

Science

2 November 2001

Vol. 294 No. 5544
Pages 945-1228 \$9

Sleep,
Dreams, &
Memory



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Do Your *E. coli* Cells Have Mammalian Envy?

BL21-CodonPlus[™] COMPETENT CELLS

Codon bias causes problems

Expression of recombinant proteins in *E. coli* is fast, simple and provides extremely high yields. However, codon bias occurs when the ratio of codons used in the heterologous gene product is different than the available tRNAs in *E. coli*. Codon bias can cause low or nonexistent protein synthesis, early termination or misincorporation of amino acids.

BL21-CodonPlus[™] cells have what it takes to express proteins from other organisms!

Stratagene has solved the problems

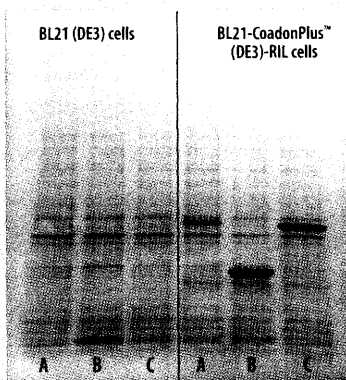
Two new BL21 strains have extra copies of rare *E. coli* tRNA genes that are used more frequently in other organisms. These strains allow high-level expression of recombinant genes that are difficult to express due to codon bias.

Our side-by-side experiments show that BL21-CodonPlus cells dramatically improve expression of recombinant proteins compared to the BL21 parental strain.

BL21-CodonPlus[™] Cells Remove Codon Bias

BL21 (DE3) cells

BL21-CodonPlus[™] (DE3)-RIL cells



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.

Don't let codon bias prevent expression of your protein in *E. coli*!

BL21-CodonPlus[™] competent cells for high-level expression

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

STRATAGENE EUROPE
Belgium, Germany, The Netherlands,
Switzerland, United Kingdom

European Toll-Free Numbers
ORDER: 00800 7000 7000
TECHNICAL SERVICES: 00800 7400 7400
Austria
0800 312 526
France
00800 7000 7000 or 0800-100391

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

* Patent Pending

www.stratagene.com



STRATAGENE[®]

BL21-CodonPlus[™]-RIL Competent Cells #230240
BL21-CodonPlus[™](DE3)-RIL Competent Cells #230245
BL21-CodonPlus[™]-RP Competent Cells #230250
BL21-CodonPlus[™](DE3)-RP Competent Cells #230255
BL21-CodonPlus[™](DE3)-RIL-X Competent Cells #230265
BL21-CodonPlus[™](DE3)-RP-X Competent Cells #230275

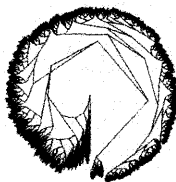
The pick-up, switch-on microarray starter kit. Powered by Pathways™ software.



Screening microarrays is easier than ever with the ResGen™ GeneFilters® microarrays starter kit from Invitrogen.

Complete. Two GeneFilters® microarrays allow you to compare over 5,000 sequence-verified cDNAs on a nylon membrane. Our sophisticated Pathways™ software analyzes vital expression data, while probe labeling reagents and hybridization buffer ensure consistent results. You get everything you need to start experiments immediately.

Cost-effective. Screen with a standard ³²P labeled probe and familiar hybridization techniques. Capture images with a phosphor imaging system. Strip and re-probe up to five times.



*Pathways™ clustering results
displayed as a hyperbolic tree*

With no new techniques to learn or equipment to buy, your GeneFilters® starter kit will save you time and money.

Powerful. Pathways™ software provides the tools you need to get results. Import multiple images. View as scatter plots and tables. Filter large data sets. Cluster data with multiple algorithms. Link to public databases. With Pathways™ software you can easily make sense of your data. Switch on microarray analysis the smart way. Pick up a

GeneFilters® microarrays starter kit. To learn more, visit www.resgen.com

 **ResGen™**
Invitrogen Corporation

United States:

ResGen™, Invitrogen Corporation
2130 Memorial Parkway, SW
Huntsville, AL 35801
Tel (Toll Free): 800 533 4363
Fax: 256 536 9016
Email: info@resgen.com

Europe:

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

International Offices:

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

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

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

www.resgen.com



980

What constitutes addiction?



1007

Avian exemplars of Mayrian explanations

1005

Brokers of burning



NEWS

NEWS OF THE WEEK

- 970 **BIOMEDICAL RESEARCH: Help Wanted: Departure of Top Officials Adds to Vacancies at NIH**
 Leshner Named to Lead AAAS
- 971 **BIOTERRORISM: New Law May Force Labs to Screen Workers**
- 973 **U.S. SCIENCE POLICY: Marburger Shakes Up White House Office**
- 973 **SCIENCESCOPE**
- 974 **FORMER SOVIET UNION: Cautious Optimism, But Progress Is Slow**
- 974 **ASTROPHYSICS: Pulsar Pulls Mass From Distorted Companion**
- 977 **RADIO ASTRONOMY: Japan and Korea to Link Networks**
- 977 **BIOMEDICAL RESEARCH: Tritium Lab to Close After Loss of NIH Funds**

- 978 **PRION DISEASES: U.S. Gets Tough Against Chronic Wasting Disease**
- 979 **PHILANTHROPY: Caltech Lands Record-Breaking \$600 Million**
- 979 **OBESITY RESEARCH: Fat Hormone Makes a Comeback**

NEWS FOCUS

ADDICTION

- ▼980 **COMPULSIVE BEHAVIORS: 'Behavioral' Addictions: Do They Exist?**
 1047
- 983 **LONG-TERM CHANGES: Beyond the Pleasure Principle**
- 985 **BIOTERRORISM: Smallpox Vaccinations: How Much Protection Remains?**
- 987 **APS DIVISION OF NUCLEAR PHYSICS: Elusive Particles Yield Long-Held Secrets**
- 988 **ARCHAEOLOGY: Spreading the Word, Scattering the Seeds**
- 991 **RANDOM SAMPLES**

SCIENCE'S COMPASS

999 LETTERS

IDeA: A Program Whose Time Has Come J. D. Capra. **Invasive Carp in China's Plateau Lakes** P. Xie, Y. Chen. **The Real Cost of Wind Energy** J. F. DeCarolus, D. W. Keith. **Response** M. Z. Jacobson, G. M. Masters. **Corrections and Clarifications**

ESSAY

- 1005 **The Fires This Time, and Next** S. J. Pyne

BOOKS ET AL.

- 1007 **ECOLOGY: *The Birds of Northern Melanesia* Speciation, Ecology, and Biogeography** E. Mayr and J. M. Diamond, reviewed by B. M. Beehler
- 1008 **PALEOBIOLOGY: *Evolutionary Patterns* Growth, Form, and Tempo in the Fossil Record** J. B. C. Jackson, S. Lidgard, and F. K. McKinney, Eds., reviewed by R. Bambach

PERSPECTIVES

- 1009 **PALEOENVIRONMENT: Clues from Fluid Inclusions** R. H. Goldstein
- ▼1011 **NEUROBIOLOGY: Neurocreationism—Making New Cortical Maps** P. Rakic
 1071

- 1012 **CLIMATE CHANGE: Storing Carbon on Land** R. J. Scholes and I. R. Noble

- ▼1015 **CELL BIOLOGY: Fusion Without SNAREs?**
 1111 S. J. Scales, M. F. A. Finley, R. H. Scheller
 1117
- ▼1016 **VIROLOGY: HIV—Breaking the Rules for Nuclear Entry** M. Segura-Totten and K. L. Wilson
 1105

REVIEWS

- ▼1021 **NEUROSCIENCE: A Paradigm Shift in Brain Research** A. Carlsson
 1047
- ▼1024 **NEUROSCIENCE: The Neurobiology of Slow Synaptic Transmission** P. Greengard
 1047
- ▼1030 **NEUROSCIENCE: The Molecular Biology of Memory Storage: A Dialogue Between Genes and Synapses** E. R. Kandel
 1047



1021

Neuroscience Nobel lectures from 2000

RESEARCH

RESEARCH ARTICLES

- ▼1071
1011 **Neocortex Patterning by the Secreted Signaling Molecule FGF8**
T. Fukuchi-Shimogori and E. A. Grove

- 1074 **Universality and Scaling in the Disorder of a Smectic Liquid Crystal**
T. Bellini, L. Radzihovsky, J. Toner, N. A. Clark

REPORTS

- 1080 **Tracking Femtosecond Laser Pulses in Space and Time** M. L. M. Balistreri, H. Gersen, J. P. Korterik, L. Kuipers, N. F. van Hulst

- 1082 **Dielectrophoretic Assembly of Electrically Functional Microwires from Nanoparticle Suspensions** K. D. Hermanson, S. O. Lumsdon, J. P. Williams, E. W. Kaler, O. D. Velev

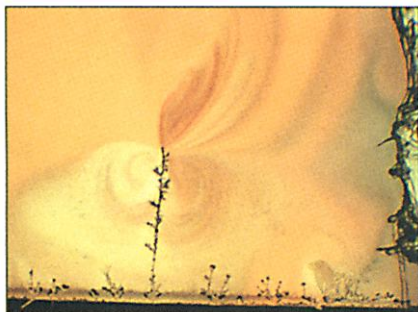
- 1086 **Oscillations in Phanerozoic Seawater Chemistry: Evidence from Fluid Inclusions**
T. K. Lowenstein, M. N. Timofeeff, S. T. Brennan, L. A. Hardie, R. V. Demicco

- 1089 **The Spin Temperature of NH₃ in Comet C/1999S4 (LINEAR)** H. Kawakita, J. Watanabe, H. Ando, W. Aoki, T. Fuse, S. Honda, H. Izumiura, T. Kajino, E. Kambe, S. Kawanomoto, K. Noguchi, K. Okita, K. Sadakane, B. Sato, M. Takada-Hidai, Y. Takeda, T. Usuda, E. Watanabe, M. Yoshida

- 1091 **Preservation of Species Abundance in Marine Death Assemblages** S. M. Kidwell

- 1094 **The Origin and Evolution of the Woolly Mammoth** A. M. Lister and A. V. Sher

- 1098 **Structural Basis for Recognition of the Intron Branch Site RNA by Splicing Factor 1**
Z. Liu, I. Luyten, M. J. Bottomley, A. C. Messias, S. Houngrinou-Molango, R. Sprangers, K. Zanier, A. Krämer, M. Sattler



1082

Making connections

SLEEP, DREAMS, AND MEMORY

- 1047 **Sweet Dreams Are Made of This**

REVIEWS

- 1048 **The Role of Sleep in Learning and Memory**
P. Maquet

- 1052 **Sleep, Learning, and Dreams: Off-line Memory Reprocessing** R. Stickgold, J. A. Hobson, R. Fosse, M. Fosse

- 1058 **The REM Sleep-Memory Consolidation Hypothesis** J. M. Siegel

See also *Science's STKE* on p. 951, *Editorial* on p. 957, *special News Focus* on addictions beginning on p. 980, and *Reviews* on pp. 1021, 1024, and 1030

- 1102 **Mammalian TOR: A Homeostatic ATP Sensor** P. B. Dennis, A. Jaeschke, M. Saitoh, B. Fowler, S. C. Kozma, G. Thomas

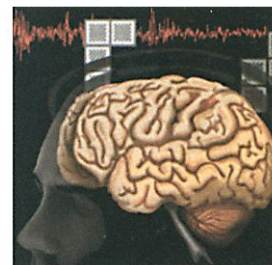
- ▼1105
1016 **Dynamic Disruptions in Nuclear Envelope Architecture and Integrity Induced by HIV-1 Vpr** C. M. C. de Noronha, M. P. Sherman, H. W. Lin, M. V. Cavrois, R. D. Moir, R. D. Goldman, W. C. Greene

- 1108 **Interaction of the Response Regulator ARR4 with Phytochrome B in Modulating Red Light Signaling** U. Sweere, K. Eichenberg, J. Lohrmann, V. Mira-Rodado, I. Bäurle, J. Kudla, F. Nagy, E. Schäfer, K. Harter

- ▼1111
1015 1117 **Synaptotagmin Modulation of Fusion Pore Kinetics in Regulated Exocytosis of Dense-Core Vesicles** C.-T. Wang, R. Grishanin, C. A. Earles, P. Y. Chang, T. F. J. Martin, E. R. Chapman, M. B. Jackson

- 1115 **Localization of Long-Term Memory Within the *Drosophila* Mushroom Body**
A. Pascual and T. Preat

- ▼1117
1015 1111 **SNARE Function Analyzed in Synaptobrevin/VAMP Knockout Mice**
S. Schoch, F. Deák, A. Königstorfer, M. Mozhayeva, Y. Sara, T. C. Südhof, E. T. Kavalali

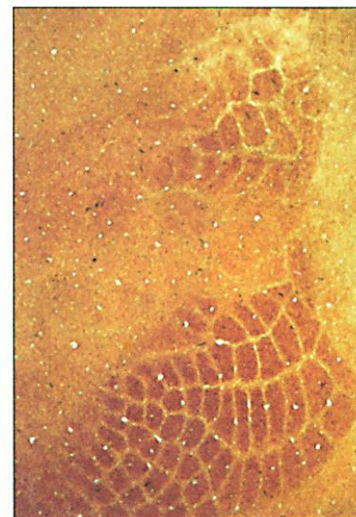


COVER 1047

People who play the computer game Tetris often see intrusive images from the game in sleep-onset "hypnagogic" dreams. The special section in this issue focuses on the roles that sleep and dreams may play in processing memories. [Image: Christopher Davis]

1071

Signaling in brain development



New on Science Express

Cell cycle and brain structure



AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

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

Change of address: allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to Science, P.O. Box 1811, Danbury, CT 06813-1811. Single copy sales: \$9.00 per issue prepaid includes surface postage; bulk rates on request. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that \$8.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075/83 \$8.00. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.



**Yes, this is an advertisement from
Amersham Pharmacia Biotech.
But you may have noticed that
something's different.**

We're now Amersham Biosciences. A name a little shorter than our previous one. And a name that embraces our broad range of expertise - systems for the biosciences, from genes to drugs. With it we have a new logo, one that expresses our role as a provider of integrated products and services. But that's all that's changed. We will still be providing the high quality products and services you have come to expect from us. We will continue to have an open and collaborative business approach. And we'll still have excellent science, that we'll continue to use to create new and innovative solutions.

Look again



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

www.amershambiosciences.com

Scienceonline

www.scienceonline.org

CONTENT HIGHLIGHTS AS OF 2 NOVEMBER 2001

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

science magazine

www.sciencemag.org

SCIENCE EXPRESS

www.sciencexpress.org

Submillimeter Evidence for the Coeval Growth of Massive Black Holes and Galaxy Bulges M. J. Page, J. A. Stevens, J. P. D. Mittaz, F. J. Carrera

Submillimeter photometry indicates that, in the early universe, starburst activity peaked at the same time as black holes were building up most of their mass.

Negative Regulation of Neural Stem/Progenitor Cell Proliferation by the *Pten* Tumor Suppressor Gene in Vivo M. Groszer *et al.*

Analysis of conditional knockout mice suggests that PTEN controls proliferation and apoptosis of neural progenitor cells.

ARR1, a Transcription Factor for Genes Immediately Responsive to Cytokinins H. Sakai *et al.*

The signal transduction chain triggered by the plant hormone cytokinin is remarkably short: The ARR1 protein, which can be activated by the cytokinin hormone receptor, can then use its DNA-binding domains to alter target gene expression.

TECHNICAL COMMENTS

Anomalies in Ozone Isotopomer Formation

Gao and Marcus (Research Articles, 13 July, p. 259) presented theoretical arguments to explain why both mass-independent and mass-dependent oxygen isotope fractionation can be observed for ozone synthesis under different conditions. In a comment, Janssen acknowledges that the theory "successfully explains most of the experimental data," but takes issue with the study's conclusion that both isotope effects "are in a sense symmetry-driven." Although that description is "clearly appropriate" for the nonstatistical effect cited by Gao and Marcus to explain the mass-independent fractionation, according to Janssen, "the same term should be avoided" to describe the zero-point energy fractionation (ZPEF) driving the large unconventional mass-dependent effects, because such fractionation "is connected only accidentally, not causally, with molecular symmetry." In a response, Marcus explains the subtler sense under which ZPEF can also be termed symmetry-driven.

The full text of these comments can be seen at www.sciencemag.org/cgi/content/full/294/5544/951a

SPECIAL FEATURE

Science Functional Genomics www.sciencegenomics.org

A Tale of Two Modifiers C. B. Kunst

How some genes affect the expression of neurological-disease phenotypes.

science's next wave

www.nextwave.org

career resources for scientists

Global: Careers in Bioengineering

In this month's feature, insight into the latest trends in bioengineering—and perspectives on why the training and skill sets of bioengineers make them among today's most sought-after scientists.

Europe: European Science Bytes K. Urquhart and E. von Ruschkowski

Bite-sized snippets of the latest career- and science-related news from Europe.

UK: Superior Supervision K. Urquhart

Is having been supervised yourself sufficient qualification for becoming a research supervisor, or should Ph.D. supervisors be given training and support to help them do a good job?

US: A Misfit Scientist Goes To Washington M. Marino

Pursuing her conviction that she'd have more fun as a science writer than as a researcher, the author took a gamble on a summer internship at the National Academies' news and information office.

KNOWLEDGE ENVIRONMENTS

science's sage ke

www.sageke.org

science of aging knowledge environment

Orientation Article: Detangling Alzheimer's Disease L. Helmuth

Toward better diagnostics and possible therapeutics.

Neurodegenerative Disease Case Study: Alzheimer's Disease

L. S. Honig and S. S. Chin

Family members often detect problems first.

science's stke

www.stke.org

signal transduction knowledge environment

Perspective: Melatonin Receptor Signaling—Finding the Path

▼Through the Dark M. I. Masana and M. L. Dubocovich

¹⁰⁴⁷ Insights from pharmacological analysis.

Review: Signaling to the Mammalian Circadian Clocks—In Pursuit of the Primary Mammalian Circadian Photoreceptor

▼M. P. Pando and P. Sassone-Corsi

¹⁰⁴⁷ How is it that the central and peripheral mammalian clocks communicate, and what are the identities of the primary photoreceptors?

