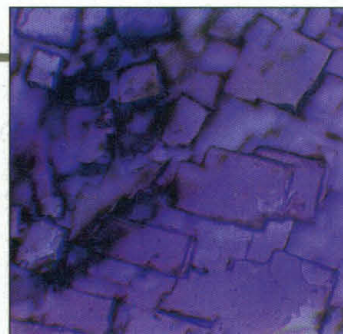
- 1359 **ETHICS: Privacy in Genetics Research** B. P. Fuller, M. J. Ellis Kahn, P. A. Barr, L. Biesecker, E. Crowley, J. Garber, M. K. Mansoura, P. Murphy, J. Murray, J. Phillips, K. Rothenberg, M. Rothstein, J. Stopfer, G. Swergold, B. Weber, F. S. Collins, K. L. Hudson

## BOOKS ET AL.

- 1362 **HISTORY OF MEDICINE: *Mending Bodies, Saving Souls A History of Hospitals*** G. B. Risse, reviewed by J. V. Pickstone

## 1364

A dash of salt from the early solar system

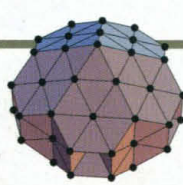
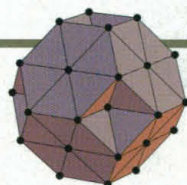


## PERSPECTIVES

- ▼ 1363 **BIOMEDICINE: The Benefits of Recycling** K. P. Steel  
1408
- ▼ 1364 **PLANETARY SCIENCE: Primordial Water** R. N. Clayton  
1377  
1380
- 1365 **GEOPHYSICS: A Seismic Look Under the Continents** K. M. Fischer and R. D. van der Hilst
- ▼ 1367 **IMMUNOLOGY: Regulating the Regulator** B. Mach  
1402

## REVIEW

- 1368 **CHEMISTRY: Global Optimization of Clusters, Crystals, and Biomolecules** D. J. Wales and H. A. Scheraga



## 1368

The lowest energy cluster of atoms

- 1396 **Eutrophication, Fisheries, and Consumer-Resource Dynamics in Marine Pelagic Ecosystems** F. Micheli

- 1399 **Selection-Based Biodiversity at a Small Spatial Scale in a Low-Dispersing Insular Bird** J. Blondel, P. C. Dias, P. Perret, M. Maistre, M. M. Lambrechts

- ▼ 1402 **GTP Binding by Class II Transactivator: Role in Nuclear Import** J. A. Harton, D. E. Cressman, K.-C. Chin, C. J. Der, J. P.-Y. Ting  
1367

- 1405 **Rapid Adaptation in Visual Cortex to the Structure of Images** J. R. Müller, A. B. Metha, J. Krauskopf, P. Lennie

- ▼ 1408 **Altered Cochlear Fibrocytes in a Mouse Model of DFN3 Nonsyndromic Deafness** O. Minowa, K. Ikeda, Y. Sugitani, T. Oshima, S. Nakai, Y. Katori, M. Suzuki, M. Furukawa, T. Kawase, Y. Zheng, M. Ogura, Y. Asada, K. Watanabe, H. Yamanaka, S. Gotoh, N. Nishi-Takeshima, T. Sugimoto, T. Kikuchi, T. Takasaka, T. Noda  
1363

- 1411 **Long-Term Depression in Hippocampal Interneurons: Joint Requirement for Pre- and Postsynaptic Events** F. Laezza, J. J. Doherty, R. Dingledine



## 1408

Deafness—mice lend an ear

**SCIENCE ONLINE**  
www.scienceonline.org

**SCIENCE**  
THE JOURNAL  
www.sciencemag.org

**SCIENCENOW**  
DAILY NEWS SERVICE  
www.sciencenow.org

**NEXT WAVE**  
WEEKLY CAREER UPDATES  
www.nextwave.org

**GRANTSNET**  
RESEARCH FUNDING DATABASE  
www.grantsnet.org

**NEUROAIDS**  
EXPERIMENTAL WEB SITE  
www.sciencemag.org/NAIDS

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.

With ÄKTA™ design, you can perform any type of purification with ease, speed and confidence. Now we've made it a fraction better.

## ÄKTA<sup>design</sup>

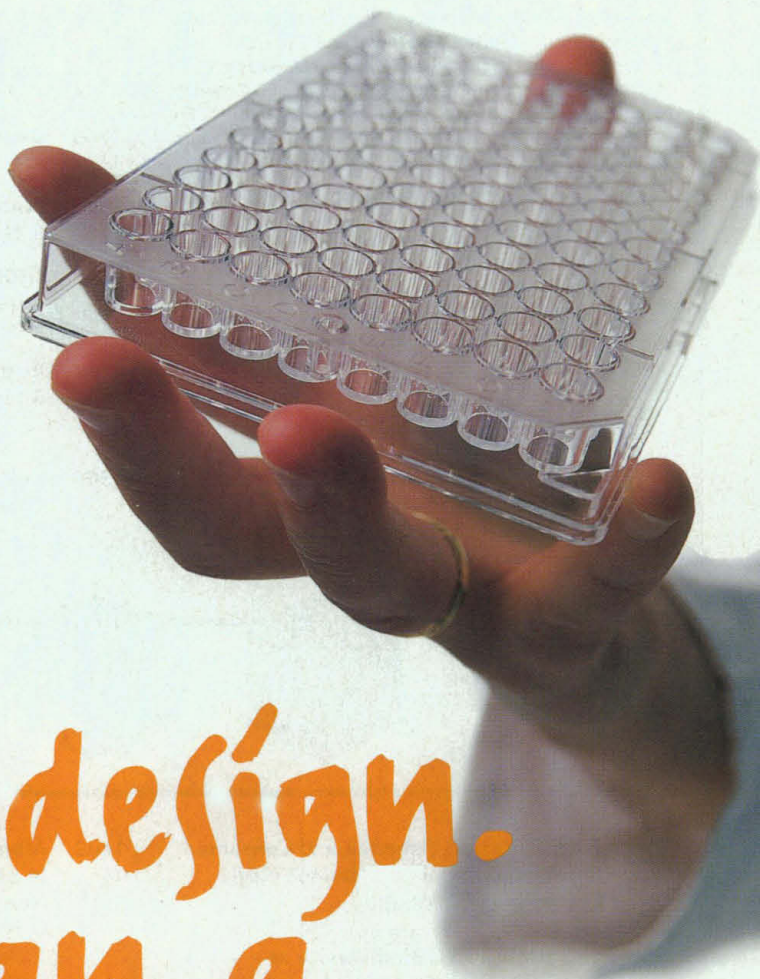
Expanded. Upgraded. Improved. Based on input from thousands of users, ÄKTA<sup>design</sup> has just evolved another step.

We've added a new fraction collector with improved tube capacity and spill-proof collection at any flow rate. So you can use a variety of vessels from micro-plates to large bottles.

A new sample pump simplifies the process of loading large volumes directly onto the column. The new version of the control and evaluation software, UNICORN™, makes it easier than ever to perform any run, from lab to production scale.

And there's a new system for truly simple purification of proteins: ÄKTA<sup>prime</sup>. It combines preprogrammed methods with dedicated columns, giving you pure proteins at the touch of a button.

For over 40 years, we've been working continuously on giving you better protein purification results, faster and more easily. To find out about the ÄKTA<sup>design</sup> family in a fraction more detail, visit [www.apbiotech.com/akta](http://www.apbiotech.com/akta)



ÄKTA<sup>design</sup>.  
More than a  
fraction better.  
Again.

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



amersham pharmacia biotech

Circle No. 21 on Readers' Service Card

# Can't see your message

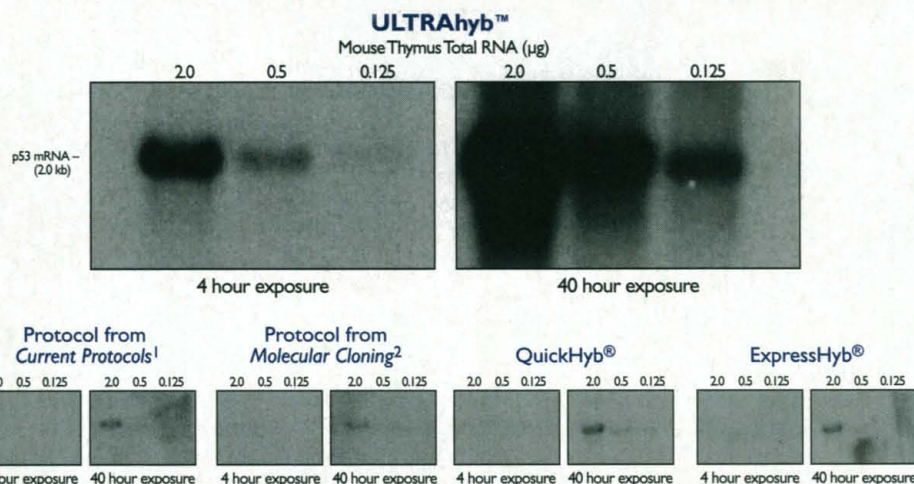
## USING A Northern?

Up to 100X increase  
in DNA probe  
sensitivity;  
20X increase in  
RNA probe sensitivity

No additional  
background  
with increased  
hybridization signal

Rare messages  
now detectable  
in Northern

Ideal for Northern,  
Southern,  
dot/slot blots  
and microarrays



**ULTRAhyb™ detects a signal in hours, compared to days using competitors' hybridization solutions.** Duplicate Northern blots were prepared using mouse thymus total RNA. Each blot was hybridized with a DNA probe to p53 at a concentration of  $1 \times 10^6$  cpm probe/ml hybridization solution. Incubation and washing conditions were as per protocol for each solution. The ULTRAhyb hybridization was incubated overnight. Blots were exposed to film for the indicated times.

1. *Current Protocols in Molecular Biology*, 1994. Ausubel, F.M. and others, editors. John Wiley & sons, Inc.

2. *Molecular Cloning: A Laboratory Manual*, 1989. Sambrook, J., Fritsch, E.F., Maniatis, T. Cold Spring Harbor Laboratory Press.

QuickHyb and ExpressHyb are registered trademarks Stratagene and Clontech, respectively.

### NOW YOU CAN WITH ULTRAHYB™

#### Choose from overnight hybridization for maximum sensitivity or 2-hour hybridization for speed

A simple overnight hybridization with ULTRAhyb can increase the signal of rare messages up to 100X; so, you can avoid switching to a more complicated technique, such as RT-PCR.

Messages that require overnight hybridization with your current buffer can now be completed in just 2 hours with ULTRAhyb.

ULTRAhyb works with RNA or DNA probes labeled isotopically or nonisotopically and in any blot hybridization protocol. And ULTRAhyb is not just for Northern – similar increases in signal are seen in Southern, dot/slot blots, and gene arrays.

For instant information about ULTRAhyb, email [ultrahyb@ambion.com](mailto:ultrahyb@ambion.com).  
Call Ambion today to order ULTRAhyb (Catalog #8670, 125 ml, \$80.00).

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

U.S. (800)888-8804  
Canada (800)445-1161

**Ambion®**  
THE RNA COMPANY™



**EMAIL AMBION  
NOW!**

For instant information about  
how ULTRAhyb works, email  
[ultrahyb@ambion.com](mailto:ultrahyb@ambion.com)

Information may also be  
requested by phone, fax or the reader  
service number below.

## STAYING SMALL

Many technologically important metal oxides perform better as their crystallite and pore sizes decrease, but grain size usually increases during the firing of precursor sols. Wu *et al.* (p. 1375) show that treating the precursor sols with a reagent that scavenges hydroxyl groups can limit increases in grain size for oxides of tin, titanium, and zirconium, apparently by avoiding agglomeration through interacting hydroxyls and by nucleating extremely small silica particles that inhibit grain boundary motion. Treating the precursor sols dramatically improved the sensitivity of tin oxide sensors for carbon monoxide.

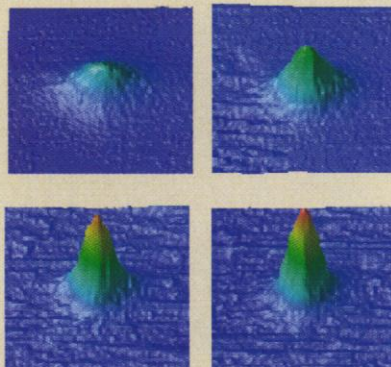
## PROCESSED PARENTS OF METEORITES

Meteorites represent our most abundant samples of extraterrestrial materials, and among the different classes of meteorites, the chondrites are assumed to represent the most primitive materials from other objects in our solar system. Chondrites can provide important clues about aqueous alteration processes that occurred on parent bodies present in the early solar system (see the Perspective by Clayton). Zolensky *et al.* (p. 1377) analyzed halite (NaCl salt) aggregates that they found within a pristine, H-group, ordinary chondrite that fell in the dry, west Texas town of Monahans in 1998. The purple halite crystals contain KCl crystals and fluid inclusions of NaCl and KCl brines that formed while the material was still part of its parent body. This finding suggests the presence of flowing water on the parent body, and therefore the aqueous alteration, occurred on the parent body when this chondritic matrix was formed. Carbonaceous chondrites may represent primordial material formed in the solar nebula, mainly through condensation of minerals from the hot gas and dust. Brearley (p. 1380) examined Allende, the most extensively studied of all of the carbonaceous chondrites, with high-resolution transmission electron microscopy and identified nanometer-sized grains of pentlandite (an iron sulfide) and amorphous carbon within the iron-rich olivines of the matrix material. This assemblage could not have been formed by condensation in the solar nebula, and the author suggests that these olivines formed by dehydration of serpentine on the parent body. Thus, rather than being the classic example of nebular condensation, Allende may

have been more extensively processed on its former asteroidal home than previously thought.

## PERSISTENT *d*-WAVES

It has been established that the pairing of electrons in the hole-doped high-temperature superconductor yttrium barium copper oxide well below the transition temperature  $T_c$  do so with a *d*-wave symmetry. There is, however, little data to show how the



pairing occurs at temperatures near  $T_c$ —an important region to understand if a correct theory is to be developed. Kirtley *et al.* (p. 1373) used a modified superconducting quantum interference device, or magnetic microscope, to monitor the half-integer magnetic flux quantum, a signature of *d*-wave pairing. They show that it persists all the way up to  $T_c$ , thus providing direct evidence that the superconductor is predominantly *d*-wave.

## HOMINID ORIGINS

The clade containing the great apes and humans apparently arose in the middle Miocene, about 15 million years ago. Ward *et al.* (p. 1382) describe a new hominid from Kenya that apparently represents a member of the stem radiation of this clade and allows grouping of several enigmatic fossils into a new genus. The hominid skeleton contains not only large parts of the jaw and many teeth, but also many other bones including several ribs and parts of the arms and hands (see the cover). The size of these bones suggests that the hominid weighed about 27 kilograms. This fossil may provide a link between early African and Asian hominids, as discussed in a news story by Zimmer.

## LEAVES THAT BEAT THE HEAT

The Triassic-Jurassic (T-J) boundary marks the third largest faunal mass extinction in Earth history. There was also a 95% turnover of floral species. Based on fossil leaf anatomy, McElwain *et al.* (p. 1386) reconstruct the environmental conditions at the T-J boundary, in particular  $CO_2$  concentrations and climate. They suggest that a large greenhouse warming effect imposed a severe selective constraint on plants, such that only those with narrow, dissected leaves could avoid lethal leaf temperatures.

## AGE-OLD EXPRESSIONS

As organisms age, their cells and tissues change in numerous ways. Now Lee *et al.* (p. 1390) have started to define the molecular basis of these changes with the aid of DNA arrays. By examining the expression of a battery of 6500 genes in mice, they see that, with age, genes associated with the stress response are expressed more, and those that control general metabolism or biosynthesis are expressed less. However, when the mice are fed fewer calories (a treatment that is known to increase life span), these the older animals retain the younger pattern of gene expression—another finding in favor of a leaner diet.

## SPERM AND SELENIUM

In mammals, selenium is required for male fertility—selenium deficiency results in impaired sperm motility. Previous studies indicated that the sperm mitochondria-associated cysteine-rich protein (SMCP) is the selenoprotein that functions in male fertility. Ursini *et al.* (p. 1393; see the news story by Strauss) now show that phospholipid hydroperoxide glutathione peroxidase (PHGPx), and not SMCP, represents the selenoprotein necessary for sperm maturation. PHGPx is enzymatically active in early spermatogenesis but inactive in mature spermatozoa. During the latter stage of spermatogenesis, insoluble PHGPx is a structural protein that, when absent in conditions of selenium deficiency, may explain defects in sperm structure and motility.

## A GLOBAL ANALYSIS REVEALS NEARBY EFFECTS

The way in which ecological communities respond to removal or addition of species or resources is an important—and controversial—route to understanding ecosys-

CONTINUED ON PAGE 1327

# Cloning Long PCR Products? Think Efficient.

**E**ven this guy knows—efficiency means getting results with minimum effort. And that's what you'll get with the TOPO™ XL PCR Cloning Kit. This one-of-a-kind kit allows you to quickly clone long (3-10 kb) PCR products and get up to 80% recombinants.

**Time-Saving Ligation.** The TOPO™ XL PCR Cloning Kit uses the unique TOPO™ Cloning technology, which takes advantage of the powerful ligation activity of topoisomerase I. The enzyme is covalently bound to the ends of the linearized pCR®-XL-TOPO vector. This allows the vector to ligate PCR products in just five minutes without the need for synthesis of special primers, enzymatic modifications, or overnight incubations with ligase. You'll save an entire day and get up to 80% recombinants. No other method for cloning long PCR products even comes close.

Table 1 - PCR Cloning Efficiencies

PCR Product Size (kb)	Cloning Efficiency
4.8	97%
7.0	80%
10.0	71%

PCR products amplified using Expand™ polymerase were TOPO™ Cloned into pCR®-XL-TOPO. Cloning efficiency equals the percent of colonies analyzed which contain an insert.

**Efficient Cloning.** pCR®-XL-TOPO contains a unique lethal gene that allows positive selection of recombinant colonies. This reduces background caused by vector religation. Only cells that contain vector with insert will grow. That's efficient. You'll eliminate screening through background colonies and get great results with minimal effort.



pCR®-XL-TOPO Vector

TOPO™ Represents covalently-bound topoisomerase I

*Be efficient. Clone your long PCR products with the TOPO™ XL PCR Cloning Kit. Order your kit today (goofy hat not included).*

#### European Headquarters:

Invitrogen BV  
P.O. Box 2312  
9704 CH Groningen  
The Netherlands  
Tel: +31 (0) 50 5299 299  
Fax: +31 (0) 50 5299 281  
Email: tech\_service@invitrogen.nl  
www.invitrogen.com

#### International Toll Free Numbers:

Tel: 00800 5345 5345\*  
Fax: 00800 7890 7890\*  
\*This number operates in all European countries excluding Finland and Sweden  
**Finland:**  
Tel: 990800 5345 5345  
Fax: 990800 7890 7890  
**Sweden:**  
Tel: 009800 5345 5345  
Fax: 009800 7890 7890

#### Distributors:

Austria 0222 889 18 19  
Australia 1 800 882 555  
China 010 6255 3477  
Hungary 01 280 3728  
India 91 80 8391453  
Israel 02 584 1111  
Italy 02 38 19 51  
Japan 03 5684 1622

Malaysia 03 432 1357  
Poland 058 341 47 26  
Portugal 01 453 7085  
Singapore 65 2922130  
South Korea 02 569 6902  
Spain 03 450 2601  
Taiwan 886 2 238 10844  
Thailand 246 7243

From all other countries, call our European headquarters at +31 (0) 50 5299 299.

#### United States Headquarters:

**Invitrogen**

1600 Faraday Avenue  
Carlsbad, California 92008  
Tel: 1-800-955-6288  
Fax: 760-603-7201  
Email: tech\_service@invitrogen.com  
http://www.invitrogen.com

Circle No. 28 on Readers' Service Card

tem processes. There is abundant theory and data on these questions, but most of the data are from freshwater systems. In a meta-analysis, Micheli (p. 1396) has synthesized data from numerous marine environments over a wide range of spatial and temporal scales. In patterns that are remarkably consistent across scales, he finds that the top-down effects of carnivore removal (for example, by marine fisheries) and the bottom-up effects of nutrient addition (for example, nitrogen loading to coastal waters from agricultural activity) affect adjacent trophic levels but cascade only weakly through the entire ecosystem.