GrantsNet

www.grantsnet.org

RESEARCH FUNDING DATABASE

AIDScience

www.aidscience.com

HIV PREVENTION & VACCINE RESEARCH

Members Only!

www.AAASMember.org

AAAS ONLINE COMMUNITY

SCOPE

<http://scope.educ.washington.edu>

EXPLORING SCIENCE CONTROVERSIES

Functional Genomics

www.sciencegenomics.org

NEWS, RESEARCH, RESOURCES

ONLINE STAFF

SCIENCENOW EDITORS Laura Helmuth, Martin Enserink, Erik Stokstad

SCIENCE'S NEXT WAVE EDITORIAL: MANAGING EDITOR Crispin Taylor; EDITORS Eick von Ruschkowski (Germany), Kirstie Urquhart (UK); CONTRIBUTING EDITORS Lesley McCarney (Canada), Jennie Wong (Singapore); PROJECT EDITOR Ric Weib; WRITERS Jim Austin, Katie Cottingham; PRODUCTION ASSOCIATE Lily Han; MARKETING: MARKETING MANAGERS Karen Horting (Global), Hazel Crocker (Europe); PROGRAM DIRECTOR Lisa Kozlowski; MARKETING ASSOCIATE Angela Walker; PROGRAM ASSOCIATES Shajuan Martin, Tammy Minor

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

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

SCIENCE'S SAGE KE EDITORIAL DIRECTOR Kelly LaMarco; SENIOR NEWS EDITOR Evelyn Strauss; ASSOCIATE EDITOR R. John Davenport

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

NEW

Automated Multiwell Purification of Milligram Amounts of 6xHis-tagged Protein!

QIAGEN® Ni-NTA Superflow together with BioRobot® automation technology provides:

- Consistent yields and milligram amounts of protein per well using a novel purification protocol
- Protocols for BioRobot 3000, and 8000 workstations
- Cross-contamination-free isolation of up to 96 different proteins in parallel
- High well-to-well reproducibility
- Robust, reliable vacuum-driven filtration and affinity chromatography

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

For more information on this application, please contact your QIAGEN Sales Representative or visit us at www.qiagen.com/automation.

Trademarks: QIAGEN®, QIAexpress®, BioRobot®, Ni-NTA (QIAGEN); Superflow (Sterogene Bioseparations). BioRobot Systems are not available in all countries; please inquire. © 2001 QIAGEN, all rights reserved.

www.qiagen.com

QIAGEN:

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

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

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

Italy
Tel. 02-33430411
Fax 02-33430426

Switzerland
Tel. 061-319-3031
Fax 061-319-3033

UK and Ireland
Tel. 01293-422-999
Fax 01293-422-922

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

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

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

Distributors:

Argentina Tecnolab S.A. [011] 4555 0010 **Austria/Slovenia** Merck EuroLab GmbH [01] 576 00 0 **Belgium/Luxemburg** Westburg b.v. 0800-1-9815 **Brazil** Uniscience do Brasil 011 3622 2320 **China** Gene Company Limited (852)2896-6283 **Cyprus** Scientronics Ltd. [02] 765 416 **Czech Republic** BIOCONSULT spol. s r.o. (420) 2 417 29 792 **Denmark** Merck EuroLab A/S 43 86 87 88 **Egypt** Clinlab 52 57 212 **Finland** Merck EuroLab Oy (09)804 551 **Greece** BioAnalytica S.A. [01]440 03 18 **India** Genetix [011]542 1714 or [011]515 9346 **Israel** Westburg (Israel) Ltd. 08 6650813/4 or 1-800 20 22 20 **Korea** IRS Laboratories, Inc. [02] 924-86 97 **Malaysia** RESEARCH BIOLABS SDN. BHD. (603)-8070 3101 **Mexico** Quimica Valaner S.A. de C.V. [5] 525 57 25 **The Netherlands** Westburg b.v. [033]-4950094 **New Zealand** Biolab Scientific Ltd. [09] 980 6700 or 0800 933 966 **Norway** Merck EuroLab AS 22 90 00 00 **Poland** Syngen Biotech Sp.z o.o. [071] 351 41 06 or 0601 70 60 07 **Portugal** IZASA PORTUGAL, LDA [21] 424 7312 **Singapore** Research Biolabs Pte Ltd 2731066 **Slovak Republic** BIOCONSULT Slovakia spol. s r.o. [02] 5022 1336 **South Africa** Southern Cross Biotechnology (Pty) Ltd [021] 671 5166 **Spain** IZASA, S.A. [93] 902 20 30 90 **Sweden** Merck EuroLab AB [08] 621 34 00 **Taiwan** TAI GEN Bioscience Corporation [02] 2880 2913 **Thailand** Theera Trading Co. Ltd. [02] 412-5672 **In other countries contact:** QIAGEN, Germany



MS-100701-100X-01

THIS WEEK IN Science

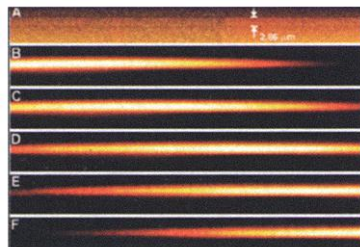
edited by Phil Szuromi

When Order Breaks Down

Phase transitions reflect changes in ordering of a system, and insights can often be gained from studies of how the phase transition changes in response to deliberate disordering. Bellini *et al.* (p. 1074) examined the effect of disordering a type of liquid-crystal phase transition, the melting of a smectic phase, in which molecules are oriented and packed in layers, into a nematic phase, where the molecules are still oriented but have no distinct layers. They introduced the liquid crystal into an aerogel network, whose highly irregular surface perturbs the ordering on the nanometer scale. By comparing the experimental results to two theoretical descriptions, they show how long-range periodicity is destroyed. Some local ordering still persists and exhibits universality behavior similar to that of bulk phase transitions.

Keeping an Eye on the Pulse

As the development of photonic devices advances, so too will the need to monitor the transient behavior of the optical pulses as they propagate through the device structure. However, peeking inside a photonic structure is far from trivial, particularly when the pulses are on the order of several tens of femtoseconds. Balistreri *et al.* (p. 1080) introduce a noninvasive technique based on an optical scanning tunneling microscope that can be used to "visualize" the pulse as it propagates through an optical waveguide with temporal and spatial resolution.



Making Connections

A simple method for connecting pairs of electrodes immersed in water with microwires has been developed by Hermanson *et al.* (p. 1082). They added colloidal gold particles to the solution and turned on an alternating current (ac) between a pair of planar electrodes. The colloidal particles attached to one electrode and grew toward the other to form a bridging wire. The process can be enhanced by placing conductive islands between the two electrodes, causing the ac field to become asymmetric, and the thickness of the wires can be controlled by the particle size, concentration, the electric field and current, and the electrolyte concentration. The addition of latex particles to the solution tended to coat the wire to form a partial insulating layer.

1089 Cometary Origins

Comets are thought to have formed through the freezing out and accretion of volatiles from the solar nebula at the edge of our solar system, where the temperatures range between 30 to 80 K. Kawakita *et al.* (p. 1089) collected high-resolution spectra from the Subaru telescope of comet C/1999 S4 (LINEAR) to determine the ortho-to-para ratio of NH_2 . By assuming that the NH_2 is derived from the photodissociation of ammonia by the solar radiation, they derived a spin temperature of the ammonia of about 38 K. If this ammonia is primordial, then the spin temperature indicates that the comet formed between 8 and 15 astronomical units in the solar nebula.

A Matter of Life and Death

Shell beds containing the fossilized remains of molluscs are abundant and have been central to the interpretation of the history of life on Earth. Do these "death assemblages" provide more than a qualitative record of the presence and absence of species at particular times? Kidwell (p. 1091) performed a meta-analysis of many quantitative studies on the correspondence between dead and live molluscs in marine sediments. She shows that these sediments provide a reliable record of the relative abundance of molluscan species in their original living communities, thus indicating that death assemblages can reveal important information about paleoecology.

She shows that these sediments provide a reliable record of the relative abundance of molluscan species in their original living communities, thus indicating that death assemblages can reveal important information about paleoecology.

Sea Changes

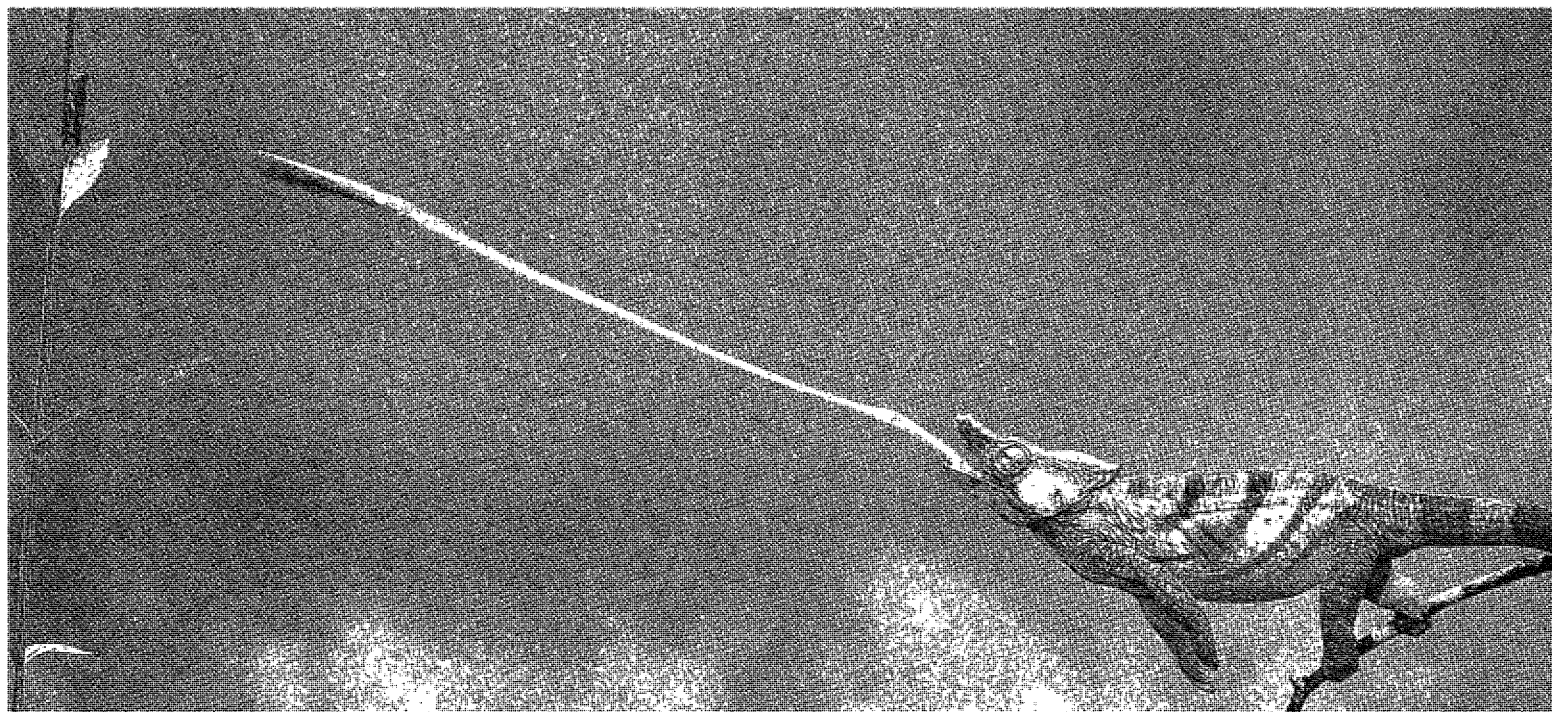
Previous work that has suggested that the chemistry of the oceans, based on major ions such as Na^+ , K^+ , Ca^{2+} , Mg^{2+} , and Cl^- , has been constant during the Phanerozoic (the past 540 million years), but this is inconsistent with observed changes in the mineralogy of marine limestones and evaporites. Lowenstein *et al.* (p. 1086; see the Perspective by Goldstein) measured the major ions trapped in fluid inclusions, which provide samples of ancient seawaters, in halite grains from marine formations throughout the Phanerozoic. Seawater chemistry has varied over time, and the variations are consistent with changes in sea-floor spreading rates, volcanism, and sea level.

Mammoth Developments

The fossil record of the woolly mammoth in Eurasia is one of the most extensive for any large mammal for the past 2 million years. Lister and Sher (p. 1094) have completed a detailed analysis of patterns of change in skull morphology and dentition spanning the mammoth's entire geographical and temporal range. They build a picture of gradual evolutionary change that resolves many of the contested questions in mammoth evolution and provides an unprecedented documentation of evolutionary tempo and mode in a large vertebrate.

Map Factor

Different regions of the mammalian cortex are dedicated to different neurological functions, but the molecular mechanisms by which the functional map is defined have been obscure. Fukuchi-Shimogori and Grove (p. 1071; see the Perspective by Rakic) have manipulated the expression of the fibroblast growth factor family member FGF8 in the developing forebrain. The effects of too much—or too little—FGF8 indicate that an intrinsic source of FGF8 in the anterior cortical primordium is responsible for determining the general structure of a neocortical map. X



Parson's Chameleon (*Calumma parsonii*)

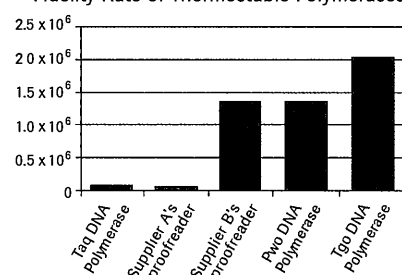
Achieve the Highest Accuracy in PCR Cloning!

Maximize accuracy in PCR with Roche Molecular Biochemicals' **new Tgo DNA Polymerase**, the highest fidelity proofreading polymerase available today.

Amplify the right sequence

Maximize your confidence in downstream cloning and sequencing by insisting on the proofreading enzyme that minimizes incorporation errors.

Fidelity Rate of Thermostable Polymerases



Fidelity rates for DNA polymerases.
(Fidelity rate = Error rate⁻¹)

Increase PCR specificity

Eliminate ambiguous results and non-specific products by amplifying only the desired product. Choose a highly specific enzyme that eliminates the need for hot start PCR.

	When you need	Choose
PCR	Sensitivity	Expand High Fidelity PCR System [†]
	Specificity	FastStart Taq DNA Polymerase [†]
	To amplify difficult DNA templates	GC-RICH PCR System [†]
	Products of 5-20 kb	Expand Long Template PCR System [†]
	Products >20 kb	Expand 20 kb ^{PLUS} PCR System [†]
RT-PCR	Accuracy	Tgo DNA Polymerase [†]
	Sensitivity	Titan One Tube RT-PCR System/Kit [†]
	To amplify difficult RNA templates	<i>C.therm.</i> Polymerase [†]

Choose the Right Enzyme for Each Application

Stop wasting time and money because standard Taq DNA Polymerase failed you. Overcome the sensitivity, specificity, fidelity, and product-length limitations of Taq. Use the table above to select an enzyme that specifically addresses your diverse amplification needs.

Contact us today!

Call us at **800-262-1640** to place your order for Tgo DNA Polymerase. Or, to learn more about any of our amplification products, visit www.biochem.roche.com/pcr

Tgo DNA Polymerase^{†▲}

Cat. No.	Pack Size	Price
3 186 172	50 reactions	\$108.00
3 186 202	100 reactions	\$180.00
3 186 199	250 reactions	\$375.00

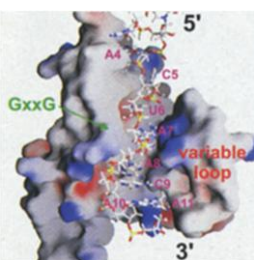


[†] Purchase of this product is accompanied by a limited license to use it in the Polymerase Chain Reaction (PCR) process for life science research in conjunction with a thermal cycler whose use in the automated performance of the PCR process is covered by the up-front license fee, either by payment to Applied Biosystems or as purchased, i.e., an authorized thermal cycler.

[▲] Licensed by New England Biolabs (NEB) under US Patents Nos. 5 322.785, 5 352.778, 5 500 363 and foreign equivalents for research use only. Expand, FastStart, and Titan are trademarks of a member of the Roche Group.

© 2001 Roche Diagnostics Corporation. All rights reserved.

Roche Diagnostics Corporation
Roche Molecular Biochemicals
Indianapolis, IN



Grabbing onto a Branch(point)

During RNA processing in eucaryotic nuclei, intervening sequences (introns) are removed. The bond between the last nucleotide of the exon and the first nucleotide of the intron is cleaved by using an intronic adenosine residue as the attacking nucleophile. This adenosine is referred to as the branch point A because this reaction yields a branched structure known as a lariat. From the solution structure of the complex between splicing factor 1 (SF1) and the branch point sequence (BPS), Liu *et al.* (p. 1098) find that the branch point

A is buried within the protein. They suggest that the subsequent formation of an RNA double helix between the BPS and U2 snRNA bypasses this sequestered adenosine, and the dissociation of SF1 would then leave this unpaired nucleotide exposed.

Coordinating Energy Consumption

The mammalian target of the immunosuppressant (and anticancer agent) rapamycin (mTOR) controls ribosome biogenesis in response to nutrients and is now shown to be a sensor of the energy status of the cell. Given that protein synthesis consumes a lot of energy, Dennis *et al.* (p. 1102) found that treatments that decreased the cellular concentration of ATP also decreased mTOR activity. In fact, mTOR exhibits a Michaelis constant for ATP similar to the concentration of ATP in a mammalian cell. Thus, mTOR seems to function as a key node for regulation of ribosome biogenesis, replete with distinct mechanisms to coordinate ribosome function with availability of ATP or amino acids.

HIV-Induced Nuclear Blebbing

The HIV protein Vpr is known to halt cell proliferation. De Noronha *et al.* (p. 1105; see the Perspective by Segura-Totten and Wilson) observed the formation of blebs or herniations in the cell's nuclear envelope. These herniations would occasionally rupture, leading to the mixing of nuclear and cytosolic contents, including cell cycle regulators. It will be important to determine how these events contribute to the inhibition of cellular proliferation.

Connect to the Light

Light perception in plants is mediated by photoreceptors called phytochromes for the red/far-red portions of the spectrum. Sweere *et al.* (p. 1108) show that the first component in the signal transduction pathway for phytochrome B in *Arabidopsis* is the response regulator ARR4. Phytochrome B regulates the expression of ARR4, which in turn interacts with phytochrome B to further light signaling. Hormone-regulated expression of ARR4 and the effect of phosphorylation on its function suggest how the light signaling pathway may interact with other signaling pathways.

Fusion Machinery Components

The SNARE proteins are parts of the cellular fusion machinery and are thought to act as specificity markers on intracellular membrane-bounded compartments (see the Perspective by Scales *et al.*). Schoch *et al.* (p. 1117) generated knockout mice that lack the SNARE synaptobrevin 2 and found that it was not absolutely required. Wang *et al.* (p. 1111) looked at the role of two isoforms of another protein with a role in fusion, synaptotagmin. Whereas overexpression of synaptotagmin I prolonged the interval from fusion pore opening to dilation during exocytosis of dense-core, noradrenaline-containing granules, synaptotagmin IV reduced this interval. Both of these proteins restricted the transfer of noradrenaline through the open pores, suggesting that synaptotagmins interact directly with the fusion pore.