## ADOPTING NEW HABITS

Studies of blue tits in the southern mainland of France have revealed that one of two populations—one that inhabits evergreen oak woodland—is maladapted: Nesting is synchronized with the peak abundance of caterpillars in deciduous oak forest (where the other population resides) rather than coinciding with the later appearance of food in the evergreen forest. In this case, gene flow swamps local adaptation. Now, Blondel *et al.* (p. 1399) have discovered an instance of intraspecific variation at the microgeographic scale. On the island of Corsica, two isolated populations of blue tits only 25 kilometers apart differ in breeding and morphological traits, each adapted to local conditions. Thus, isolation can lead to local adaptation even in a bird species that is highly mobile.

## A GTP-DEPENDENT TRANSCRIPTION FACTOR

The class II transactivator (CIITA) is a global transcription factor that regulates the expression of the major histocompatibility complex (MHC) class II genes involved in antigen presentation in the immune response. Rather than binding to DNA directly, it binds to the MHC promoter binding factor RFX5. Harton *et al.* (p. 1402; see the Perspective by Mach) now show that CIITA is an unusual guanosine triphosphate (GTP) binding protein, in that GTP binding has direct effects on the protein's transcriptional activity. Mutations in CIITA that decrease GTP binding also decrease its transactivation activity, but this activity can be restored with analogous sequences from the small GTP-binding protein Ras. Like some members of the Ras superfamily, CIITA is an inefficient GTPase. Functional analyses show that GTP binding helps CIITA directly regulate its localization to the nucleus.

## FIBROCYTES AS HEARING AIDS

X-linked nonsyndromic mixed deafness (DFN3) is caused by mutations in the gene encoding transcription factor Brn-4. To investigate possible pathogenetic mechanisms, Minowa *et al.* (p. 1408; see the Perspective by Steel) established a mouse model of the disorder by targeted mutagenesis. The Brn4-deficient mice were profoundly deaf and showed a substantial reduction in endocochlear potential. There were no gross defects in the middle ear or cochlear structures, but severe pathological anomalies were seen in fibrocytes, a population of cells implicated in the regulation of cochlear potassium homeostasis. Thus, DFN3 differs from many other forms of deafness in that it appears to arise from malfunction of a nonsensory cell type.

## CONTRASTING MECHANISMS

Until now, two types of neuronal adaptation in the visual cortex have been described. One is an almost instantaneous gain control that normalizes cortical responses, and the other a slow adaptation developing over seconds. Müller *et al.* (p. 1405) describe a novel phenomenon in response to a short presentation of a high-contrast stimulus. The time course of their adaptation is in between the two previously described mechanisms and is pattern specific. A stimulus at one orientation will skew the orientation tuning curve of a complex cell away from the stimulus orientation. This finding might be a mechanism for improving the discriminability of subtle differences in orientation for successive eye fixation.

## LTD AND INTERNEURONS

Traditionally, long-term potentiation (LTP) or depression (LTD) studies in the hippocampus have focused on the major synaptic connections between the principal neurons, the large neurons within these areas. However, the degree of fine-tuning in the brain would be enormously enhanced if the same type of plasticity were also possible on the smaller interneurons. Laezza *et al.* (p. 1411) describe a mechanism of LTD induction in a subpopulation of interneurons in the CA3 region of the hippocampus that depends on the combined activation of presynaptic metabotropic receptors and calcium-permeable postsynaptic AMPA receptors. This finding adds another dimension to plasticity and potential processing pathways the mammalian central nervous system.

# BAbCO

BERKELEY ANTIBODY COMPANY

CREATING NEW  
**ANTIBODY**  
SOLUTIONS

**COVANCE**  
THE DEVELOPMENT SERVICES COMPANY

Shaping Solutions

*Custom Antibody Services*

POLYCLONAL PRODUCTION

HYBRIDOMA DEVELOPMENT

ASCITES SCALE-UP

IMMUNOCHEMICAL TECHNOLOGIES

INNOVATIVE ANTIBODY PRODUCTS

*Covance*

1223 South 47th Street

Richmond, CA 94804

Toll-Free 800.922.2226

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

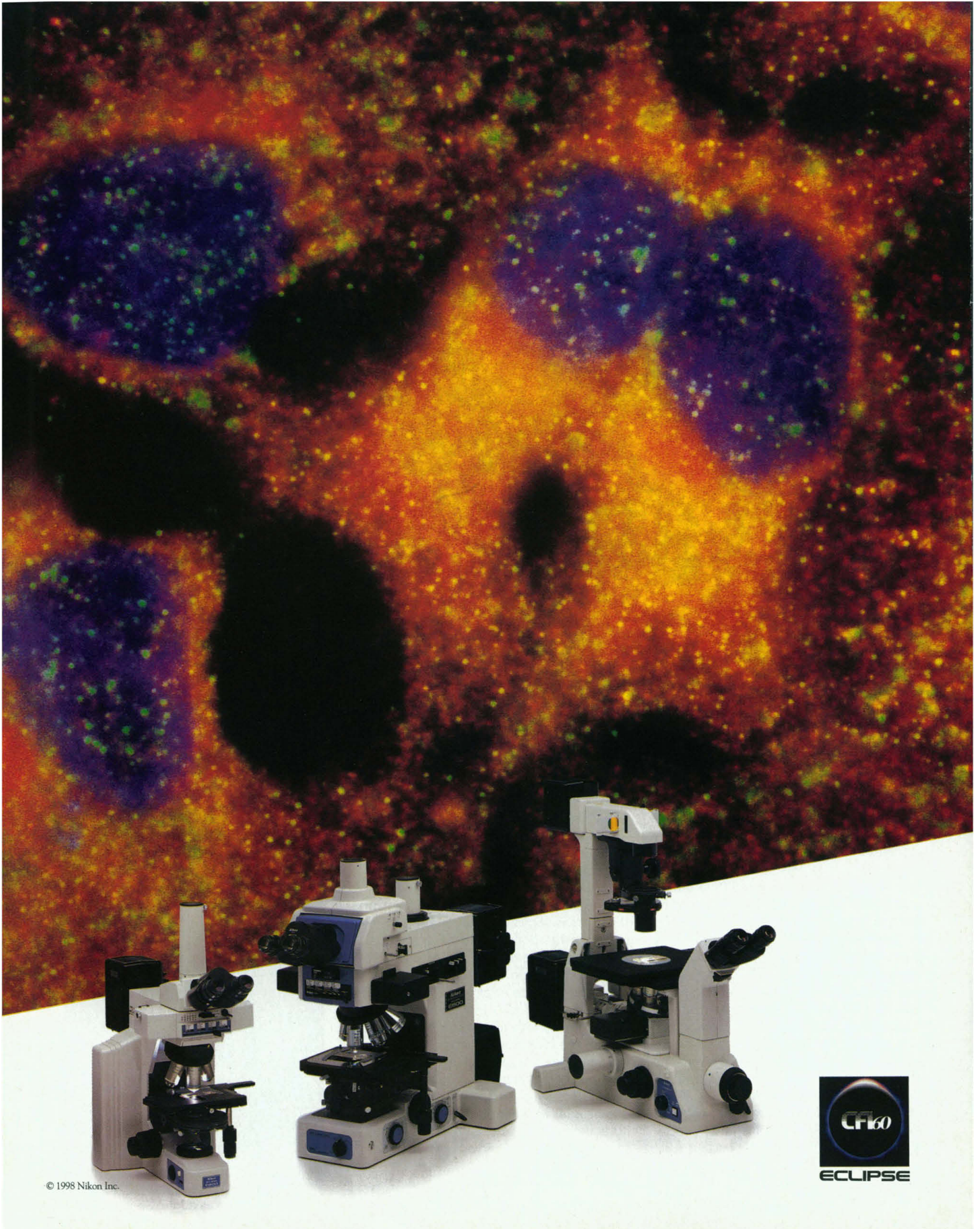
P.O. Box 7200

Denver, PA 17517

Toll-Free 800.345.4114

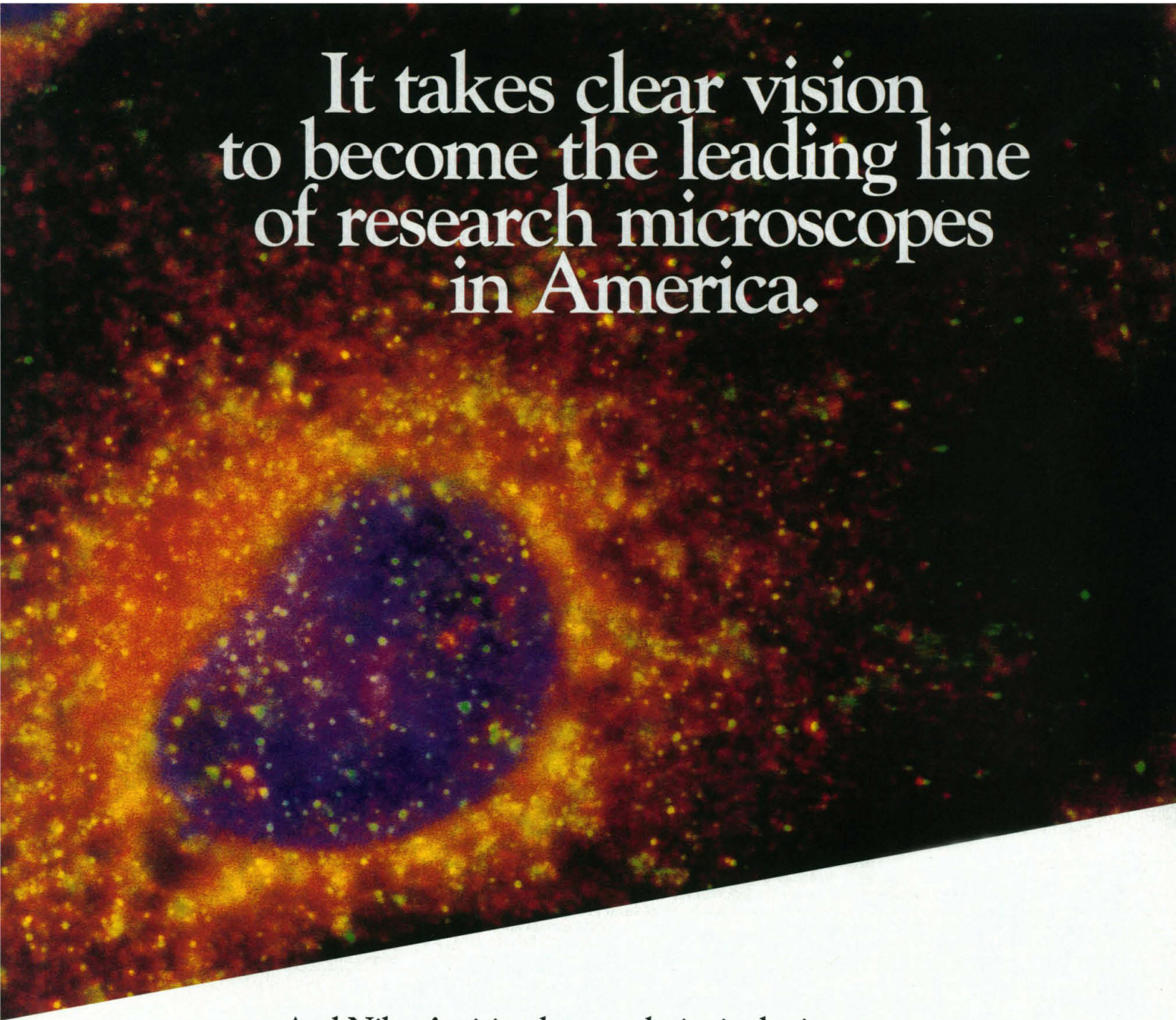
[www.covance.com](http://www.covance.com)

[immunology.services@covance.com](mailto:immunology.services@covance.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



**Redefining Infinity**

Circle No. 43 on Readers' Service Card

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

EDITOR  
**Ellis Rubinstein**

MANAGING EDITOR  
**Monica M. Bradford**

#### EDITORIAL

DEPUTY MANAGING EDITORS: R. Brooks Hanson (Physical Sciences), Katrina L. Kelnor (Biological Sciences); SUPERVISORY 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, H. Jesse Smith, Valda Vinson; EDITORIAL SUPPORT Candace Gallery, Carolyn Kyle, Elise Laffman, Kathy Libal, Patricia M. Moore, Anita Wynn; ADMINISTRATIVE SUPPORT Sylvia Kihara

#### SCIENCE'S COMPASS

SENIOR EDITOR/POLICY FORUM Barbara Jasny; SENIOR EDITORS/PERSPECTIVES Orla Smith, Julia Uppenbrink; ASSOCIATE BOOK REVIEW EDITOR

TOR Sherman J. Suter; CONTRIBUTING EDITORS Kevin Ahern, Richard Peters, Robert Sikorski, David F. Voss; PUBLICATION ASSISTANTS Jeffrey Hearn, Elizabeth Lenox; INFORMATION SPECIALIST Janet Kegg; LETTERS AND TECHNICAL COMMENTS: EDITOR Christine Gilbert; ASSOCIATE EDITOR Steven S. Lapham; PUBLICATION 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, Laura Helmut (intern), Constance Holden, Jocelyn Kaiser, Richard A. Kerr, Andrew Lawler, David Malakoff, Eliot Marshall, Elizabeth Pennisi, Gretchen Vogel BUREAUS: BERKELEY, CA Marcia Barinaga (contributing correspondent); SAN DIEGO, CA Jon Cohen (contributing correspondent); CHICAGO, IL James Glanz; PACIFIC NORTHWEST Robert F. Service; 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

EDITORIAL MANAGER Cara Tate; SENIOR COPY EDITORS Cay Butler, Harry Jach, Barbara Ordway, Christine M. Pearce; COPY EDITORS Jeffrey E. Cook, Etta Kavanagh, Jason Llewellyn, EDITORIAL COORDINATORS Monique Martineau, Ellen E. Murphy, Beverly Shields; PUBLICATIONS ASSISTANT Joi S. Granger

#### PRODUCTION

DIRECTOR James Landry; MANAGER Wendy K. Shank; ASSISTANT PRO-

DUCTION MANAGERS, Elizabeth A. Harman (Internet), Rob Masson; ASSOCIATES Patricia Riehn Berg (Internet), Vicki J. Jorgensen, Tara L. Kelly, Jessica K. Moshell, Rebecca Thomas

#### ART

DESIGN DIRECTOR C. Faber Smith; ASSOCIATE ART DIRECTOR Elizabeth Carroll; SCIENTIFIC ILLUSTRATOR Katharine Sutliff; GRAPHICS ASSOCIATES Holly Bishop, Preston Moraghan, Darcel Pugh; PHOTO RESEARCHER Leslie Blizard

#### SCIENCE INTERNATIONAL EUROPE

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

#### ASIA

JAPAN NEWS BUREAU: Dennis Normy (contributing correspondent); CHINA REPRESENTATIVE Hao Xin; Pallava Bagla (contributing correspondent, India)

#### SCIENCE NOW: 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

PUBLISHER  
**Richard S. Nicholson**

ASSOCIATE PUBLISHER  
**Beth Rosner**

MEMBERSHIP/CIRCULATION DIRECTOR  
**Michael Spinella**

#### MEMBERSHIP/CIRCULATION

SUBSCRIPTION SERVICES: 202-326-6417; 800-731-4939

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; ASSOCIATE Deborah Stromberg; COORDINATOR Lauri Sirois; EUROPE MANAGER Jane Pennington; EXECUTIVES Ruth Jackson, Martin Paine; RESEARCH: MANAGER Renuka Chander; BUSINESS AND FINANCE: MANAGER Teressa Stirk; 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 Emilie David; ASSISTANT Karen Lentz MARKETING: DIRECTOR John Meyers; ASSOCIATES Catherine Giordano, Allison Pritchard ELECTRONIC MEDIA: MANAGER David Gillikin; COMPUTER SPECIALIST Wendy Green; PRODUCTION ASSOCIATES Mark Croatti, Ellen McGuire, Louis Williams ADMINISTRATIVE SUPPORT Jessica Tierney

#### PRODUCT ADVERTISING

NATIONAL SALES MANAGER NORTHEAST AND E. CANADA Richard Teeling; 973-694-9173, FAX 973-694-9193 • 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: 410-273-1007, FAX 410-273-1591 NEW MEDIA SALES MANAGER Chris Peterson: 410-560-3960, FAX 410-560-3961 • UK/SCANDINAVIA/France/ ITALY/BELGIUM/NETHERLANDS Andrew Davies: (44) 7-071-226-216, FAX (44) 7-071-226-233 • GERMANY/SWITZERLAND/AUSTRIA Tracey Peers: (44) 1-260-297-530, FAX (44) 1-260-271-022 JAPAN Mashy Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852 • TRAFFIC MANAGER Carol Maddox; SALES ASSOCIATES Sean Gee, Sheila Myers

#### RECRUITMENT ADVERTISING

SALES AND PRODUCTION OPERATIONS MANAGER Terri Seiter Azie U.S. SALES MANAGER Gabrielle Boguslawski: 718-491-1607, FAX 202-289-6742; INTERNET SALES MANAGER Beth Dwyer; SALES SUPERVISOR Daryl Anderson; SALES REPRESENTATIVES Kathleen Clark, Beth Dwyer, Bren Peters-Minnis, Kristin Westapher; ASSISTANTS Erika Bryant, Jody Fenty, Christina Geiger PRODUCTION-TRAFFIC MANAGER Jennifer Rankin; ASSOCIATE Christine Borkowski COPY EDITOR/PROOFREADER Chris Filiatreau U.K./EUROPE: SALES MANAGER Debbie Cummings; SALES EXECUTIVE Sabine Lenuid; ASSISTANT Elisabeth Py: (44) 1223-326500, FAX (44) 1223-326532 AUSTRALIA/NEW ZEALAND: Keith Sandell: (61) 02-9922-2977, FAX (61) 02-9922-1100 JAPAN: Mashy Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852

#### 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 Kohlstedt; 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.