The Long and the Short of Memory

Although small, the fruit fly *Drosophila* can learn and remember, and the sophisticated genetics of this fly has made it possible to probe several aspects of short- and long-term memory. Pascual and Pr  at (p. 1115) find that the *alpha-lobes-absent* mutant is missing either the two vertical lobes or two of the three median lobes of the mushroom body. Long-term memory requires the two vertical lobes, but not the three median lobes, while short-term memory requires only one of the three median lobes.

CREDIT: LIU ET AL.



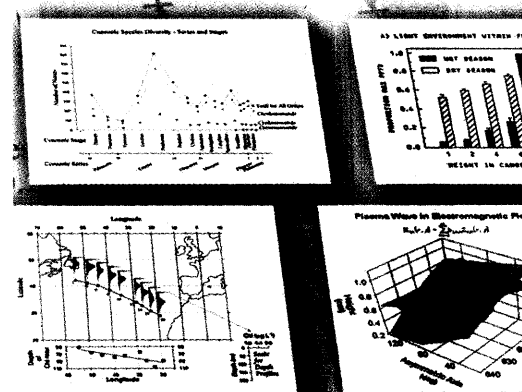
**Isn't it time to
move beyond
spreadsheets?**

You've spent months gathering and analyzing data. Now you need to show off your work — clearly and precisely. You can struggle to create graphs with a spreadsheet or data analysis program, but isn't your time best spent performing research? You need to create compelling, publication-quality graphs — without spending hours at the computer.

Scientists like you designed the exact solution — SigmaPlot®. It delivers a full range of graphing options and over 80 2-D and 3-D graph types. With SigmaPlot, you can create clear, compelling graphs you simply can't get with basic spreadsheet packages.

"My research requires flexibility in data presentation. I've tried other products, but SigmaPlot gives me the widest range of graphical formats and the most intuitive data entry."

Richard B. Weinberg M.D.
Professor of Medicine



Download a FREE trial copy!

www.sigmaplot.com/download

To order, call 1.800.345.4740

For distributors worldwide, visit
www.spsscience.com/talk

SIGMAPLOT
Exact Graphs for Exact Science

H U M A N F U L L - L E N G T H G E N E S

Who says

size

doesn't matter?

Functional Genomics Begins with a Full-Length "cDNA Clone"*

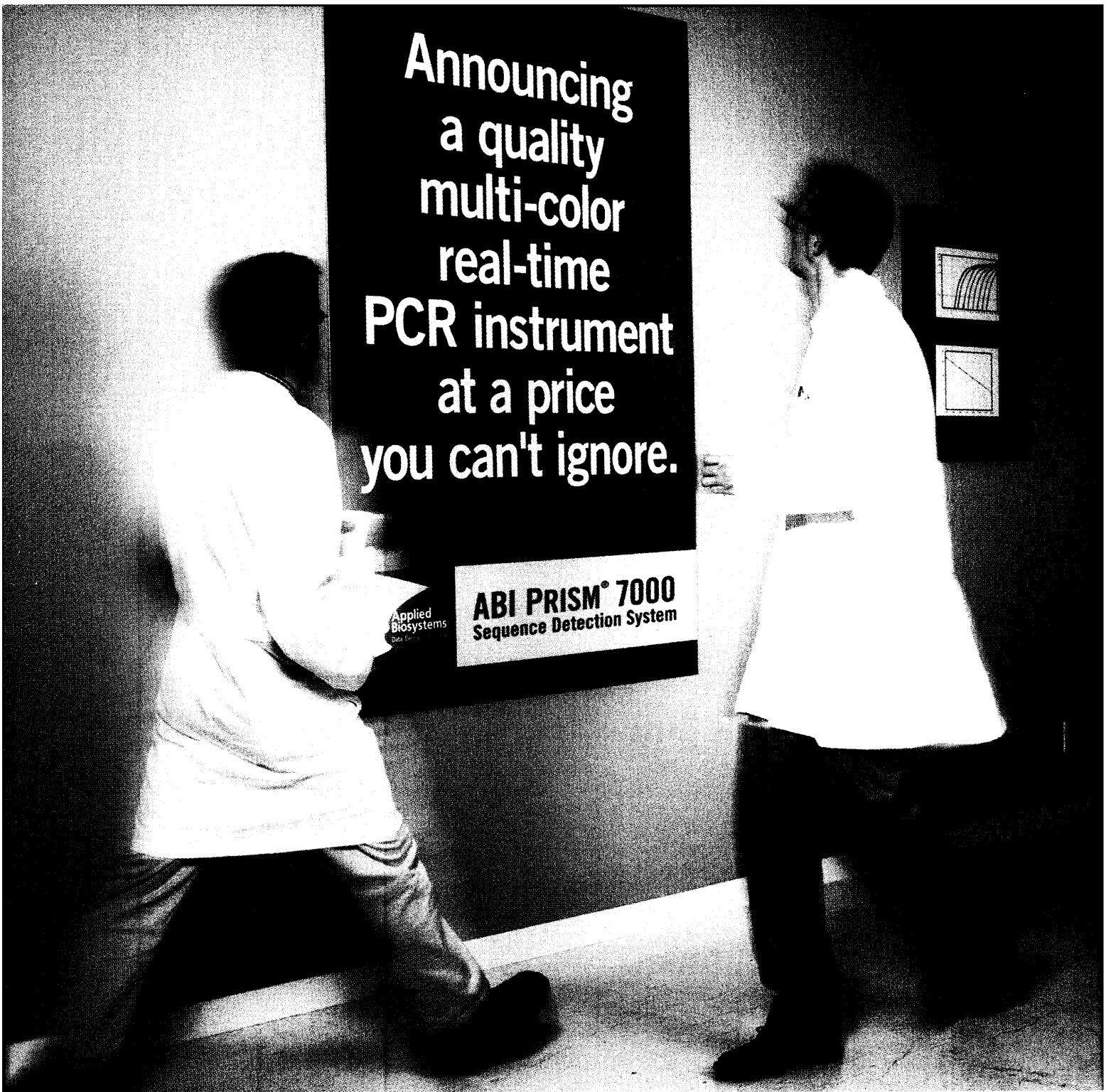
- Almost 10,000 genes available, many of which code for hypothetical proteins with no known function.
- Apart from being able to search for your gene by its NM accession number or nucleotide sequence, you may select based on the presence of a specific protein domain or motif.
- Additionally, you may select your gene by its sites of expression (limited institutional licenses available).
- The full-length genes are provided with transcriptional promoters for direct expression in mammalian cells and for cell-free protein expression in a coupled transcription-and-translation system.
- The following are examples of our growing collection of genes, which include those encoding proteins with specific domains or motifs: 90 7tm, 74 ank, 82 arf, 26 BRCT, 52 BTB/POZ, 42 bZIP, 83 cadherin, 42 DEAD, 88 EF hand, 67 EGF, 80 KRAB, 74 LRR, 54 PDZ, 88 PH, 68 PHD, 98 ras, 137 rrm, 50 SH2, 100 SH3, and 135 WD40.

O R I G E N E T E C H N O L O G I E S , I N C .



Visit us at www.origene.com - or - Call us at 301.340.3188

*Our "cDNA clones" are provided in a complex environment of cofactors which, we believe, makes them nearly indistinguishable from the naturally-occurring form



Announcing
a quality
multi-color
real-time
PCR instrument
at a price
you can't ignore.

Applied
Biosystems
Data. Decision. Discovery.

ABI PRISM® 7000
Sequence Detection System

**AB Applied
Biosystems**
Data. Decision. Discovery.

Life is full of pleasant surprises.

Think quality, multi-color, real-time PCR has to be expensive? Think again. For less than you ever imagined possible, the new ABI PRISM® 7000 Sequence Detection System gives you exceptional multi-color performance in a convenient space-saving design. Assay development guidelines that include the use of Primer Express® software, as well as a dedicated line of reagents and disposables, ensure your success. Looks like your need for quality data is being met head on.

Want to know more about the ABI PRISM® 7000 Sequence Detection System?
Call **1.650.638.5800**, or visit **www.appliedbiosystems.com/7000**.

Applera Corporation is committed to providing the world's leading technology and information for life scientists. Applera Corporation consists of the Applied Biosystems and Celera Genomics businesses. The PCR process is covered by patents owned by Roche Molecular Systems, Inc. and F. Hoffmann-La Roche Ltd. Applied Biosystems, ABI PRISM and its design, and Primer Express are registered trademarks and AB (Design) and Applera are trademarks of Applera Corporation or its subsidiaries in the US and certain other countries. For Research Use Only. Not for use in diagnostic procedures. ©2001 Applied Biosystems. All rights reserved.

Amplify your Message

Do for your RNA what electricity did for the guitar.

The new MessageAmp™ aRNA Kit

can amplify your
mRNAs 1000X

in a single reaction. This means you can get that valuable array data from your limiting RNA samples. Each step of the MessageAmp procedure has been optimized for high efficiency and high yields, and the kit is compatible with both biotin and Cy™ dye labeling. The procedure can be completed in less than one day.

MessageAmp contains reagents for first-strand cDNA synthesis, RNase H digestion, second-strand synthesis, cDNA purification, in vitro transcription (using MEGAscript™ technology) and aRNA purification.

For more information about the MessageAmp Kit visit:
www.ambion.com/messageamp

Cy™ is a trademark of Amersham Pharmacia Biotech

Ambion®

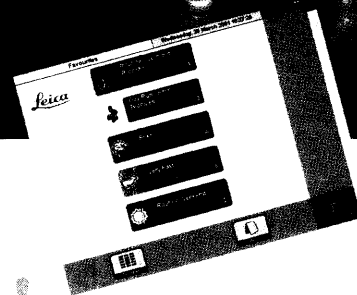
THE RNA COMPANY®
2130 Woodward • Austin, TX 78744

US: 800-888-8804 CANADA: 800-445-1161

tel(512)651-0200 • fax(512)651-0201 • email: moinfo@ambion.com
For a complete list of distributors visit <http://www.ambion.com>

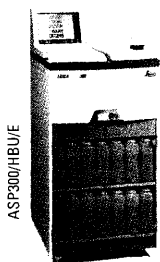


Please visit our new website



Different to the rest!

The NEW Leica ASP300 Tissue Processor



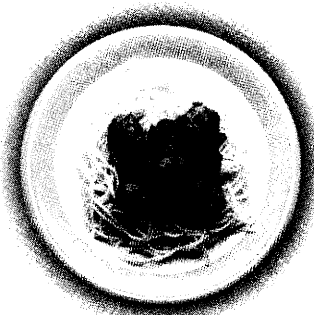
On the surface, all tissue processors may seem the same. But now Leica Microsystems offers you something different: a uniquely simplified instrument using the latest user-friendly, colour touch screen system. Smart design and proven technology are combined to create a new standard in automated tissue processing. Allow us to show you in your laboratory why the Leica ASP300 is different.

Leica Microsystems Nussloch GmbH
Heidelberger Strasse 17-19
D-69226 Nussloch

Phone +49 6224 143 0
Fax +49 6224 143 200
www.leica-microsystems.com

Leica

MICROSYSTEMS



Performance Enhancers

Power your cell culture system with the right nourishment.

Now you can minimize adaptation time, improve control, increase yield and simplify scale-up with the most trusted name in cell culture.

No matter what your cell type.

Hybridomas. CHO cells. HEK (293) cells. Insect cells. Neurons. Blood and bone marrow cells. Keratinocytes. ES cells. Hepatocytes. Endothelial cells. Mammalian cells for virus production.

You name it. We can make a serum-free, protein-free or chemically-defined GIBCO™ medium optimized for its culture.

What's more, we make it in a format to suit your system: dry powder, 1X liquid, concentrates, and new Advanced Granulation Technology™.

Use GIBCO™ specialty and serum-free nutrient media.

And pump up performance.

www.invitrogen.com



Better Cell Culture Through Innovation

For laboratory research use only and not for diagnostic use. The safety and efficacy of these products in diagnostic or other clinical uses has not been established. © 2001 Invitrogen Corporation PAS01-093MS

Target: Bone

Focus on gene function

DeltaBase™ is the world's largest searchable database on *in vivo* mammalian gene function. Information in DeltaBase is generated using large-scale mouse gene knockout technology and standardized phenotypic analysis protocols. More than 20,000 data points are collected on hundreds of disease-relevant genes every year.

Featured here is just one of those genes.

Phenotypes at your fingertips

Through a browser-enabled interface, DeltaBase subscribers can quickly review and compare phenotypic data, images and analysis summaries from genes belonging to gene families that have demonstrated a high degree of success as drug targets. This information can be used to identify valid targets and to support decisions about therapeutic value. In addition, animal models for all targets in DeltaBase are made available to subscribers for further study.

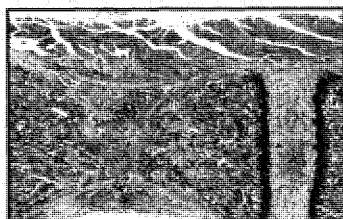
Discover the power of DeltaBase

For more information on DeltaBase, aim your browser to **www.deltagen.com** and register for the online demo.

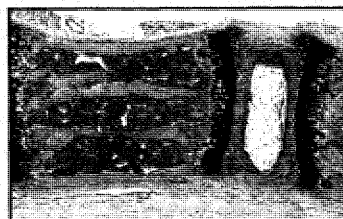
Phenotypic analysis

Gene: Ion channel

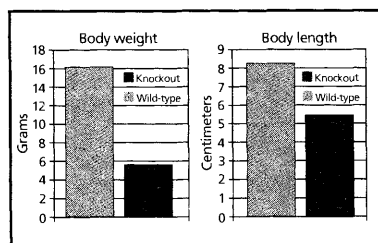
Homozygous knockout



Wild-type



All homozygous knockout mice are runted and exhibit osteopetrosis. Severe fibro-osseous proliferation is present in the cranial bones, femur, tibia, vertebrae and/or sternum. Homozygous knockout mice also show diminished bone marrow hematopoietic cells within the marrow spaces (myelophthisis). An example from the sternum is shown here. A wild-type sternum is presented for comparison.



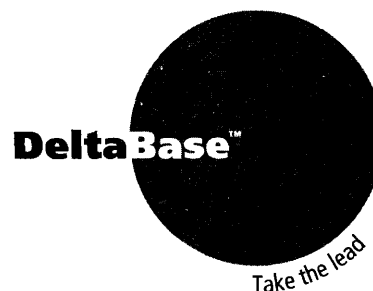
The weight of the homozygous knockout mice is reduced by 62% when compared to age- and gender-matched wild-type control mice. The average body length is reduced by one-third.

To provide the most comprehensive view of phenotypic changes, DeltaBase combines advanced imaging technologies with histopathology—the gold standard in medical diagnosis. With this information, you can quickly identify the high-quality drug targets that have the greatest therapeutic potential.



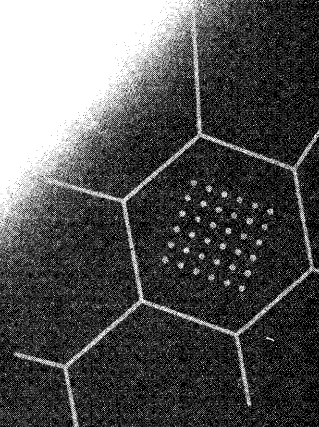
Gene Function to Drug Discovery™

Deltagen, DeltaBase and Gene Function to Drug Discovery are trademarks of Deltagen, Inc. © 2001 Deltagen, Inc. All rights reserved.



Get focused...

with **ProteomIQ™** the total integrated proteomics platform



**proteome
systems**

integrated proteome technology

www.proteomesystems.com

Sydney Australia +61 2 9889 1830 Boston USA +1 866 779 7836

Sample
preparation

Sample
fractionation

Array
technology

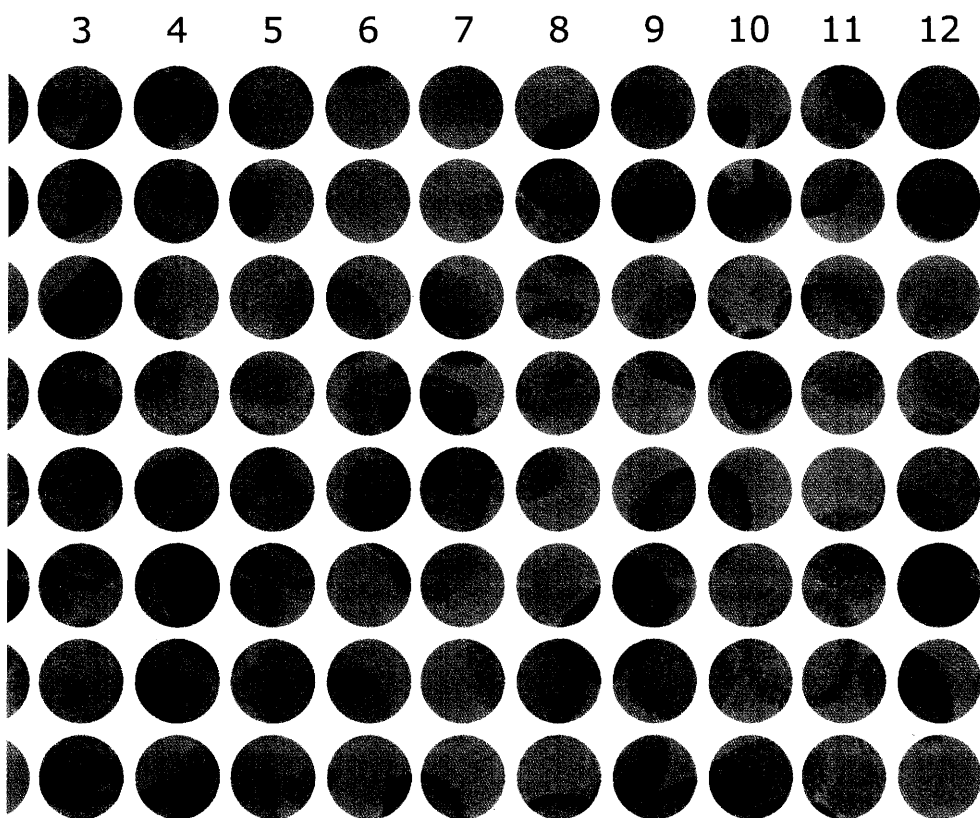
Image
analysis

Protein
processing

Mass
spectrometry

Bioinformatics

Surfer – Michael Ho Photographer – John Bilderback, 2001



Assay Designs, Inc.
www.assaydesigns.com

Immunoassays for
Neuroscience Research

cAMP & cGMP

Most Sensitive and Always Available!

Measure the Activity of

Caspase-3
Caspase-6
Granzyme B

Please visit us at **Neuroscience Booths 129 & 131**

800 Technology Drive • Ann Arbor, Michigan 48108 • United States

Phone: 734.668.6113 • Toll Free: 800.833.8651 (USA - Canada) • Fax: 734.668.2793

Web: www.assaydesigns.com • Email: info@assaydesigns.com

Simplify Your Science®





We make
researchers
happy.

It's that simple.

At Integrated DNA Technologies, Inc., it is our goal to maintain the highest customer satisfaction in the industry (if not the whole world). The joy that our customers receive begins with our first-rate customer service, our knowledgeable technical support team, and our advanced, but easy to use, online ordering system. Then comes the wide range of our products. From PCR primers to dual-labeled fluorescent probes to antisense oligonucleotides, we strive to reach unmatched quality standards in everything we do. Remember, we are here to meet your research needs and to keep you smiling.

Discover what we can do:

SameDay Oligo Service
Antisense Oligonucleotides
Your-Way 96-Well Plates
Custom Gene Synthesis
Custom RNA Synthesis
ReadyMade Primers™
Modifications (including 6-FAM, TET, Biotin, Fluorescein, Thiol and Amino Acid)
Modifiers, Spacers)

and much more!



**INTEGRATED DNA
TECHNOLOGIES, INC.**

www.idtdna.com



A new Star is born: MiniSpin® plus SPACE

With the MiniSpin plus SPACE – the “big” blue brother of our extremely successful centrifuge models MiniSpin® and MiniSpin® plus – you can discover a whole new dimension of personal centrifuges.

This high-performance, easy-to-operate centrifuge is equipped with a black (hole) 12-position aluminum rotor and designed for modern workstations in the research and training sectors – on earth. The futuristic exterior shows the blue planet on your lab bench which thus becomes part of the endless depths. Nevertheless, it is home to safe, reliable and durable technology of an earth-shatteringly high quality.

The maintenance-free drive spins up to twelve 1.5/2 ml Eppendorf Tubes® to a maximum rcf of 14,000 – without any influence by the earth on the cover with its low g-force of just 1 x g. The smooth and quiet braking borders on the unnatural.

Like all Eppendorf centrifuges, MiniSpin plus SPACE offers the typical Eppendorf operating comfort and is available world-wide – for a limited time and in limited quantities.

MiniSpin plus SPACE: New blue dimensions and a SPACE-age design set this personal centrifuge head and shoulders above the competition. In fact, it is out of this world – it comes from Eppendorf.

Product Features of MiniSpin® plus SPACE

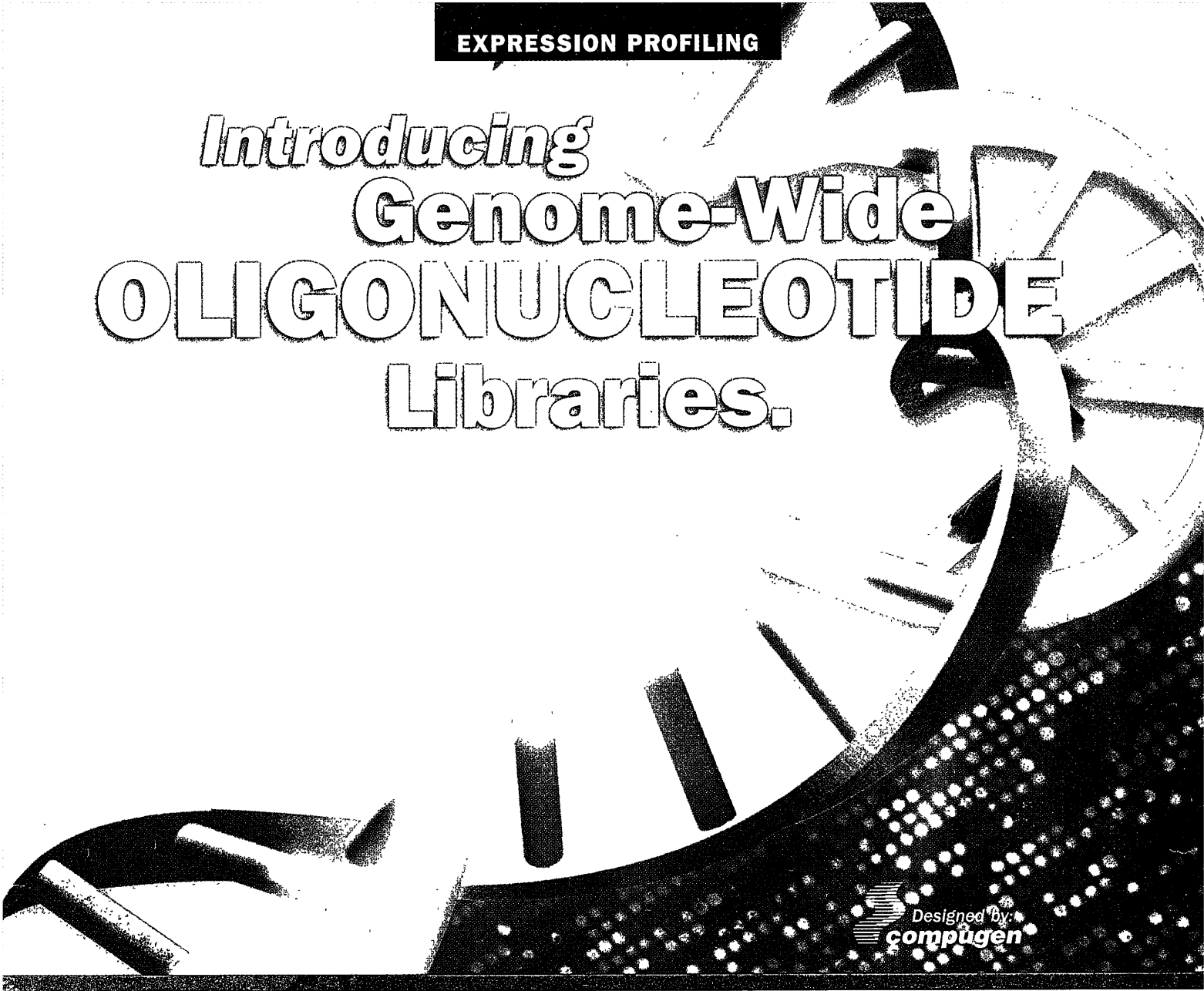
- Including autoclavable aluminum rotor
- Automatic lid release
- Max. speed: 14,500 rpm (rcf: 14,000 x g)
- Acceleration and braking times lower than 13 sec. (for max. speed)
- Separate adjustable short-spin key



eppendorf
In touch with life

Eppendorf AG · 22331 Hamburg · Germany · Phone: +49 40-5 38 01-0 · Fax: +49 40-5 38 01-556 · e-mail: eppendorf@eppendorf.com · Internet: www.eppendorf.com
Application Hotline: Phone: +49 180-3 66 67 83 · e-mail: application-hotline@eppendorf.de

Brinkmann Instruments, Inc. · One Cantiague Road, P.O. Box 1019 · Westbury, N.Y. 11590-0207 · Phone 800-645-3050 or 516-334-7500 · Fax 516-334-7506
e-mail: info@brinkmann.com · website: www.brinkmann.com



EXPRESSION PROFILING

Introducing **Genome-Wide OLIGONUCLEOTIDE Libraries.**

Designed by
compugen

The Difference Is In The Design.

Accurate design is critical when performing high-throughput gene expression profiling. Sigma-Genosys and Compugen introduce three new Oligonucleotide Libraries, designed using Compugen's proprietary LEADS™ technology for transcriptome prediction and manufactured using Sigma-Genosys' patented Abacus™ oligo synthesis platform.

- Comprehensive collections of gene specific oligos
- Broader genome representation of mRNA's and EST's
- Alternative splice variant modeling
- Grouped by Gene Ontology™* assignment

Contact us at 1-800-234-5362 or go to www.labonweb.com/chips to find out more information about these new genome-wide oligo collections for high-throughput formats and applications.

* Gene Ontology is a trademark of Gene Ontology Consortium

Our New Oligonucleotide Libraries

- *Human Library*
(18,861 oligos)
- *Mouse Library*
(7,524 oligos)
- *Rat Library*
(4,854 oligos)

www.genosys.com

LEADERSHIP IN LIFE SCIENCE, HIGH TECHNOLOGY AND SERVICE

1442 LAKE FRONT CIRCLE • THE WOODLANDS, TX 77380-3600
800-234-5362 • FAX 281-363-2212 • EMAIL GINFORMATION@SIAL.COM • A Member of the Sigma-Aldrich Family

SIGMA
GENOSYS

Drug Discovery

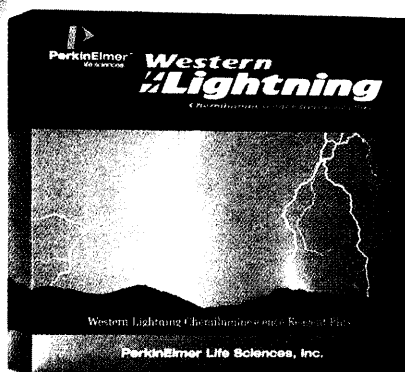
Research

Clinical Screening

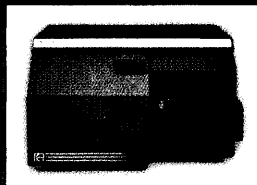
Chemiluminescence Imaging

Lightning

Chemiluminescence Reagent Plus



KODAK™ Image Station



A versatile, compact benchtop imaging system with superior sensitivity and accuracy for all your imaging needs.

Products You Trust

NEN

WALLAC

See the difference in western blot imaging.

A start-to-finish system from a single trusted source. Western Lightning—a reliable NEN brand product from PerkinElmer Life Sciences—taps the full power of chemiluminescence detection with sensitivity as much as 4 times greater than other brands.

PerkinElmer has everything you need for western blot imaging—including reagents, instrumentation and applications expertise! PerkinElmer is the single trusted source for western blotting.

Also try our new DNA Thunder Chemiluminescence Reagent Plus for Nucleic Acid Detection.

Mention promotion code JM123101 to receive a 50% discount off your first order of Western Lightning.
(Offer good through December 31, 2001.)


PerkinElmer™
life sciences.

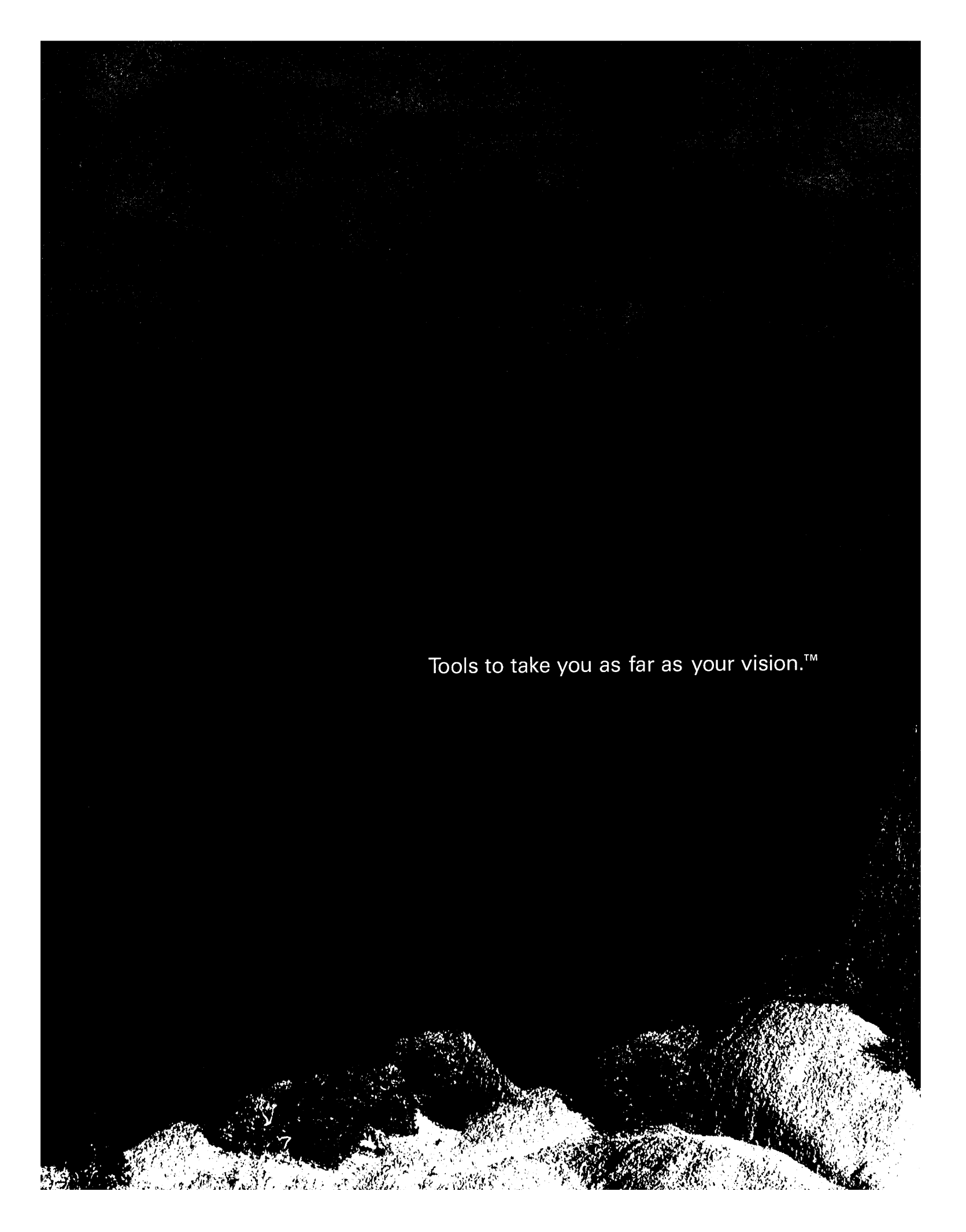
Worldwide Headquarters: PerkinElmer Life Sciences, 549 Albany Street, Boston, MA 02118-2512 USA (800) 551-2121

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

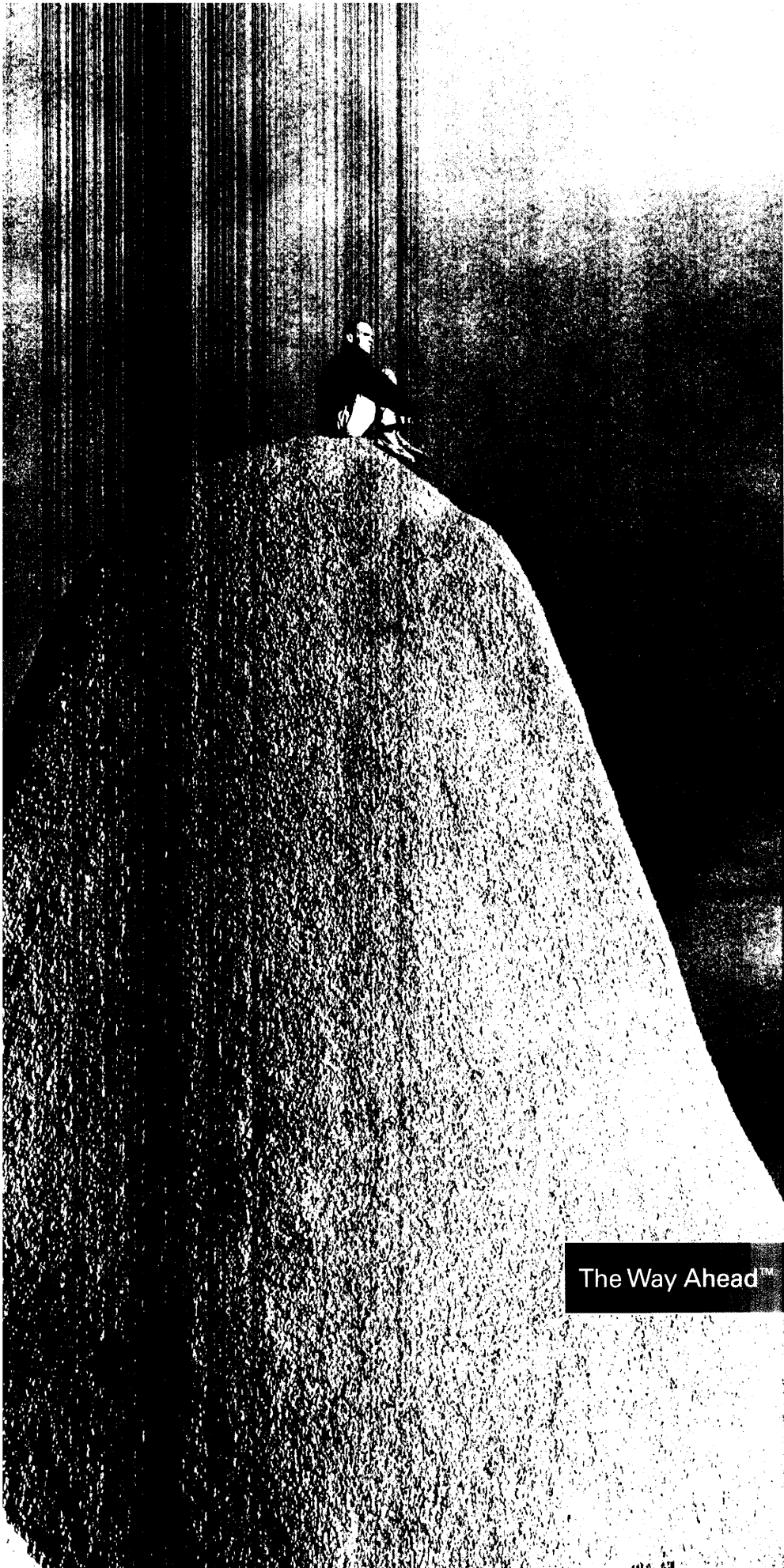
Kodak is a trademark of Eastman Kodak Company, Rochester, NY

© 2001 PerkinElmer Life Sciences

www.perkinelmer.com/lifesciences



Tools to take you as far as your vision.™



You have the vision. Affymetrix has the tools, designed with experience and thoughtful science to add value to your research. Our GeneChip® expression arrays enable you to explore a comprehensive set of genes from the public domain, or any specific subset of interest to you. In addition, we offer a complete and integrated system to give you the freedom to do in new ways what you do best – practice good science. And with powerful online informatics resources and custom array programs, our tools are more flexible and affordable than ever. There has never been a better time to turn your vision into biologically meaningful results. Call us or visit our website and move your research forward. Affymetrix. The Way Ahead™.