#### 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 <i>Children's Hospital, Boston</i>	The Salk Institute David Clapham <i>Children's Hospital, Boston</i>	University of Toronto Peter Gruss <i>Max Planck Institute of Biophysical Chemistry</i>	Nicole Le Douarin <i>Institut d'Embryologie Cellu- laire et Moléculaire du CNRS</i>	Kiyotaka Okada <i>Kyoto University</i>	Tomoyuki Takahashi <i>University of Tokyo</i>
Don L. Anderson <i>California Institute of Technology</i>	Adrienne E. Clarke <i>University of Melbourne, Parkville</i>	Philip C. Hanawalt <i>Stanford University</i>	Norman L. Letvin <i>Beth Israel Hospital, Boston</i>	Bert W. O'Malley <i>Baylor College of Medicine</i>	Masatoshi Takeichi <i>Kyoto University</i>
Michael Ashburner <i>University of Cambridge</i>	F. Fleming Crim <i>University of Wisconsin, Madison</i>	Paul Harvey <i>University of Oxford</i>	Harvey F. Lodish <i>Whitehead Institute for Biomedical Research</i>	Stuart L. Pimm <i>The Univ. of Tennessee, Knoxville</i>	Keiji Tanaka <i>RIKEN Institute</i>
Frank S. Bates <i>Univ. of Minnesota, Minneapolis</i>	Paul J. Crutzen <i>Max-Planck-Institut für Chemie</i>	M. P. Hassell <i>Imperial College at Silwood Park</i>	Richard Losick <i>Harvard University</i>	Yeshayahu Pocker <i>Univ. of Washington, Seattle</i>	David Tilman <i>Univ. of Minnesota, St. Paul</i>
Stephen J. Benkovic <i>Pennsylvania State University</i>	James E. Dahlberg <i>University of Wisconsin Medical School, Madison</i>	Nobutaka Hirokawa <i>University of Tokyo</i>	Seth Marder <i>University of Arizona</i>	Martin Raff <i>University College London</i>	Robert T. N. Tjian <i>Univ. of California, Berkeley</i>
Alan Bernstein <i>Mount Sinai Hospital, Toronto</i>	Robert Desimone <i>National Institute of Mental Health, NIH</i>	Tasuku Honjo <i>Kyoto University</i>	Diane Mathis <i>Institut de Chimie Biologique, Strasbourg</i>	Douglas C. Rees <i>California Institute of Technology</i>	Yoshinori Tokura <i>University of Tokyo</i>
Michael J. Bevan <i>University of Washington, Seattle</i>	Hans Eklund <i>Swedish Univ. of Agricultural Sciences, Uppsala</i>	Eric C. Johnson <i>The Scripps Research Institute</i>	Susan K. McConnell <i>Stanford University</i>	T. M. Rice <i>ETH-Hönggerberg, Zürich</i>	Derek van der Kooy <i>University of Toronto</i>
Seth Blair <i>University of Wisconsin, Madison</i>	Paul T. Englund <i>Johns Hopkins University School of Medicine</i>	Hans Kende <i>Michigan State University</i>	Stanley Meisel <i>University of California, Davis</i>	David C. Rubie <i>Universität Bayreuth</i>	Geerat J. Vermeij <i>University of California, Davis</i>
David E. Bloom <i>Harvard Institute for International Development</i>	G. Ertl <i>Max-Planck-Gesellschaft</i>	Elliott Kieff <i>Harvard University</i>	Douglas A. Melton <i>Harvard University</i>	Erkki Ruoslahti <i>The Burnham Institute, CA</i>	Bert Vogelstein <i>Johns Hopkins Oncology Center</i>
Piet Borst <i>The Netherlands Cancer Institute</i>	Richard G. Fairbanks <i>Lamont-Doherty Earth Observatory</i>	Jeffrey T. Kiehl <i>National Center for Atmospheric Research, Boulder</i>	Andrew Murray <i>Univ. of California, San Francisco</i>	Jozsef Schell <i>Max-Planck-Institut für Zucht- forschung</i>	Gerhard Wegner <i>Max-Planck-Institut für Polymerforschung</i>
Henry R. Bourne <i>Univ. of California, San Francisco</i>	Douglas T. Fearon <i>University of Cambridge</i>	Judith Kimble <i>University of Wisconsin, Madison</i>	Elizabeth G. Nabel <i>The Univ. of Michigan</i>	Ronald H. Schwartz <i>National Institute of Allergy and Infectious Diseases, NIH</i>	Arthur Weiss <i>Univ. of California, San Francisco</i>
James J. Bull <i>University of Texas at Austin</i>	Harry A. Tizard <i>The University of Chicago</i>	Stephen M. Kosslyn <i>Harvard University</i>	Shigetada Nakanishi <i>Kyoto University</i>	Terrence J. Sejnowski <i>The Salk Institute</i>	Zena Werb <i>Univ. of California, San Francisco</i>
Kathryn Calame <i>Columbia Univ. College of Physicians &amp; Surgeons</i>	Roger I. M. Glass <i>Centers for Disease Control</i>	Michael LaBarbera <i>The University of Chicago</i>	Roger A. Nicoll <i>Univ. of California, San Francisco</i>	Christopher R. Somerville <i>Carnegie Institute of Washington, Stanford, CA</i>	George M. Whitesides <i>Harvard University</i>
Dennis W. Choi <i>Washington Univ. School of Medicine, St. Louis</i>	Peter N. Goodfellow <i>SmithKline Beecham, UK</i>	Antonio Lanzavecchia <i>Basel Institute for Immunology</i>	Staffan Normark <i>Swedish Institute for Infectious Disease Control</i>	Michael P. Stryker <i>Univ. of California, San Francisco</i>	Ian A. Wilson <i>The Scripps Research Institute</i>
Joanne Chory	Jack F. Greenblatt			Cliff Tabin <i>Harvard Medical School</i>	Alan P. Wolfe <i>National Institute of Child Health and Human Development, NIH</i>
				John Jen Tai <i>National Taiwan University</i>	Martin Zatz <i>National Institute of Mental Health, NIH</i>



# Chemdex MADE TO

# ORDER

## Convenient One-Stop Shopping

### Buy online at Chemdex.com

The Chemdex Marketplace is the best way to buy biological and chemical reagents online. We are adding lab supplies, instruments, and equipment to create a convenient one-stop source for all your laboratory needs.

When you purchase online with Chemdex, you can:

- Buy from the suppliers you know and trust
- Find what you need quickly with our precision search engine
- Order from multiple suppliers with one electronic order form
- Rely on world-class customer service

Visit the Chemdex Marketplace today at [www.chemdex.com](http://www.chemdex.com).

## Custom Procurement Solutions

### Streamline your purchasing

Chemdex procurement solutions go far beyond our Web site. Our e-commerce technology can be integrated into your company's current systems and customized to match your existing business rules.

Chemdex procurement solutions feature:

- Custom pricing and catalog views
- Electronic requisition routing and approval
- Summary billing and consolidated reporting

Let Chemdex streamline your organization's purchasing process so you can focus on what's important — research and development.

To learn more about our custom procurement solutions, call 1-888-810-4732 or e-mail [enterprise@chemdex.com](mailto:enterprise@chemdex.com).



**Chemdex**  
Accelerating Science

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. 33 on Readers' Service Card

# TIME MACHINE



## The New Mini-Prep 24 for Automated Plasmid Mini-Preps

The Mini-Prep 24 uses a new method of plasmid purification based on agarose gel electrophoresis and subsequent recovery by electroelution.

The Mini-Prep 24 uses premanufactured sample cassettes that come ready for direct loading of up to 2 ml of culture.

Call now to learn how the New Mini-Prep 24 can give you with quality DNA while saving you lots of time.



**High Purity** - sufficient for automated fluorescent and manual sequencing.

**Easy Operation** - begin prep with direct loading of bacteria culture - no centrifugation step saves you time.

**Consistent Results** - up to 6  $\mu$ g of plasmid per ml.

**Fast** - up to 24 preps per hour, saving you time.

**Quality** - time and time again.

**MacConnell**  
RESEARCH

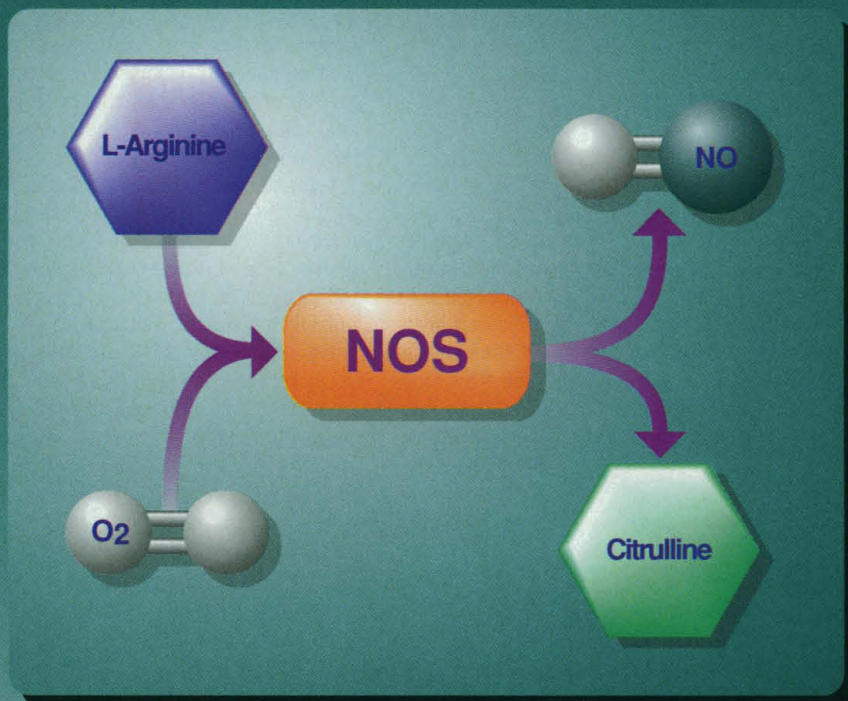
**1-800-466-7949**

11339 Sorrento Valley Rd • San Diego, CA 92121 Phone: (619) 452-2603 Fax (619) 452-6753

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

Circle No. 22 on Readers' Service Card

# Antibodies Specific for... Nitric Oxide Synthases



- High Quality Monoclonal and Polyclonal Antibodies
- Multiple clones specific for iNOS, eNOS, or nNOS
- Applications in Western Blotting, Immunoprecipitation, Immunofluorescence, and Immunohistochemistry
- Sampler Kit Now Available!

Nitric Oxide — *Science* Molecule of the Year, and then, the focus of a Nobel Prize. What lies ahead in your study of nitric oxide generation and signaling? For over a decade, Transduction Laboratories has been a leading provider of antibody reagents that target proteins in various areas of research, including NOS and the nitric oxide pathway. In addition to our NOS specific antibodies, we offer an extensive list of products targeted to numerous signaling and effector molecules that have been implicated in the biological functions of nitric oxide.