The Way Ahead™



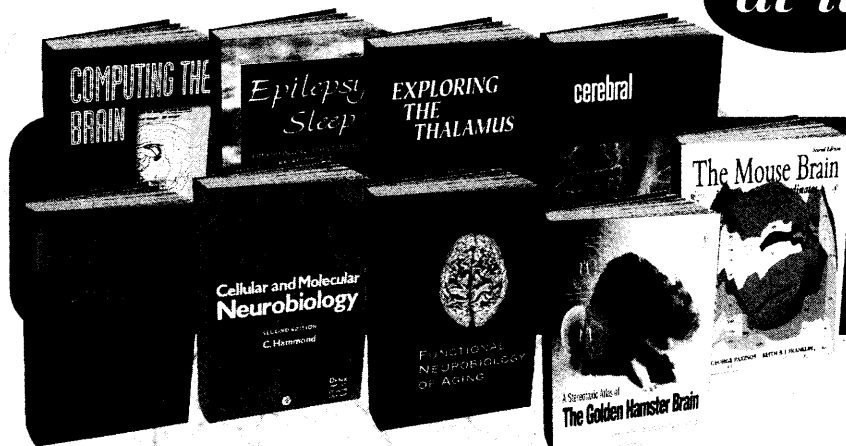
www.affymetrix.com
1-888-DNA-CHIP (362-2447)
Europe: +44 (0) 1628 552550

© 2001 Affymetrix, Inc. All rights reserved. Affymetrix, the Affymetrix logo and GeneChip are registered trademarks of Affymetrix, Inc. CustomExpress and NetAffx are trademarks of Affymetrix, Inc. Products may be covered by one or more of the following patents and/or sold under license from Oxford Gene Technology: U.S. Patent Nos. 5,445,934; 5,744,305; 6,261,776; 6,291,183; 5,700,637; and 5,945,334; and EP 619 321; 373 203 and other U.S. or foreign patents. For research use only. Not for use in diagnostic procedures.

neuroscience

at its

finest



Join us in **BOOTH 630**
during the **SOCIETY FOR**
NEUROSCIENCE Meeting,
November 10th - 15th
in San Diego!

Febrile Seizures

Edited by

Tallie Z. Baram
Shlomo Shinnar

This book presents the latest developments in the field as well as the current state of knowledge in:

- New genetic methodologies
- New imaging tools & emerging data, visualizing effects of febrile seizures on the brain

October 2001, 308 pp, \$99.95 (tentative)
ISBN: 0-12-078141-7

The Mouse Brain in Stereotaxic Coordinates, 2E

George Paxinos
Keith B.J. Franklin

- A coronal set featuring 100 photographs & 100 matching detailed diagrams delineating the entire brain
- Thoroughly revised cortical delineations & improved subcortical delineations

July 2001, 264 pp
Deluxe with CD-ROM: \$189.95, ISBN: 0-12-547637-X
Standard: \$149.95, ISBN: 0-12-547636-1

Cellular & Molecular Neurobiology, 2E

Constance Hammond

- Details ionic basis of neuronal excitability, synaptic transmission, & sensory transduction
- Addresses dendritic processing of afferent information

May 2001, 518 pp
Deluxe with CD-ROM: \$115.00, ISBN: 0-12-311625-2
Standard: \$69.95, ISBN: 0-12-311624-4

Computing the Brain

A GUIDE TO NEUROINFORMATICS

Edited by

Michael A. Arbib
Jeffrey S. Grethe

- Offers an integrated view of neuroinformatics for a multidisciplinary audience
- Explores & explains new work being done in neuroinformatics

March 2001, 380 pp, \$99.95, ISBN: 0-12-059781-0

Cerebral Vasospasm

R. Loch Macdonald
Bryce Weir

- Examines the current understanding of vascular smooth muscle physiology
- Provides in-depth overviews of symptoms & treatments
- Vividly illustrated with beautiful photographs & diagrams

March 2001, 518 pp, \$149.95, ISBN: 0-12-464161-X

A Stereotaxic Atlas of the Golden Hamster Brain

Lawrence P. Morin
Ruth I. Wood

- Presents accurate three-dimensional coordinates for stereotaxic surgery
- Brings together current information about hamster brain structure

March 2001, 146 pp, \$134.95, ISBN: 0-12-507040-3

Epilepsy & Sleep

PHYSIOLOGICAL & CLINICAL RELATIONSHIPS

Edited by

Dudley S. Dinner
Hans O. Lüders

- Outlines sleeping disorder symptoms which may in fact be caused by epilepsy
- Essential for epileptologists, psychiatrists, physicians, & sleep disorder therapists

December 2000, 300 pp, \$99.95, ISBN: 0-12-216770-8

Functional Neurobiology of Aging

Edited by

Patrick R. Hof
Charles V. Mobbs

- Organized by function, making it easy to find & understand the material
- Addresses impairments both associated & not associated with diseases

December 2000, 960 pp, \$169.95, ISBN: 0-12-351830-X

Exploring the Thalamus

S. Murray Sherman
R. W. Guillery

PRaise for **EXPLORING THE THALAMUS**

"...simply magnificent...All the chapters are excellent"

—Vernon Mountcastle, JOHNS HOPKINS

"...a down-and-dirty look at the brain as it appears to two observers who have seen it from close at hand. It deserves to be read a few pages at a time, with thoughtful breaks..."

—Richard Masland

MASSACHUSETTS GENERAL HOSPITAL, BOSTON,
"TRENDS IN NEUROSCIENCES" (2001)

- Discusses important problems concerning the function & structure of the thalamus
- Concludes each chapter with thought-provoking questions

November 2000, 312 pp, \$59.95, ISBN: 0-12-305460-5

Visit our web site at

www.academicpress.com/neuro
to learn more, or call us at
800-321-5068.



ACADEMIC PRESS

All prices and publication dates subject to change without notice. ©2001 by Academic Press. All Rights Reserved. SS/EA/LS-03111 10/01

IS THERE AN EASIER WAY

to Get All Your Cell Signaling
and Neuroscience Products?



Yes! Sigma-RBI

Why search around for cell signaling and neuroscience products? Sigma-RBI has them all — from standard biochemical reagents to the latest cutting-edge research products, including key signal transduction enzymes, phosphospecific antibodies, novel receptor ligands, selective enzyme inhibitors and much, much more.

Sigma-RBI is committed to bringing you the widest array of new, exciting and innovative research products.

With over 5,000 cell signaling and neuroscience products to select from, Sigma-RBI provides the right research tools right when you need them.

Plus, all products are available in one easy-to-use catalog conveniently arranged by scientific areas of interest — with over 600 new products added every year.

All products are backed by our world-renowned customer service and technical support, and can be researched using our award winning Web site.

Subscribe now to receive our new product updates and our newest Cell Signaling & Neuroscience Catalog by returning the attached card, or by calling 1-800-282-1298 and requesting literature code (079), or visit our Web site at www.sigma-aldrich.com/cellsignaling.

availability, ordering & tracking

www.sigma-aldrich.com

scientific tools, products & information

LEADERSHIP IN LIFE SCIENCE, HIGH TECHNOLOGY AND SERVICE
SIGMA-ALDRICH CORPORATION • BOX 14508 • ST. LOUIS • MISSOURI 63178 • USA

SIGMA
RBI

IN ORDER TO MOVE
FORWARD, YOU
SOMETIMES HAVE TO
TAKE A STEP BACK.

ScienceDirect Backfiles bring you access to valuable research from the past. In 1965, Robert Burns Woodward won the Nobel Prize for Chemistry - this research work is now accessible online. Searchable, fully integrated and linked with other online content, ScienceDirect Backfiles bring the research of the past to the scientists of today. Complete your collection. For more information, please go to

(ScienceDirect is a part of Elsevier Science)

Visit us at the Society for Neuroscience, Elsevier Neuroscience Village, booths 516-526 & 615-625, on November 10-15, in San Diego.

SCIENCEDIRECT BACKFILES

Research of the past for the scientists of today.

PEPTIDE ANTISERA

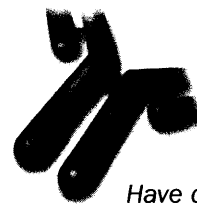
Partner with a Leader in CUSTOM PEPTIDE ANTISERA Services

No one is better equipped than Sigma-Genosys to be your partner in custom peptide and antiserum production. We produce antisera for some of the world's leading pharmaceutical companies and academic institutions. Just send us your peptide sequence and leave the rest to us.*

- Custom Peptide Design & Synthesis
- Conjugation to Carrier Protein
- Immunization into Two Animals
- Sera Collection

Save yourself the time and worries involved in antisera production. Call Sigma-Genosys at 877-710-1502.

*Sigma-Genosys also offers a partial antisera service, in which you supply the antigen and we perform the immunization and sera collection. Optional services such as protocol extensions, ELISA and affinity purification are also available. Contact our in-house representatives for details.



Have questions?

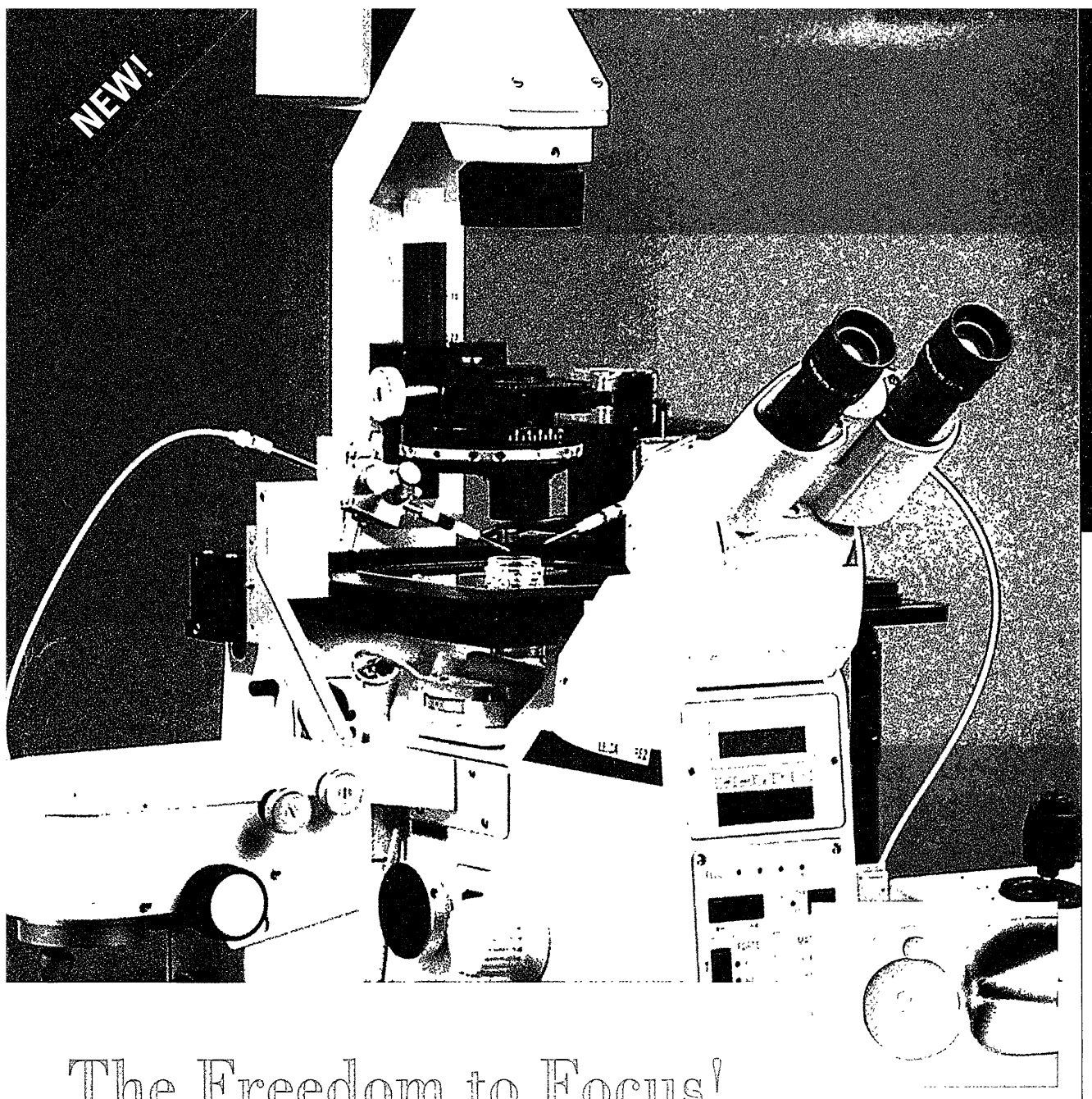
Call us. Whether you're a novice or pro, you can count on our technical support for answers.

www.genosys.com

LEADERSHIP IN LIFE SCIENCE, HIGH TECHNOLOGY AND SERVICE

1442 LAKE FRONT CIRCLE • THE WOODLANDS, TX 77380-3600
877-710-1502 • FAX: 281-363-2212 • EMAIL: ginformation@sial.com • A Member of the Sigma-Aldrich Family

SIGMA
GENOSYS



The Freedom to Focus!

Leica Microsystems research microscopes are designed with results in mind. All functions have been carefully engineered to allow you to focus on your experiment, not on your equipment.

Our new family of automated research instruments goes beyond mere automation. These microscopes have *intelligence*. The complete coordination of every optical and mechanical component provides unprecedented ease-of-use and specimen protection. Moreover, the remote control of all major functions affords outstanding specimen accessibility and user comfort for those long experiments.

And with Leica, you can always count on our world class optics to supply the highest resolution, brightest intensity and sharpest contrast for crisp, clear images.

When you need true innovation, call Leica Microsystems at 800-248-0123.

Fluorescence

Live Cell Imaging

Integrated Solutions

Leica Microsystems Inc.
2345 Waukegan Road
Bannockburn, IL 60015

Telephone (847) 405-0123 (800) 248-0123
Fax (847) 405-0164
In Canada Call (800) 205-3422
www.leica-microsystems.com

Leica
MICROSYSTEMS

A PERFECT 10

Don't take our word for it, ask a colleague why your next vibration isolation table should be from TMC.

We continually ask our customers to rank our tables on a scale from 1 to 10. We also ask why they chose TMC. Here's what they say:

- "10!! This is our 2nd table, they work well... Price. Ken McKay very helpful"

Dartmouth Medical School

- "10...Quality, service, price"

UC Santa Barbara, Physics Department

- "10...We have used TMC tables for years. Always pleased...past experience"

National Institutes of Health

- "10...Very reliable/good quality and workmanship... previous experience at NIH"

Howard University

- "10...Easy set-up and hook-up...Competitor recommended you!"

UMass Medical Center

- "10...This is my fourth TMC table purchase... Price and fast delivery"

University of New Mexico

- "10...Excellent help from Wes Wigglesworth ...Past experience"

Neuroscience Department at a NYC University

- "Let me tell you that your table is working beautifully. There is no vibration in the tip of the electrode!!!!!! Thanks again, you made my life much easier."

Baylor College of Medicine

TMC™

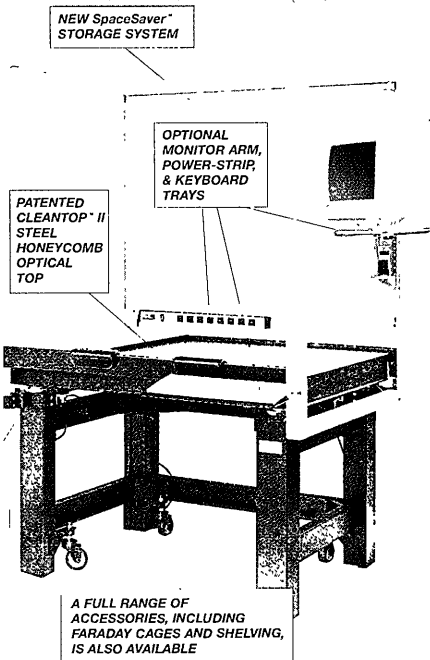
Technical Manufacturing Corporation

15 Centennial Drive
Peabody, MA 01960 USA
Tel: 978-532-6330, Fax: 978-531-8682
e-mail: sales@techmfg.com

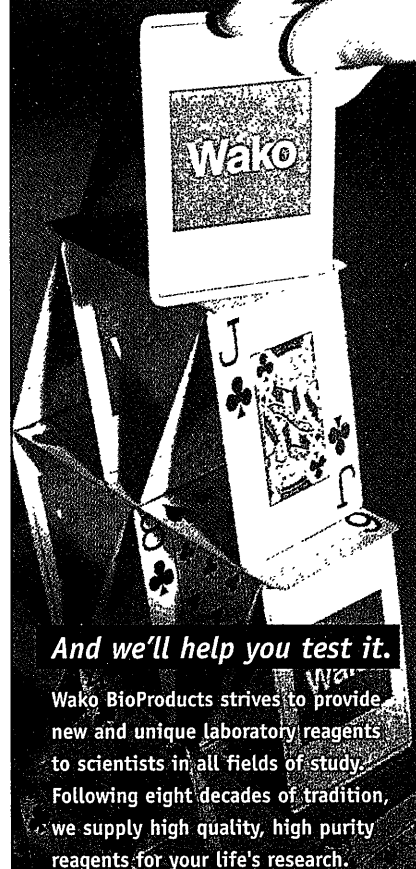
1-800-542-9725 www.techmfg.com



V I B R A T I O N S O L U T I O N S



You've Got Some Nerve...



And we'll help you test it.

Wako BioProducts strives to provide new and unique laboratory reagents to scientists in all fields of study. Following eight decades of tradition, we supply high quality, high purity reagents for your life's research.