# Transduction Laboratories

*A Becton Dickinson Company*

Circle No. 41 on Readers' Service Card

**Asia Pacific**  
BD Singapore  
Tel (65) 860-1478  
Fax (65) 860-1590

**Europe**  
Becton Dickinson GmbH  
HQ Pharmingen Europe  
Tel (49) 40 532 84 48 0  
Fax (49) 40 531 58 92

**United States**  
Transduction Laboratories  
Tel 606-259-1550  
Customer Service 1-800-227-4063  
Fax 606-259-1413  
<http://www.translab.com>

**United States**  
PharMingen  
Tel 858-812-8800  
Orders 1-800-848-6227  
Tech Service 1-800-825-5832  
Fax 858-812-8888  
<http://www.pharmingen.com>

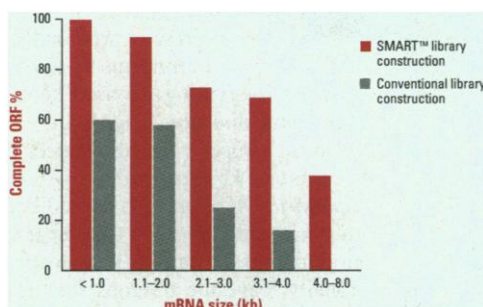
## Related Products

Acetylcholine Receptor  $\alpha$   
Acetylcholine Receptor  $\beta$   
Arginase 1  
B2 Bradykinin Receptor  
Calcineurin  
CaM Kinase IV  
Caveolin 1  
Caveolin 2  
Caveolin 3  
Cox-2/PGHS  
ERK (pan ERK)  
ERK1  
ERK2  
Ets-1  
Heme Oxygenase 1  
Heme Oxygenase 2  
JAK1  
Jun  
5-Lipoxygenase  
NF- $\kappa$ B p65  
NMDAR2B  
p38 MAPK  
Phospholipase C $\beta$ 1  
Phospholipase C $\gamma$   
Phospholipase C $\delta$ 1  
PIN  
PKA<sub>C</sub>  
PKA<sub>RI</sub>  
PKA<sub>RI</sub>-FITC  
PKA<sub>RI</sub> $\alpha$   
PKA<sub>RII</sub> $\alpha$   
PKA<sub>RII</sub> $\beta$   
PKC $\alpha$   
PKC $\beta$   
PKC $\gamma$   
PKC $\delta$   
PKC $\epsilon$   
PKC $\eta$   
PKC $\theta$   
PKC $\theta$ -HRPO  
PKC $\lambda$   
PKC $\lambda$   
PSD-95  
Stat1 (C-terminus)  
Stat1 (N-terminus)  
Stat1 (N-terminus)-HRPO  
TEF-1  
Uroplatin



Illustration inspired by the art of Charles Demuth (1883–1935).

- **Enrich for full-length cDNAs**
- **Generate high-quality cDNA for library construction**
- **cDNA suitable for PCR-Select cDNA Subtraction from small amounts of total RNA**



SMART cDNA libraries contain more complete ORFs than are found in conventional libraries.

**Want the benefits of SMART when doing RACE?**  
**Try the new SMART RACE cDNA Amplification Kit (#K1811-1).**

**Germany & East Europe:** CLONTECH GmbH • Tel: 06221 34170 Fax: 06221 303511  
**United Kingdom:** CLONTECH UK Ltd. • Tel: 01256 476500 Fax: 01256 476499  
**Japan:** CLONTECH Japan Ltd. • Tel: 03 3523 9777 Fax: 03 3523 9781  
**Switzerland:** CLONTECH AG • Tel: 061 68354 50 Fax: 061 68354 52  
**Austria:** CLONTECH GmbH • Tel: 01 310 6688 Fax: 01 310 7744

**Distributors:** Australia: 61 7 3273 9100 ■ Belgium/Luxembourg: 0 800 1 9815 ■ Brazil: 55 11 66940539 ■ Canada: Now call CLONTECH direct • 800 662 2566 ■ Chile: 56 2 209 6770 ■ China: BEIJING YUANGPING BIOTECH • 86 10 68187551; GENE CO. LTD. • 021 6428 7163; GENETIMES TECHNOLOGY • 86 21 6402 2371 ■ Czech Republic: 420 19 7265214 ■ Egypt: 202 349 8311 ■ Finland: 358 9708 596 19 ■ France: 33134 602424 ■ 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 ■ 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 ■ Poland: 49 06221 34170 ■ Portugal: 351 361 36 20 ■ Scandinavia: 46 8 728 00 65 ■ Singapore: 65 775 7284 ■ South Africa: 27 21 671 5166 ■ Spain: 34 9 1 630 0379 ■ Taiwan: 886 2 27202215 ■ Thailand: 662 530 3804 4 ■ Turkey: 90 216 385 8321

rev.7/28/99

CLONTECH's SMART™ Technology\* is a true advance that allows you to generate cDNA that reliably matches the length of your input RNA. The **SMART cDNA Library Construction Kit (#K1051-1)** verifiably increases the percentage of full-length cDNA, allowing you to generate representative, directionally cloned libraries without adaptor ligation, from as little as 50 ng of total RNA or as much as 1 µg of poly A<sup>+</sup> RNA. To synthesize high-quality cDNA for subtraction, use the **SMART PCR cDNA Synthesis Kit (#K1052-1)**. Call and order today!

\* Patent pending.

Circle No. 44 on Readers' Service Card

**CLONTECH**  
 NOW YOU CAN.

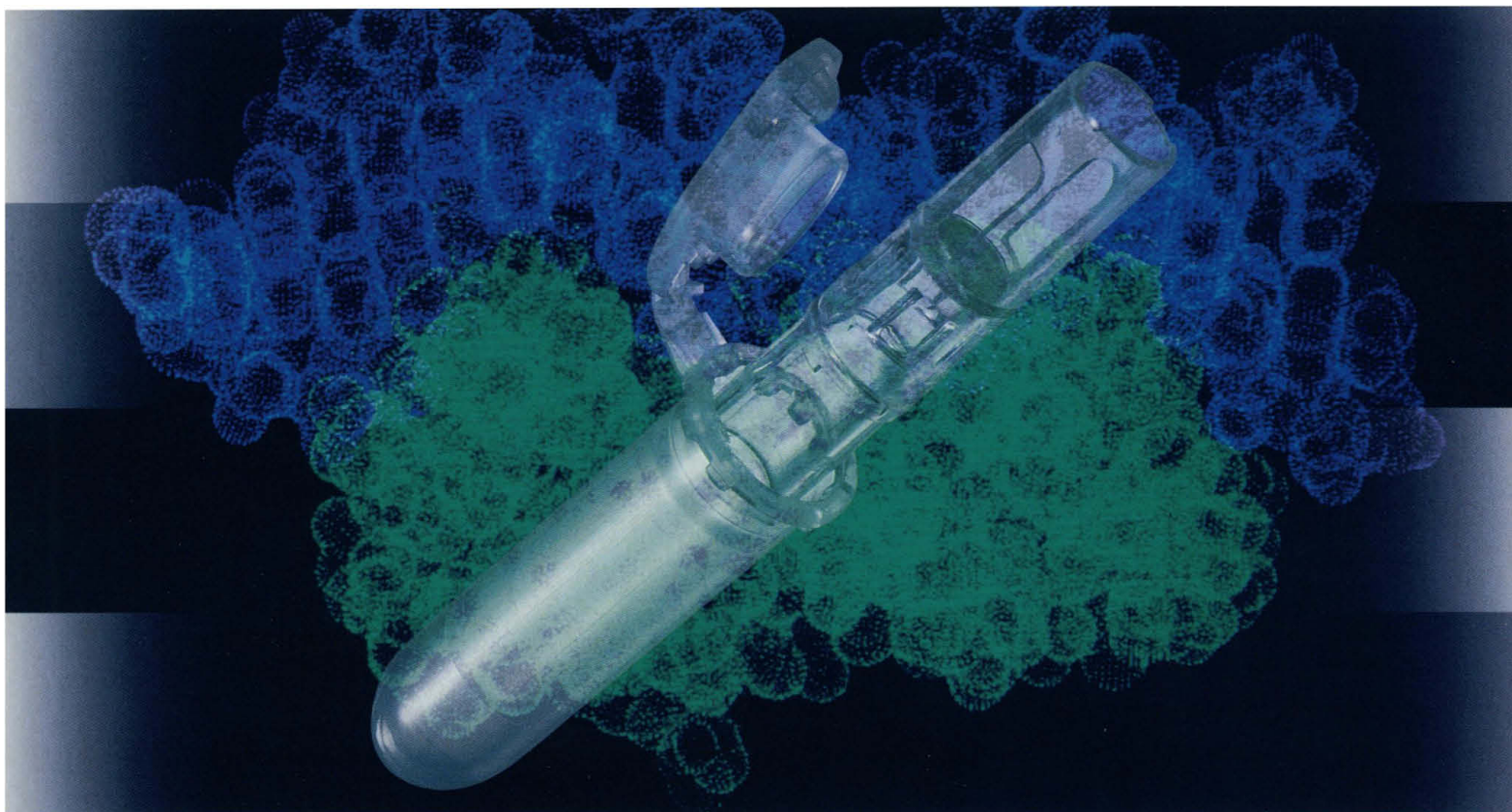
1020 East Meadow Circle, Palo Alto, California 94303 USA

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

© 1999, CLONTECH Laboratories, Inc.

(AD92252)



Background picture: Electron cloud of a DNA- and protein complex

## Take the easy way out!

Eppendorf has once again come up with the goods: The two-part **Centrifugal Filter Tube system** for time-saving and efficient concentration, purification, desalting and rebuffering of samples.

**Maximum efficiency:** The invertible filter inserts ensure the highest possible sample yield and are available with six different membrane types for cut-off sizes of 4, 10, 30 and 100 kD as well as 0.22 µm and 0.45 µm.

**Unbeatable results:** Thanks to the defined retention volume, 300-fold concentrations are possible with no problem whatsoever. And the special PES (polyethersulfone) membranes guarantee low protein- and nucleic acid binding.

**Immortality:** A built-in "deadstop" prevents the concentrated sample from drying out completely. Safety is also assured by the Safe-Lock mechanism for 0.5 ml tubes.

**New advantage:** The tubes are tailored perfectly to the Eppendorf centrifuge program. Just two parts, but enough for optimal handling convenience.

In short, the ultra-fine Eppendorf Centrifugal Filter Tube mini system makes your day in the lab simply perfect.