Antibodies:

Anti Rat Synaptobrevin 2
Anti Rat Synaptotagmin 1
Anti Rat Syntaxin
Anti Rat SNAP-25
Anti Substance P
Anti sGC
Anti Rat iNOS
Anti Rat nNOS

Reagents:

All Natural Kainic Acid
L-012
Follistatin
Activin A
Activin B
Activin AB

Neurotoxins:

Botulinum Toxins A-F
Tetrodotoxin
Joro Spider Toxin JSTX-3

Toll Free (in the USA only): 877-714-1920
Telephone: 804-714-1920



www.wakousa.com

in vivo / in vitro

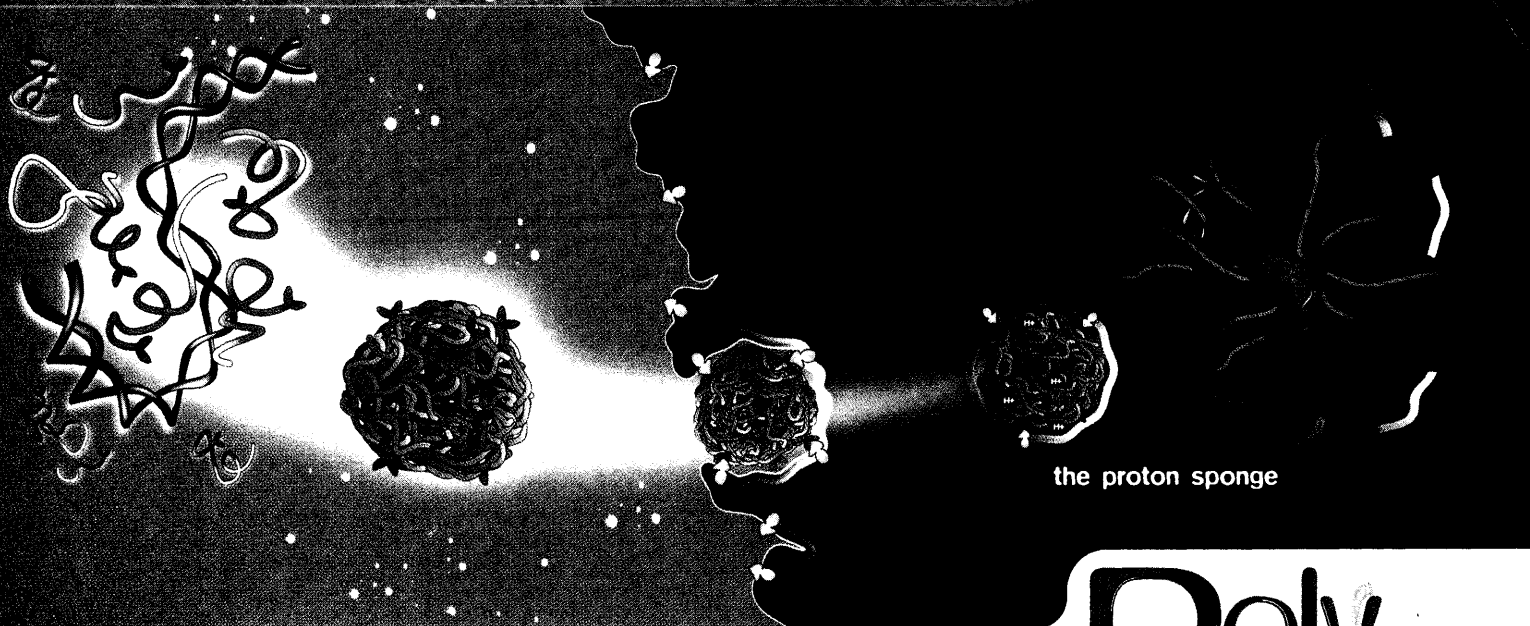
From the PEI people : The jetPEI™ transfection reagents

For
genes and
oligos

Many reports on the successful
use of tagged PEI to direct
genes and oligonucleotides
to cells *in vitro* and *in vivo*
are available on our web site.

- **jetPEI** the robust cell culture reagent with broad spectrum
- **jetPEI-Gal** for hepatocytes
- **jetPEI-Man** for macrophages and dendritic cells
- **jetPEI-RGD** for epithelial and endothelial cells
- **jetPEI-Fluo** to investigate intracellular trafficking and biodistribution

Attractive price • easy protocol • +/- serum



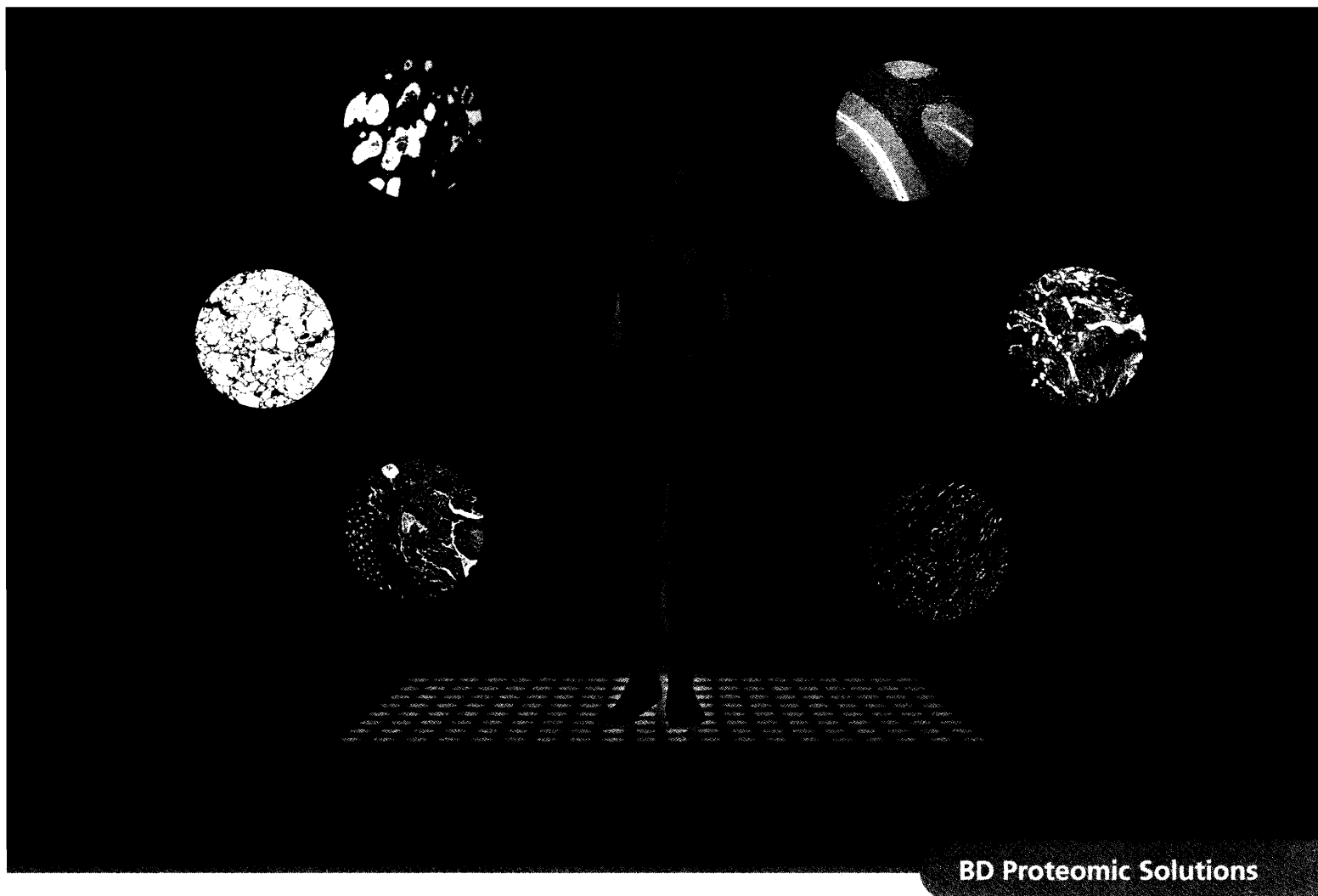
the proton sponge

www.polyplus-transfection.com

PolyPlus transfection SAS BP 21, 67401 Illkirch cedex France

Phone : +33 390 244 328 - Fax : +33 390 244 329

Poly
transfection
The transfection-dedicated company



BD Proteomic Solutions

Multiple Tissue Arrays for your proteomic research

Location, location, location.

Check out our locations for your proteomic research.

Localizing and profiling

Identify and verify your genes and proteins in a histologically complete view (1.5 mm spot) of all major structures.

High throughput screening

Screen your genes and proteins in many tissues on one smart slide.

Time saving

Jump right into your research with our ready to use slide of up to 100 large tissue spots full of rich histological details.

Quality you can rely on

Each spot on our array is carefully selected to ensure optimal orientation and presentation of relevant histological structures.

Zinc (Formalin Free) Fixed MTAs

We offer both Formalin- and Zinc- (Formalin free) fixed MTAs enabling you to test a greater range of antibodies.

Custom MTAs

You set the specs and/or provide tissues, we give you the arrays.

Species

We offer human, mouse, and rat MTAs.

Antibodies and probes

Thousands of antibodies and probes for your proteomic needs.

BD Biosciences

Clontech
Discovery Labware
Immunocytometry Systems
Pharmingen

BD Biosciences Pharmingen

Visit www.bdbiosciences.com. Call 877.232.8995 (in the USA) to order.

For research use only. Not for use in diagnostic or therapeutic procedures. Not for Resale.
BD, BD Logo and all other trademarks are the property of Becton, Dickinson and Company. ©2001 BD



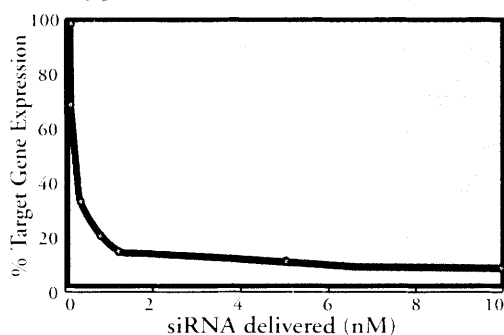
Knock Out Target Gene Expression



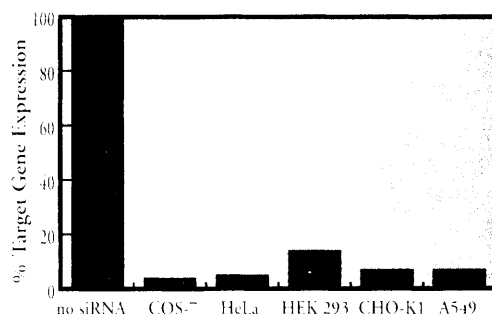
TransIT[®]-TKO

small interfering RNA (siRNA) transfection reagent

95% Knock Out in COS-7 Cells



Knock Out in Selected Cell Lines



knocks out up to 95% target gene expression

effective on a variety of cell lines

no media change or serum addition

Introductory Offer- Call Now for 50% Off

Mirus

Gene Transfer Specialists

www.genetransfer.com 888.530.0801

TransIT is a registered trademark of Mirus Corporation
© Mirus Corporation 2001.



Unleash the power of productivity.

Today's labs are under tremendous pressure to achieve geometric gains in productivity. Many are turning to Tecan. From our world-class instruments and readers, automated workstations, and robotic systems, to revolutionary new innovations like our LabCD™ microfluidic assay platform, Tecan can help unleash the power of productivity in your lab. Call one of our automation consultants today or visit www.tecan.com.

Genomics • Proteomics • Drug Discovery • Clinical Diagnostics

For a current listing of Tecan offices, call +41 1 922 81 11; in the U.S., call 800 338 3226.

TECAN.

FUELING Innovation

It's in our
genes.



Fueling innovation is at the very core of what we do for you, by supplying a wide range of quality products to the academic and industrial biosciences. Like ExoSAP-IT™. Our new Mut proteins. Sequenase™ T7 DNA Polymerase. And many other tools that fuel emerging technologies and applications. At USB, our commitment to innovation — along with our proven performance, integrity and responsiveness — have made us a leader in the supply of biochemicals and molecular biology reagents. Call USB today — Your Partner in Fueling Innovation™.

USB Corporation 26111 Miles Road Cleveland OH 44128 800.321.9322 www.usbweb.com



New! Higher Resolution
1600x1200

Real Time Viewing

Getting your work done is what it's all about.

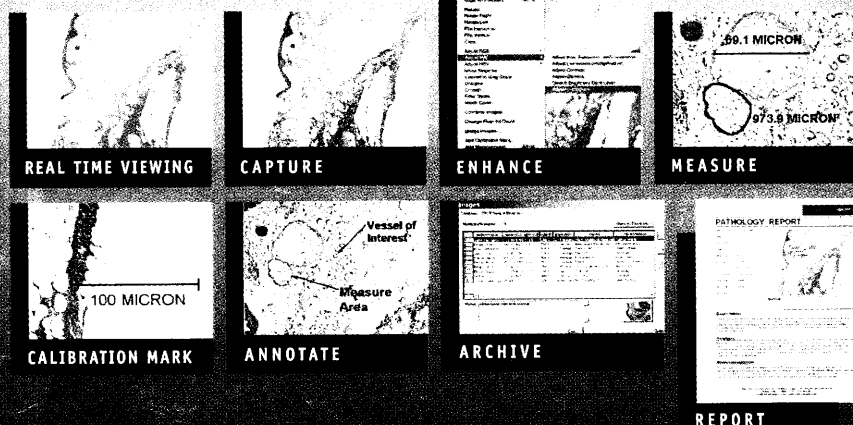
Solving problems
with your imaging
system is not.

You don't want to spend a lot of time battling hardware and software issues. When you buy a SPOT RT digital camera you get an imaging environment designed by one company, with camera and software seamlessly integrated.

With the SPOT RT, the focus is on your work and getting it done, not on managing the camera.



- 1600 x 1200 resolution
- 36 bit RGB Color
- -12° C Cooling



*Great Images,
Real Time Viewing,
Comprehensive
Software,
A Complete Working
Environment.*

SPOT

DIAGNOSTIC
Instruments, Inc.

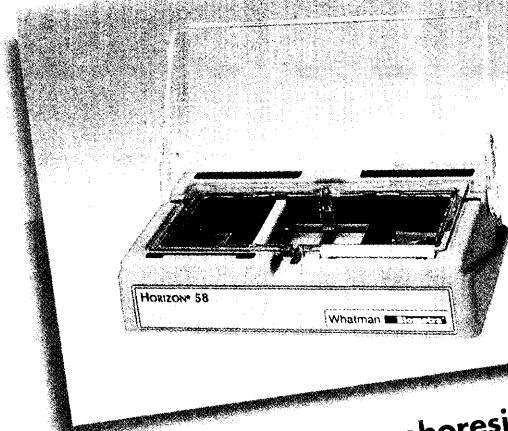
PHONE: 810.731.6000 • FAX: 810.731.6469 • e-mail: info@diaginc.com
TOLL FREE: 888.396.1218 • www.diaginc.com/a22.htm

Whatman **Biometra**[®]

Electrophoresis instrumentation for any application

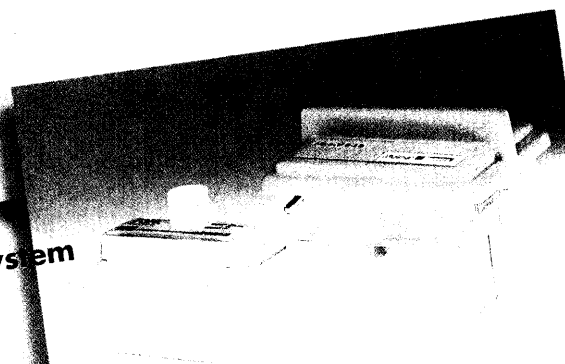
Horizon 58 Horizontal Gel Electrophoresis System

- Rapid analysis
- Heat resistant gel casting components
- Removable gel deck and buffer tray



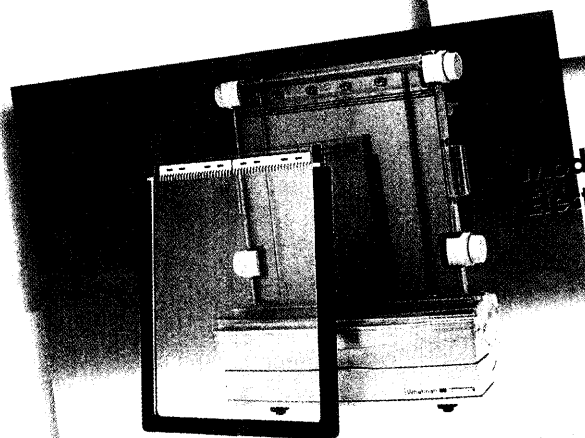
Mini V8.10 Vertical Gel Electrophoresis System

- Easy assembly
- One instrument for electrophoresis and blotting



Model S2001 Sequencing Gel Electrophoresis System

- Patented casting clamp
- Leak resistance
- Safe and easy buffer disposal
- Convenient gel size (30 x 40 cm)



more info at

www.biometra.com

phone +49-(0)551/50 68 6-0 · fax +49-(0)551/50 68 6-66 · e-mail: info@biometra.co.uk

SORVALL®



6 liters. 9 minutes.
0 kidding.

Introducing the SORVALL® Evolution™ RC Superspeed.

One instrument now does it all – from large-volume cell pelleting to isolation of sub-cellular particles. And it does it all faster, with:

- Unequaled accel/decel across the board
- Simple, intelligent operation
- Industry's widest choice of rotors
- Vacuum-free DuraFlex™ drive system

Superspeed centrifugation will never be the same again. It's going to be a whole lot better. Contact Kendro today.

 **Kendro**
Quality Products - Lifetime Care

Visit us at Neuroscience, Booth 2242

Offices worldwide. In the U.S., call 1-800-522-7746, Fax 203-270-2166.

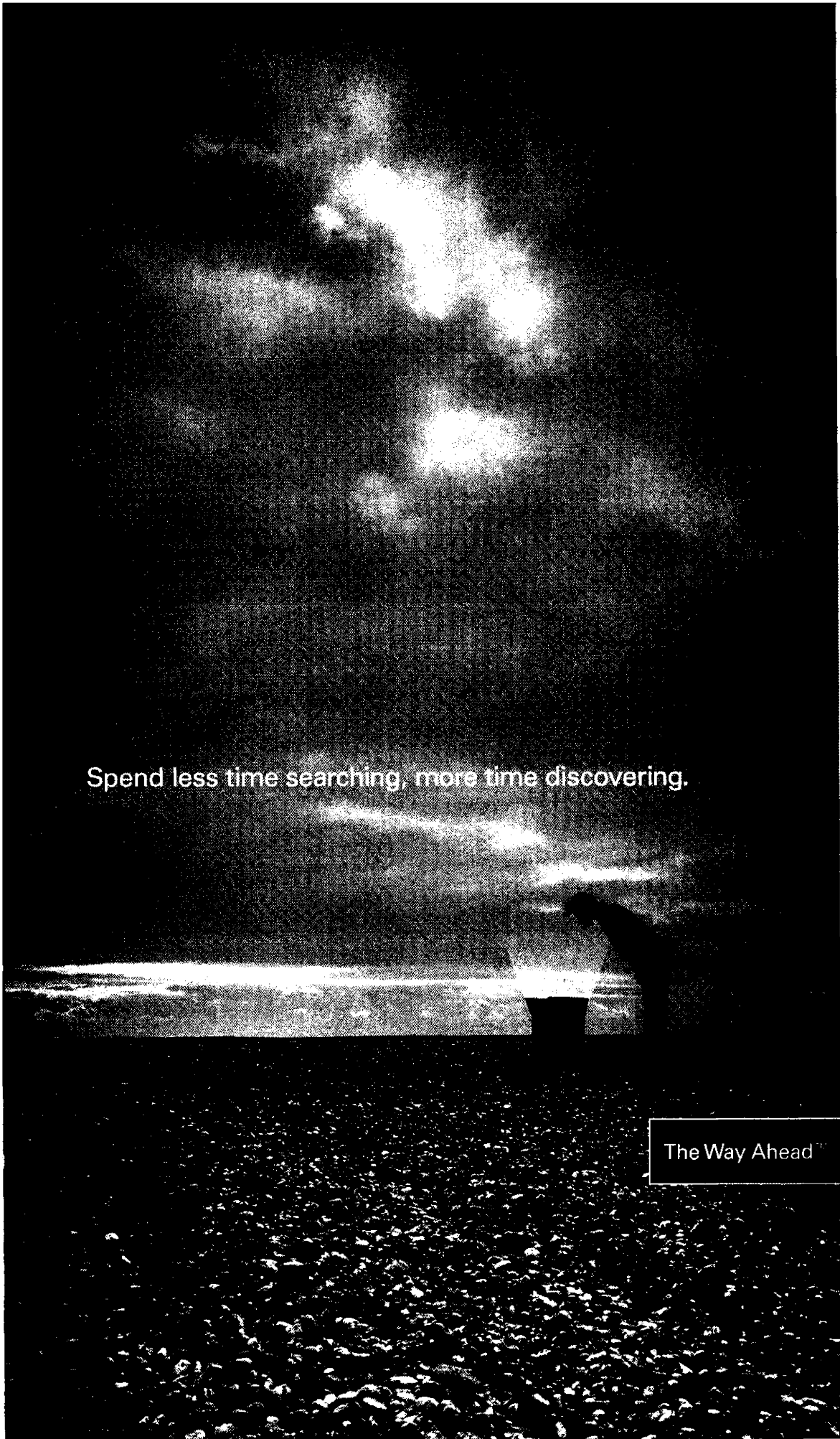
In Europe, 49 (1805) 536 376, Fax 49 (1805) 112 114.