IDEAL FOR  
**PCR**

● Three sizes for max. sample volumes of 0.5 ml, 4.0 ml and 15 ml

Circle No. 9 on Readers' Service Card

**eppendorf**  
*In touch with life*

Eppendorf – Netheler – Hinz GmbH · 22331 Hamburg · Germany · Life Science Application-Hotline: +49 180-3 666 789 · Fax +49 40-538 01-556

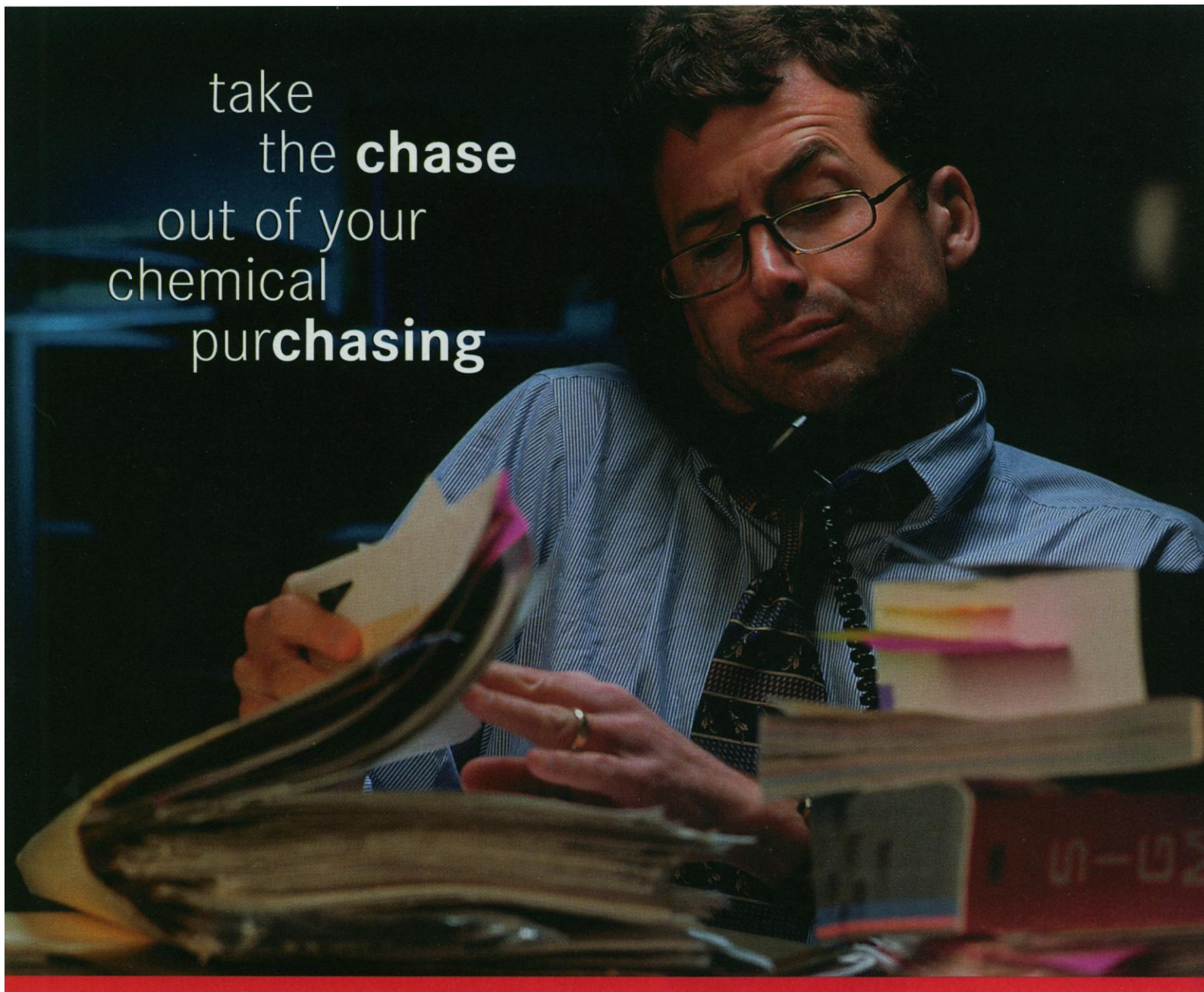
e-mail: [eppendorf@eppendorf.com](mailto:eppendorf@eppendorf.com) · eppendorf home page: <http://www.eppendorf.com>

Brinkmann Instruments, Inc. · One Cantiague Rd. · Westbury, NY 11590-0207 · Phone 800-645-3050 or 516-334-7500 · Fax 516-334-7506

e-mail: [info@brinkmann.com](mailto:info@brinkmann.com) · website: [www.brinkmann.com](http://www.brinkmann.com)

eppendorf® is a registered trademark.

take  
the **chase**  
out of your  
chemical  
purchasing



TRY OUR eCOMMERCE SOLUTION @ [www.sigma-aldrich.com](http://www.sigma-aldrich.com)

#### EASY ON-LINE ORDERING

The Sigma-Aldrich PipeLine™ eCommerce system offers simple, on-line access to over 200,000 products from the Sigma-Aldrich brands: Sigma, Aldrich, Fluka, Supelco and Riedel-de Haën. Now you can place multi-brand orders for biochemicals, chemicals, equipment and laboratory supplies from all of our brands in a single transaction.

#### FIND WHAT YOU NEED FAST

With eight different ways to search, including product name, product number, CAS number, molecular formula and structure, pinpointing products is a snap.



*Stop the chase and log on today.  
It will make your job easier.  
[www.sigma-aldrich.com](http://www.sigma-aldrich.com)*

#### A TOTAL INFORMATION RESOURCE

Because we are a manufacturer, we offer not only quality products but the technical knowledge and support to back them up.

- Over 90,000 on-line MSDS's
- Over 2 million on-line Certificates of Analysis
- Thousands of data sheets and technical bulletins



**SIGMA-ALDRICH**

3050 Spruce Street, St. Louis, MO 63103 • 800-521-8956 or 314-771-5765  
Circle No. 46 on Readers' Service Card

# CDNA A.S.A.P.



**On Target. On Time.**

When you want the longest target cDNA clone and you want it in a hurry, call Genome Systems. Screen 1 million clones from the library of your choice – or use our SuperPool service to screen 10 million clones from 10 libraries, all at once. With over 30 high-quality oligodT-primed custom libraries available (and more on the way), we offer the fastest high-throughput screening in the business. Choose from Arabidopsis, Drosophila, Human, Mouse, Rabbit, Rat, Xenopus, and Zebrafish tissue-specific libraries.

At Genome Systems, you really do get it faster!

**Get it Now. 800-847-7058.**

**GenomeSystemsInc™**

4633 World Parkway Circle, St. Louis, MO, 63134-3115

PHONE: 314.427.3222 FAX: 314.427.3324 E-MAIL: [info@genomesystems.com](mailto:info@genomesystems.com) WEB: [www.genomesystems.com](http://www.genomesystems.com)

INTERNATIONAL: Call us free by dialing your country access code + (800 number). Contact your local service provider for details.

A wholly owned subsidiary of Incyte Pharmaceuticals, Inc.

Circle No. 49 on Readers' Service Card

# Lexicon Genetics

***Paving the way in the post-genomics era.***



**Let Lexicon Genetics lead you  
to discoveries at unprecedented speed.**

---

## **S-T-V™ Seek-Target-Validation Program**

**Level 1:** Biological Analysis

**Level 2:** Organ & Physiologic Systems Analysis

**Level 3:** Pathway Discovery & Analysis

---

### **Drug Target Validation**

- High-throughput screening
- Phenotypic analysis
- *In Vivo* biological function
- Elimination of false leads

### **Proprietary Technologies**

- Cre/Lox
- Positive negative selection
- Isogenic DNA
- Lambda KOS vectors

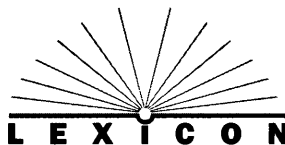
### **Mutant Mice**

- Point mutations
- Conditional knockouts
- Null alleles
- Humanized alleles

**Contact Lexicon *today* to get your project started immediately.**

Also, check out **OmniBank®**, Lexicon's Internet Database of over 50,000 cryopreserved mouse ES cell lines at [lexgen.com](http://lexgen.com).


**Academic Inquiries**  
[omniacad@lexgen.com](mailto:omniacad@lexgen.com)



**Commercial Inquiries**  
[omnicorp@lexgen.com](mailto:omnicorp@lexgen.com)

**LEXICON GENETICS INCORPORATED** 4000 Research Forest Drive The Woodlands, TX 77381 800/578-1972 Fax 281/296-0749 [www.lexgen.com](http://www.lexgen.com)

Circle No. 34 on Readers' Service Card



B a s i c  
e n z y m e s  
f r o m t h e  
c o m p a n y  
t h a t

n e v e r f o r g o t  
t h e b a s i c s .

The basic elements of your research – modifying enzymes, ultrapure biochemicals and reagents – have always been the basics of our business. So while many companies are pursuing multiple technologies, we are continuing to concentrate on one goal – to supply you with consistently pure, superior quality enzymes, biochemicals and convenience reagents. USB also gives you a level of service that is becoming rare in this business. Our customer service and technical support representatives know our products and your needs. Superior products. Superb service. Just two of the reasons why more researchers and large-scale manufacturers are turning to USB. To learn more, visit us at [www.usbweb.com](http://www.usbweb.com). Or call 1.800.321.9322. USB. When you start with better raw materials, you finish with better results.

For your authorized USB distributor outside the United States, contact your local Amersham Pharmacia Biotech office.

©1999 USB Corporation

USB Corporation  
26111 Miles Road  
Cleveland, OH 44128  
1.800.321.9322  
[www.usbweb.com](http://www.usbweb.com)



Rediscover the chemistry

Circle No. 13 on Readers' Service Card

Introducing



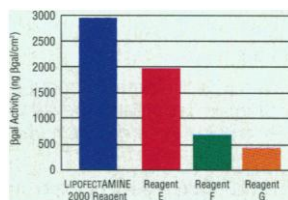
## *The transfection reagent for the next millennium.*

LIPOFECTAMINE™ 2000 Reagent offers the highest transfection efficiencies and expression levels for the widest variety of cell lines.

LIPOFECTAMINE 2000 Reagent provides:

### **Highest Transfection Efficiencies and Activities**

- Excellent for transient and stable transfections in a variety of cell lines
- Works well for both adherent and suspension cell types
- Unsurpassed performance in the presence or absence of serum
- Ideal for cells commonly used for protein expression (293, CHO and COS, shown above left to right)



Comparison of β-Galactosidase activity in CHO-S cells transfected with pCMVSPORT-βgal DNA. LIPOFECTAMINE 2000 Reagent, and several other commercially available transfection reagents.

### **Rapid, Easy-to-Use Protocol**

- Simplified steps for easy automation
- Ideal for high throughput applications

LIPOFECTAMINE 2000 Reagent is part of our full line of GIBCO BRL® transfection reagents, media, selective antibiotics, cell lines, and DNA purification systems for eukaryotic gene expression.