In Asia Pacific, (852) 2711-3910, Fax (852) 2711-3858.

Or contact your local Kendro Representative.

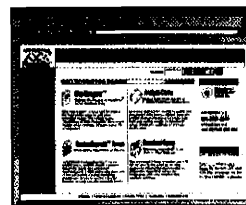
info@kendro.com

Visit our website
www.kendro.com



Spend less time searching, more time discovering.

The Way Ahead™



The NetAffx™ website.
An integrated, online informatics resource that can turn your vision into results. Now you can access a world-class informatics website that can help streamline the design and analysis of your array-based experiments – right from your desktop. The NetAffx™ website, exclusively from Affymetrix, helps bring biological meaning to your expression results. It integrates valuable annotations from public and proprietary databases with design information from Affymetrix® GeneChip® probe arrays. Using the NetAffx website, you can design and order GeneChip® CustomExpress™ arrays online, mixing and matching content to meet your specific research needs. For more information, access the NetAffx website from our home page and turn your vision into results. Affymetrix. The Way Ahead™.

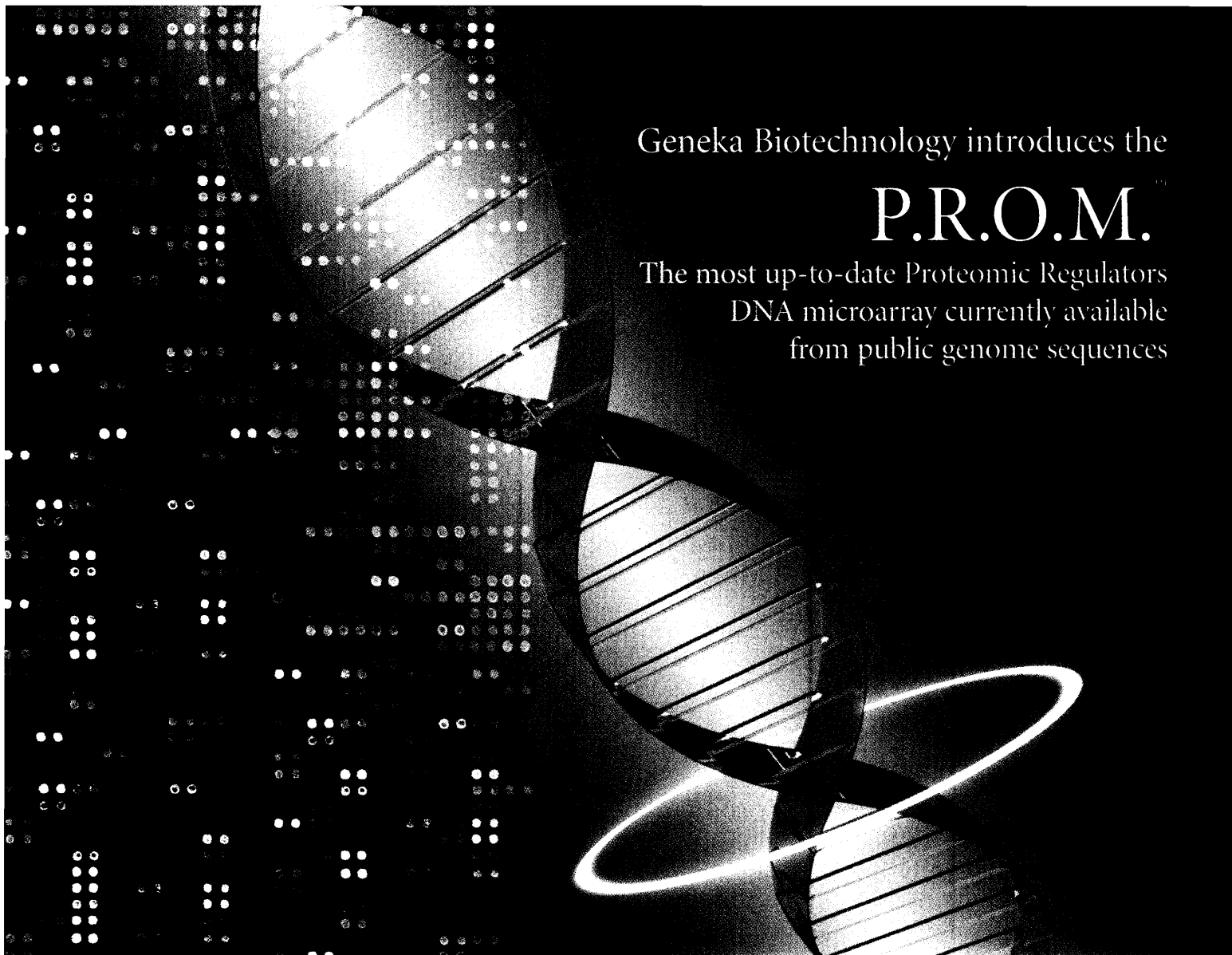
AFFYMETRIX®




**Tools to take you
as far as your vision.™**

www.affymetrix.com
1-888-DNA-CHIP (362-2447)
Europe: +44 (0) 1628 552550

© 2001 Affymetrix, Inc. All rights reserved. Affymetrix, the Affymetrix logo and GeneChip are registered trademarks of Affymetrix, Inc. CustomExpress and NetAffx are trademarks of Affymetrix, Inc. For research use only. Not for use in diagnostic procedures.



Geneka Biotechnology introduces the

P.R.O.M.[™]

The most up-to-date Proteomic Regulators
DNA microarray currently available
from public genome sequences

Geneka Biotechnology introduces the P.R.O.M.[™] (Proteomic Regulatory Oligonucleotides Microarray), the most up-to-date Proteomic Regulators DNA microarray currently available from public genome sequences.

The P.R.O.M.[™] is devoted exclusively to Proteomic Regulators (transcription factors and co-activators). In-house custom services ranging from oligonucleotide probe design to data analysis and complete technical support are also available.

The P.R.O.M.[™] array contains internal and external controls for an optimal signal normalization. All probes were designed to offer the best possible specificity and were experimentally validated.



For information about
P.R.O.M.[™] features, benefits and
applications, visit our web site at
www.geneka.com.

GENEKA BIOTECHNOLOGY INC.

SPECIALISTS IN FUNCTIONAL GENOMICS, PROTEOMICS & GENE REGULATION

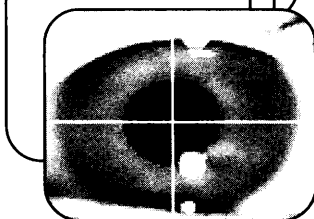


Tel: 1-888-343-6352 or 514-528-9225 • Fax: 1-888-528-9225 • E-mail: info@geneka.com

ISCAN®

EYE MOVEMENT MONITORING SYSTEMS

ISCAN is the world's leading producer of video based eye movement monitoring systems. Our broad range of products set the pace for performance and usability and can be customized to suit any research application.



Products & Features Include:

- * Non-invasive, real-time measurement of pupil position, size and subject's point of gaze.
- * Complete Eye Tracking Laboratories, Benchtop, Head Mounted, High Speed, High Res, Head Tracking, Integrated VR Displays and PC card versions.
- * Data Acquisition Hardware and Analysis Software.

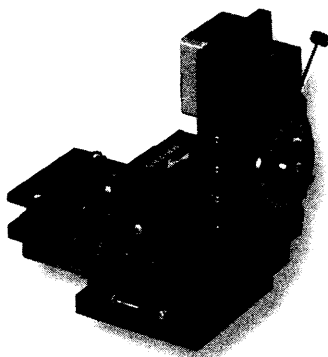
Applications Include:

Fixation Monitoring, Vision Research, Advertising Research, Psycho-Visual Experiments, Vestibular Testing, Reading Studies, Toxicology, Human Factors Evaluation, Cognitive Neuroscience, Drug or Alcohol Response, Aids for the Disabled, Rehabilitation Training, Control in VR Environments.

ISCAN, Inc.
89 Cambridge Street
Burlington, MA 01803
USA

Web: www.iscaninc.com
eMail: info@iscaninc.com
Tel: 781-273-4455
Fax: 781-273-0076

A Stable 4-axis Micromanipulator



Model:	MP-285
Versatile:	1 inch of travel on each axis
Smooth:	Tightly coupled manual control
Drift Free:	Less than 10nm/hour
Affordable:	Call for a quote.

PRECISION INSTRUMENTATION FOR THE SCIENCES



SUTTER INSTRUMENT COMPANY
51 DIGITAL DRIVE, NOVATO, CA. 94949
PHONE: 415.883.0128 FAX: 415.883.0572
EMAIL: info@sutter.com WWW.SUTTER.COM

Pssst...

Have a look!



Carl Zeiss MicroImaging, Inc.
micro@zeiss.com
www.zeiss.com/micro



How can I read the latest ground-breaking research first?

Scienceexpress

Where can my paper get worldwide attention within days of acceptance?

Scienceexpress

What's another great reason to join AAAS today?

Scienceexpress



Each week the editors of **Science** select several of the most important and cutting-edge research papers to publish online in *Science Express*. Within days of acceptance the paper is available to download on your own computer. All this happens weeks before the final version appears in the print version of **Science**. Papers in *Science Express* are available free to individual AAAS members and for a nominal fee to non-members.



Get it first with

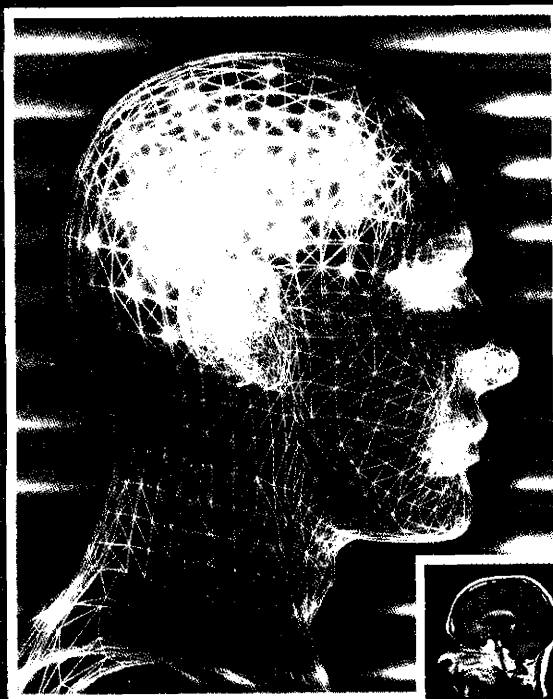
www.sciencexpress.org

Science
Discover the Future

LABORATORY TECHNOLOGY TRENDS

Neuroscience:

UNRAVELING AND REPAIRING
THE HUMAN BRAIN



The following organizations have placed ads in the Special Advertising Section, **NEUROSCIENCE: Unraveling and Repairing the Human Brain**

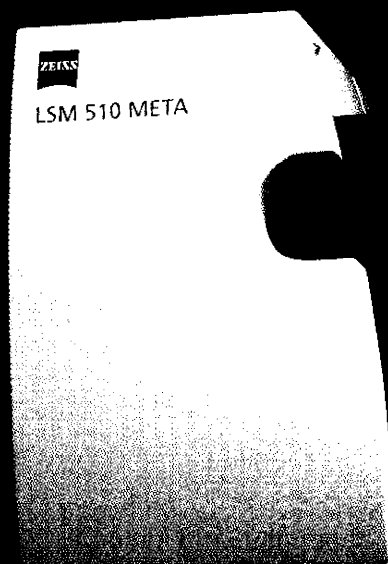
ADVERTISER	Page
Affymetrix, Inc.	1139
American Type Culture Collection	1142
Cayman Chemical	1132
Iobion Informatics	1135
Qiagen, Inc.	1137
Super Array	1141

Turn to page 1133

Science
www.scienceonline.org

Opening

doors to new worlds!



The Next Generation:

Laser Scanning Microscope
LSM 510 META for multi-channel
fluorescence in single and
multiphoton microscopy.

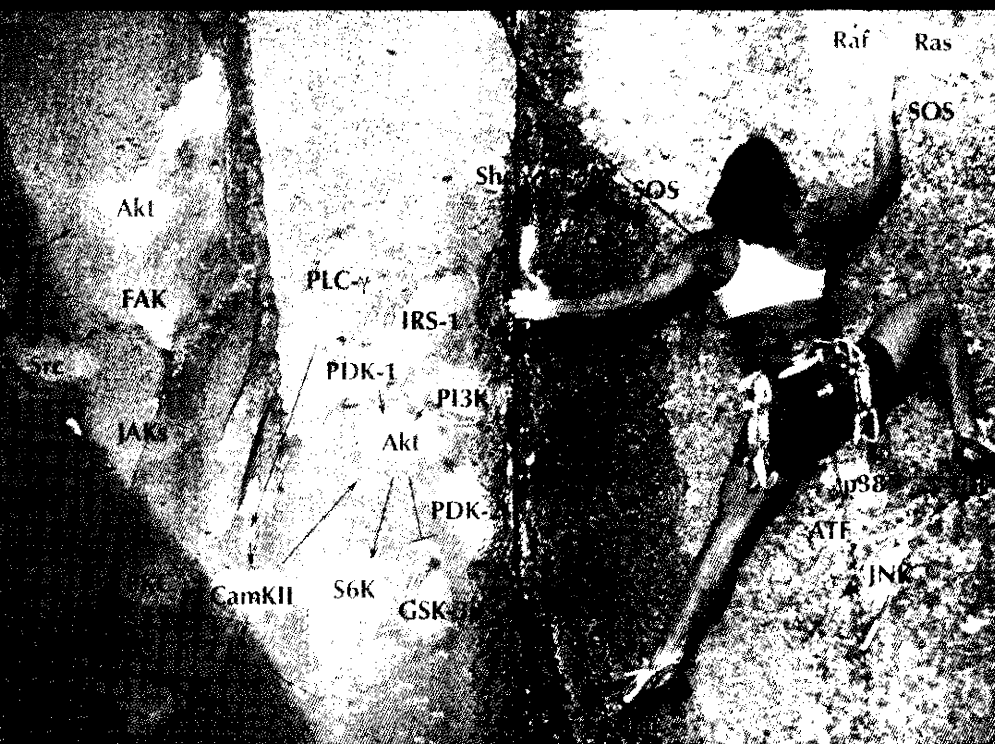
META - a unique confocal
microscope detector
will separate overlapping
fluorescence dyes for sharp,
crosstalk free images.

For more information,
call 800-233-2343.

Carl Zeiss Microimaging, Inc.
micro@zeiss.com
www.zeiss.com/micro



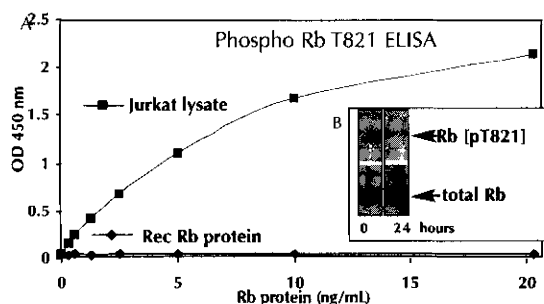
Phospho-specific Antibodies from BioSource



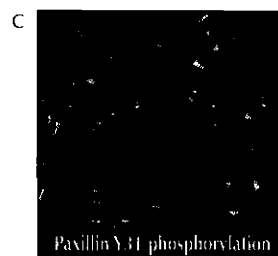
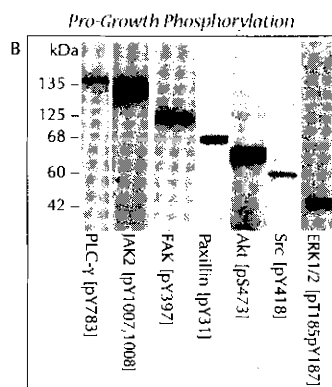
Leading the way in pathway exploration.

BioSource Advantages

- All products are created & manufactured by BioSource
- Affinity purified – both negative/positive selection
- Specificity is tested by peptide competition and/or mutant analysis
- Control peptides and cell extracts available
- Sample and bulk pricing available



The manufacturing procedure typically allows the resulting Phospho-specific Antibodies to function in several applications such as: A) ELISA (B) Western blotting, and (C) Immunostaining. Figure (C) courtesy of Dr. Hisataka Sabe.



Phospho-specific Antibodies

Akt/PKB	GSK-3β	p53
Bad	IGF-1	Paxillin
CB1	IκB-α	PKR
cdc2	Insulin-R	PLCγ-1
c-Raf	Integrin-β ₁	Pyk2
EGF-R	Integrin-β ₃	Rb
elF-2α	IRS-1	RON
elF-4E	JAK 1 & 2	Src
ERK1/2	JNK	STATs 1 & 3
ERK5	Lck	Syndecan-4
FAK	p38	Tau

Sampler Packs available for Pro-Growth, Stress, JAK/STAT, MAPK, FAK, EGFR, Pyk2, Src and Tau.

If you don't see it - we'll make it!
Custom peptide, phospho-specific & general antibody production, is our specialty- antibodies@biosource.com

For research use only.



Novartis and Clay drove his Cancer into remission in 60 days.



"Last year, cancer made me too weak to climb a flight of stairs. This year, I climbed Pike's Peak and loved it."