Contact TECH-LINE<sup>SM</sup>, TECH-ONLINE<sup>SM</sup>, or your Life Technologies representative for more information on the *transfection reagents of choice* for the next millennium.

Product	Size	Cat No.
LIPOFECTAMINE 2000 Reagent	11668-019	1.5 ml
	11668-027	0.75 ml



Essential Technologies for the Science of Life™

Internet Ordering and Information: [www.lifetech.com](http://www.lifetech.com)

U.S. Academic Orders/TECH-LINE: (800) 828-6686

U.S. Government Orders/TECH-LINE: (888) 584-8929

U.S. Industrial Orders/TECH-LINE: (800) 874-4226

Latin America Orders/TECH-LINE: (301) 610-8709 Canada Orders: (800) 263-6236

Circle No. 27 on Readers' Service Card

These products are for laboratory research use only and are not intended for human or animal diagnostic, therapeutic, or other clinical uses, unless otherwise stated. Quantities subject to change without notice. ©1999 Life Technologies, Inc. 99-078CRE

# NEW PRODUCTS

## LOW-FLUORESCENCE ASSAY PLATES

### Hitachi Genetic Systems

For more information call 650-615-9600 or **circle 143** on the Reader Service Card

New 96-well assay plates, tested for low background fluorescence and minimal light scattering, are now available. These polystyrene flat-bottomed plates have black-pigmented, opaque walls to prevent well-to-well cross talk and are optically clear for the passage of laser light. The plate bottoms are 60% thinner than conventional polystyrene plates, resulting in lower background fluorescence. Each plate has a total well volume of 360  $\mu$ L.

## LUCIFERASE ASSAY SYSTEM

The Steady-Glo Luciferase Assay System was developed for batch processing of multiple plates in high-throughput applications. The Steady-Glo reagent is tolerant of mixing conditions, evaporation, and pipetting errors. These characteristics help improve assay reproducibility and robustness, features particularly valuable when working with 384-well plates. The Steady-Glo reagent has a half-life of more than 5 hours in common culture media, allowing multiple plates to be read in 1 to 2 hours with little change in luminescence.

### Promega

For more information call 800-356-9526 or **circle 144** on the Reader Service Card

## DNA ANALYZER FOR MUTATION SCREENING

The WAVE-HS DNA Analyzer provides an automated, turn-key approach for efficient screening for mutations in genes involved in carcinogenesis and neoplastic growth. The instrument combines the manufacturer's Temperature Modulated Heteroduplex Analysis (TMHA) with the sensitivity and accuracy of fluorescence detection, which provides a powerful tool for detection of unknown mutations in heterogeneous samples. The fluorescently labeled mutant heteroduplexes produced by TMHA can be easily detected by the analyzer, even in samples in which the presence of a mutated allele may be masked by more than 100-fold excess of wild-type allele. The non-gel approach of

### Trans-genomic

For more information call 800-369-2822 or **circle 145** on the Reader Service Card

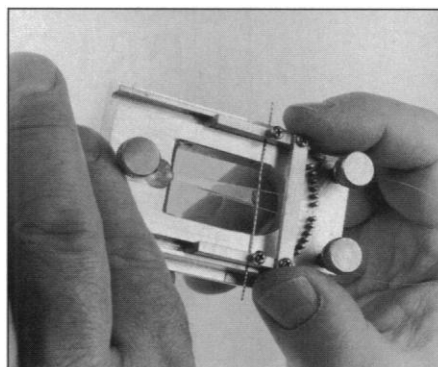
the analyzer makes its technology attractive for cancer research and other high-throughput applications.

## THIN FILMS BY SURFACE TENSION

### International Crystal Laboratories

For more information call 973-478-8944 or **circle 146** on the Reader Service Card

The *TENSIONER* makes use of surface tension to create thin films from polymer solutions. The sample is placed in the well of the patent-pending *TENSIONER*, which is located at the apex of a triangle made of thin filaments. Then the movable base is drawn up from the well along the filament legs of the triangle and a thin film is stretched across the wire; where it is then ready for analysis by Fourier-transform infrared spectroscopy. The *TENSIONER* is al-



so useful for sampling difficult liquids, such as acid, glue, epoxy, and cyanoacrylate. It can be used both as a microscope stage and for tensile strength testing.

## HIGH-THROUGHPUT DNA CLONING

The Fast-Link DNA Ligation Kit is for high-throughput DNA cloning. The kit's reagents are optimized for rapid and efficient ligation of cohesive-end DNA, blunt-end DNA, and polymerase chain reaction (PCR) products into plasmid, cosmid, or lambda libraries. Cohesive-end ligations can be performed in 5 min at room temperature; blunt-end ligations take 15 min. Ligation of PCR product containing non-template A overhangs can be completed in 1 hour. Desalting of ligation reactions prior to electroporation is not necessary.

### Epicentre Technologies

For more information call 800-284-8474 or **circle 147** on the Reader Service Card

## CYTOKINE-SPECIFIC MRNA QUANTITATION

Quantikine mRNA assay is a novel method to quantitate cytokine-specific mRNA at low levels. It is sensitive, specific, and accurate without the disadvantages of the traditional mRNA quantitation methods. It is a colorimetric microplate assay that makes use of either total or polyadenylated RNA. The assay can be completed in less than one day and is suitable for analysis of multiple mRNA targets on the same microplate.

### R&D Systems

For more information call 800-343-7475 or **circle 148** on the Reader Service Card

## LITERATURE

### Harlan Sprague Dawley

For more information call 317-894-7521 or **circle 149** on the Reader Service Card

*Harlan* is a product guide offering more than 200 stocks and strains of rats, mice, rabbits, hamsters, guinea pigs, gerbils, cats, beagles, hounds, mongrels, swine, and miniature swine. The guide also includes information on Harlan Health and Genetic Monitoring programs, surgical and contract services, immunological products and services, flexible-film isolators, growth and survival data, and laboratory animal diets and bedding.

*AAA-Direct Amino Acid Analysis System* is a product bulletin on a new system that detects amino acids directly with high sensitivity and without pre- or post-column derivatization. The system makes use of integrated pulsed amperometric detection, a direct detection technique applicable to a wide range of applications in protein characterization and food analysis for monitoring large-scale cell cultures and fermentation broths.

### Dionex

For more information call 408-481-4223 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.

## MAMMALIAN GENOTYPING SERVICE

The Mammalian Genotyping Service is funded by the National Heart, Lung, and Blood Institute to assist in linkage mapping of genes which cause or influence disease. Genotyping is carried out using short tandem repeat polymorphisms at Marshfield, Wisconsin under the direction of Dr. James Weber. Capacity of the Service is currently about 5,000,000 genotypes (DNA samples times polymorphic markers) per year and growing. Although the Service was initially established for genetic projects dealing with heart, lung, and blood diseases, the Mammalian Genotyping Service will now consider all meritorious applications.

To ensure that the most promising projects are undertaken, investigators must submit brief applications that are evaluated by a scientific advisory panel. At this time, only projects involving humans, mice or rats and only projects with > 10,000 genotypes will be considered. DNA samples must be in hand at the time of application. **There are no genotyping fees for approved projects.** Application deadlines are every six months.

### View instructions online:

<http://www.marshmed.org/genetics>

### Call or e-mail for an application:

(715) 389-3525

[cwvinsks@mflclin.edu](mailto:cwvinsks@mflclin.edu)

### Upcoming Deadlines:

September 30, 1999

March 31, 2000

Circle No. 40 on Readers' Service Card

We've set the  
**STAGE** for  
performance &  
price!



### The New OptiScan™ Stage

- Economical alternative for routine applications
- XY, XYZ and Z (focus) only systems available
- Available with up to 2 filter wheels and 3 high-speed shutters
- Works with most image analysis programs
- Fits to any new or existing upright microscope

**PRIOR**  
Scientific

80 Reservoir Park Drive, Rockland, MA 02370

800-877-2234 • 781-878-8442

Fax: 781-878-8736

email: [info@prior.com](mailto:info@prior.com) • website: [www.prior.com](http://www.prior.com)

5/99

Circle No. 32 on Readers' Service Card

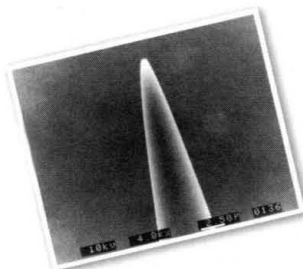
## The Tool for Exploring the Microworld



### The P-2000

**Micropipette Puller** rapidly and consistently produces micropipettes for cell physiology, nanoelectrospray, scanning microscopy and other innovative technologies. Pre-programmed to make quartz probes with tip diameters from nanometers to micrometers.

Call or write us today for more information.



Actual 1  $\mu$ m quartz capillary tip fabricated with the P-2000.

From the world leader in micropipette technology.



**SUTTER INSTRUMENT COMPANY**

51 DIGITAL DRIVE • NOVATO CALIFORNIA • 94949 • PHONE: (415) 883-0128  
FAX: (415) 883-0572 • EMAIL: [info@sutter.com](mailto:info@sutter.com) • WEB: [WWW.SUTTER.COM](http://WWW.SUTTER.COM)

Circle No. 25 on Readers' Service Card

Enhance your AAAS  
membership with the  
Science Online advantage.

## Science ONLINE

**Full text Science**—research papers and news articles with hyperlinks from citations to related abstracts in other journals before you receive *Science* in the mail.

**ScienceNOW**—succinct, daily briefings, of the hottest scientific, medical, and technological news.

**Science's Next Wave**—career advice, topical forums, discussion groups and expanded news written by today's brightest young scientists across the world.

**Research Alerts**—sends you an email alert every time a *Science* research report comes out in the discipline, or by a specific author, citation or keyword of your choice.

**Science's Professional Network**—lists hundreds of job openings and funding sources worldwide that are quickly and easily searchable by discipline, position, organization, and region.

**Electronic Marketplace**—provides new product information from the world's leading science manufacturers and suppliers all at a click of your mouse.

Visit Science Online at <http://www.scienceonline.org>, call 202-326-6417, or email [membership2@aaas.org](mailto:membership2@aaas.org) for more information.



AMERICAN ASSOCIATION FOR THE  
ADVANCEMENT OF SCIENCE