— Clay Coker

In March 2000 Clay Coker dragged himself into his local ER. He had already suffered through months of fever, chills and extreme fatigue, but what he discovered made him feel even worse. He was diagnosed with cancer. It had made him so weak that climbing a flight of stairs became impossible. But those dark days are over. Today, Clay's feeling great and climbing mountains to prove it. Novartis is proud to be the innovative force that's bringing new optimism and hope to patients and their families. No one can promise what the future holds for cancer patients, but today Clay is winning the fight against his particular form of cancer, enjoying a good quality of life and realizing his dreams.

Think what's possible.



www.novartis.com

We at Novartis are committed to the belief that there is nothing on Earth more valuable than human life. We join people everywhere who share this belief and honor the thousands of lives that were lost in the tragic attacks on September 11, 2001.

Make ALZET[®] pumps part of your blueprint for success.

Cutting edge data frequently result from careful experimental planning, which includes consideration of the optimal drug delivery system. ALZET osmotic pumps are the gold standard in continuous infusion studies in animals as small as mice and rats, and allow the effects of agents, even those with short half-lives, to develop fully.

Customize Your Research Plans

ALZET pumps can be used in a variety of ways, from simple subcutaneous or intraperitoneal implantation to targeted tissue or organ infusion using a catheter attachment. Two brain infusion kits broaden your research options by allowing intracerebroventricular or cerebral infusion of brain tissue. These pumps have been used in gene therapy research, exotic animal breeding experiments, and even on the space shuttle.

Draw On Our Experience

Visit the ALZET web site at www.alzet.com to learn more about how to incorporate these pumps into your research design. You will find citations on the delivery of hundreds of compounds, as well as references on delivery via a number of different routes. ALZET pumps give you the power to achieve and maintain an effective drug concentration for a sustained period of time, resulting in more accurate data.

Fig. 2

ALZET osmotic pumps come in three sizes with a variety of flow rates and durations. ALZET Brain Infusion Kits consist of 28 gauge stainless steel cannulae which can penetrate 3-5 mm below the skull surface.

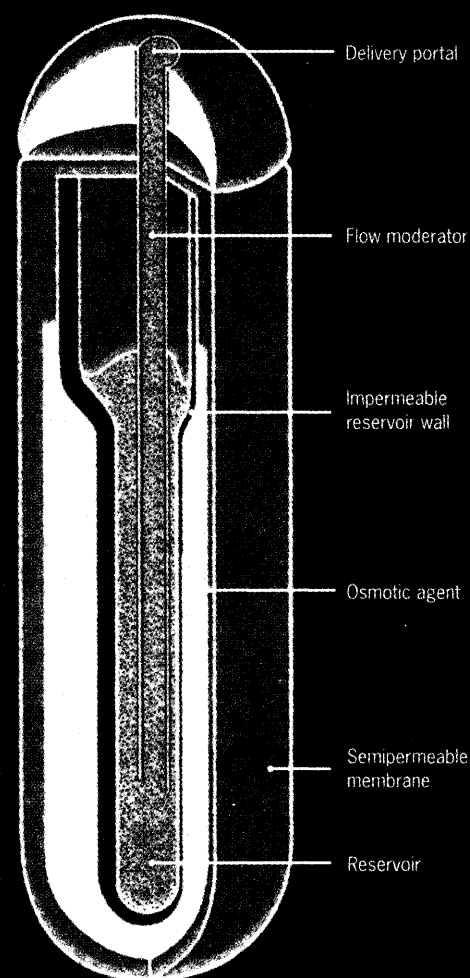
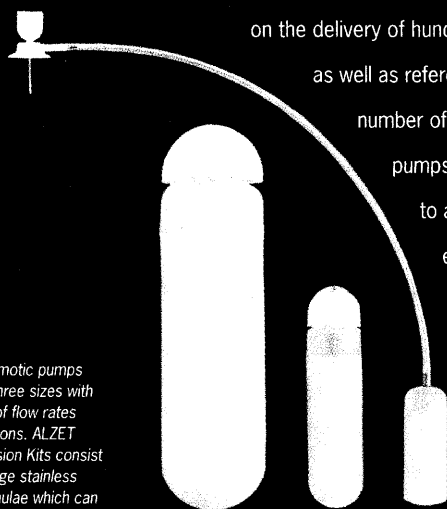
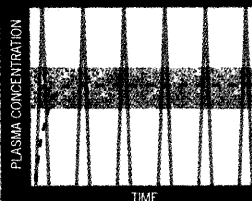


Fig. 1

The ALZET pump operates as interstitial fluid is attracted into the pump by the osmotic layer at a rate limited by the outer, semi-permeable membrane. As the osmotic layer hydrates, it compresses the flexible reservoir, which expels drug from the delivery portal of the pump.



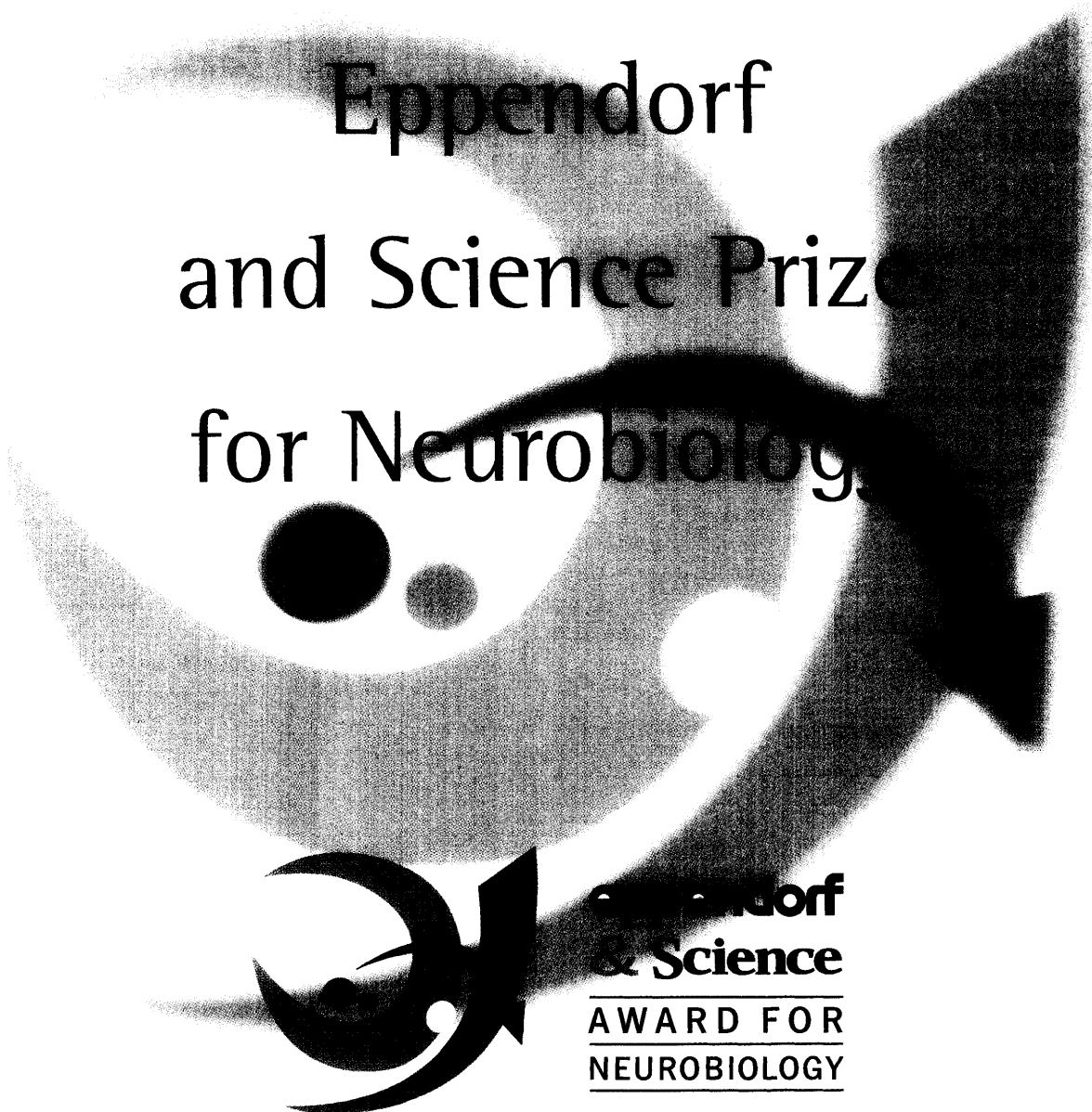
Eliminate Fluctuations in Plasma Drug Concentration

Fig. 3

Prolonging exposure to recombinant proteins by multiple daily injections results in repeated fluctuations in the level of protein in plasma and tissues, and corresponding variations in protein effects over time. Because the protein concentration is constantly changing during the course of the experiment, the resulting data can be misleading as to the nature of the protein's effects and the dose required to elicit them. ALZET pumps provide continuous drug infusion to maintain a constant plasma level (dashed line) within the effective concentration range (shaded bar).

alzet[®]
OSMOTIC PUMPS

www.alzet.com



Eppendorf and Science Prize for Neurobiology



**eppendorf
& Science**
AWARD FOR
NEUROBIOLOGY

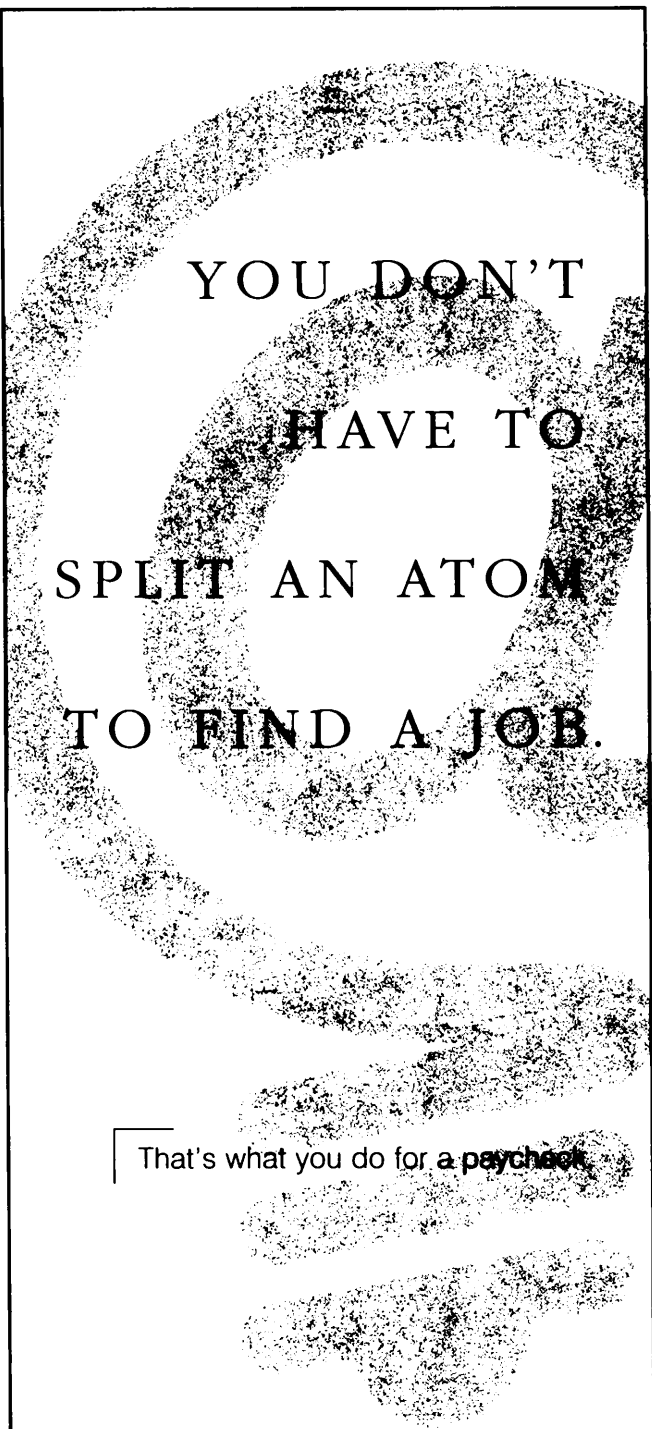
Eppendorf AG and Science have initiated a new annual research award of \$25,000. The award acknowledges outstanding contributions to neurobiology research based on methods of molecular and cell biology.

The prize will be awarded each year in conjunction with the annual Meeting of the Society for Neuroscience.

Young Scientists who have received an advanced professional degree of either a Ph.D. or M.D. within the past 10 years are eligible.

The award winner will be selected by a committee of independent scientists chaired by the Editor-in-Chief of Science. A prize winner will be announced for the first time at the 2002 Meeting of the Society for Neuroscience.

For more detailed information please visit the Eppendorf Homepage at www.eppendorf.com/award2002 or visit Science Online at www.scienceonline.org.



YOU DON'T
HAVE TO
SPLIT AN ATOM
TO FIND A JOB.

That's what you do for a paycheck

Science @
CAREERS 
www.sciencecareers.org

job postings
resume/CV database
e-mail alerts
employer profiles

Pssst...

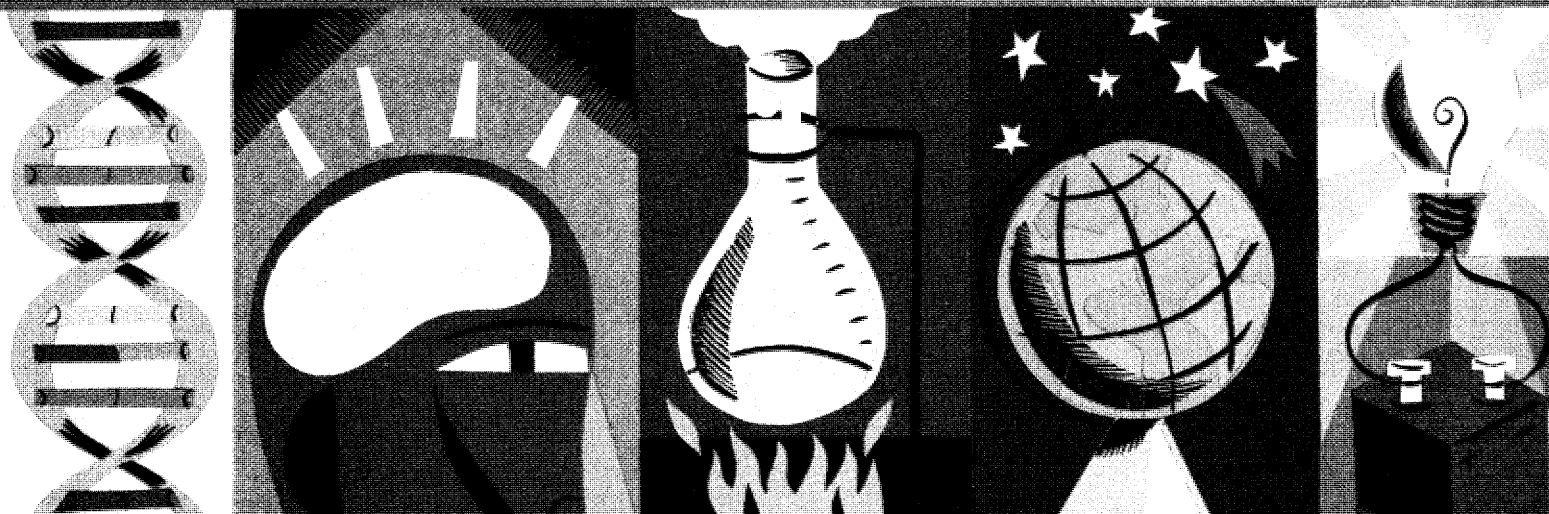
Have a look!

The Next Generation:
Laser Scanning Microscope
LSM 510 META
www.zeiss.de/lsm

ZEISS

Call for Posters

Submission Deadline:
8 November 2001



AAAS Annual Meeting and Science Innovation Exposition

Science in a Connected World

14-19 February 2002 • Boston MA

The AAAS Poster Session

- Provides the opportunity to present your research and update meeting attendees on new scientific developments
- Offers an excellent venue for extended informal discussion with meeting attendees
- Abstracts of accepted posters will appear in the 2002 AAAS Annual Meeting Program Book

All abstracts will be peer reviewed.

2002 Poster Categories

- Education
- Life Sciences
 - Ecology & Environment
 - Molecular & Cellular Biology
 - Organismic Biology
- Physical Science
- Social Science
- Technology and Engineering

Special Student Award Competition

This event recognizes the individual research efforts of students actively working towards a college-level degree.

For complete details and poster submission, visit:

www.aaasmeeting.org

Or contact:

AAAS Meetings
Department
1200 New York Ave., NW
Washington, DC 20005

E-mail

aaasmeeting@aaas.org

Phone

202-326-6450

**Submission Deadline:
8 November 2001**

►►► For more details: www.aaasmeeting.org



AAASMember.org

The AAAS members-only website!

- Read *Science* articles before they are printed with *Science Express*
 - Access *Science* archives back to 1880 through **JSTOR** (Journal Storage project)
- View or change your member account information online
- Purchase scientific books at a discount through the AAAS/Fatbrain.com online bookstore
- Access 2001 Annual Meeting lectures online through Digiscript

PLUS... Coming Soon!

- Online member directory
 - AAAS online store
- Integrated search capabilities across all AAAS websites

Visit AAASMember.org today!



AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

1200 New York Avenue, NW • Washington, DC 20005
(202) 326-6417 • membership@aaas.org

Science International

Bateman House • 82-88 Hills Rd • Cambridge • CB2 1LQ • UK
subscriptions@science-int.co.uk

Opening

doors to new worlds!



The Next Generation:
Laser Scanning Microscope
LSM 510 META

www.zeiss.de/lsm



Drug Discovery

Research

Clinical Screening

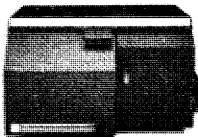
Chemiluminescence Imaging

DNA Thunder

Chemiluminescence Reagent Plus

See the difference in DNA imaging.

KODAK™ Image Station



A start-to-finish system from a single trusted source.

A versatile, compact benchtop imaging system with superior sensitivity and accuracy for all your imaging needs.

Products You Trust

NEN

wallac



DNA Thunder—new from PerkinElmer Life Sciences—taps the full power of high-sensitivity chemiluminescence detection and applies it to nucleic acid detection. It enables higher sensitivity and increased resolution with no change in protocol, so you'll achieve consistent, high-quality results.

PerkinElmer has everything you need for chemiluminescent DNA imaging—including reagents, instrumentation and applications expertise! We're your one source for superior quality chemiluminescence products.

*Mention promotion code **JM123101** to receive a 50% discount off your first order of DNA Thunder. (Offer good through December 31, 2001.)*

Also try PerkinElmer's highly effective Western Lightning Chemiluminescence Reagent Plus for western blotting.

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

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

Kodak is a trademark of Eastman Kodak Company, Rochester, NY

© 2001 PerkinElmer Life Sciences