

AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

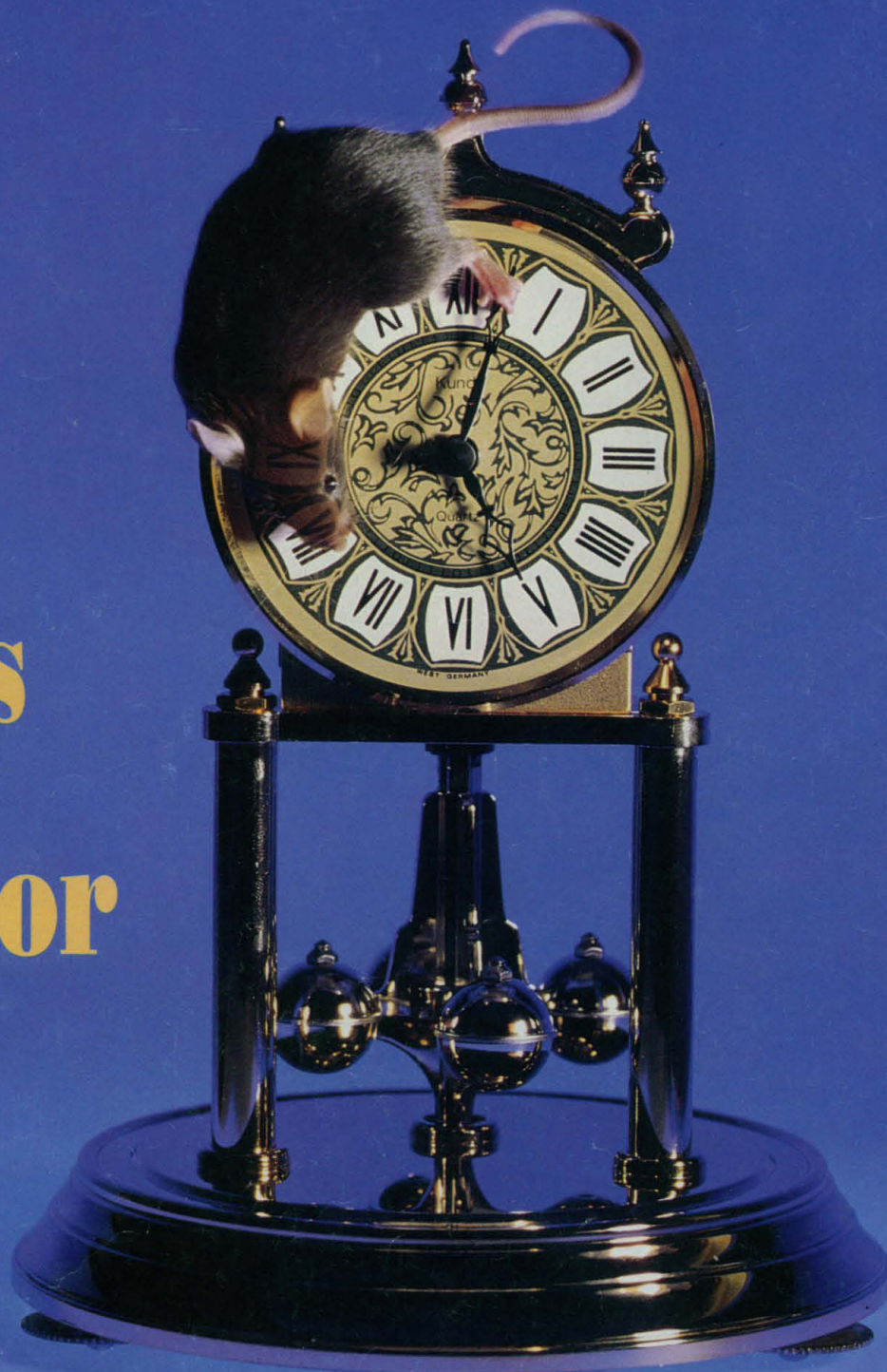
SCIENCE

17 JUNE 1994

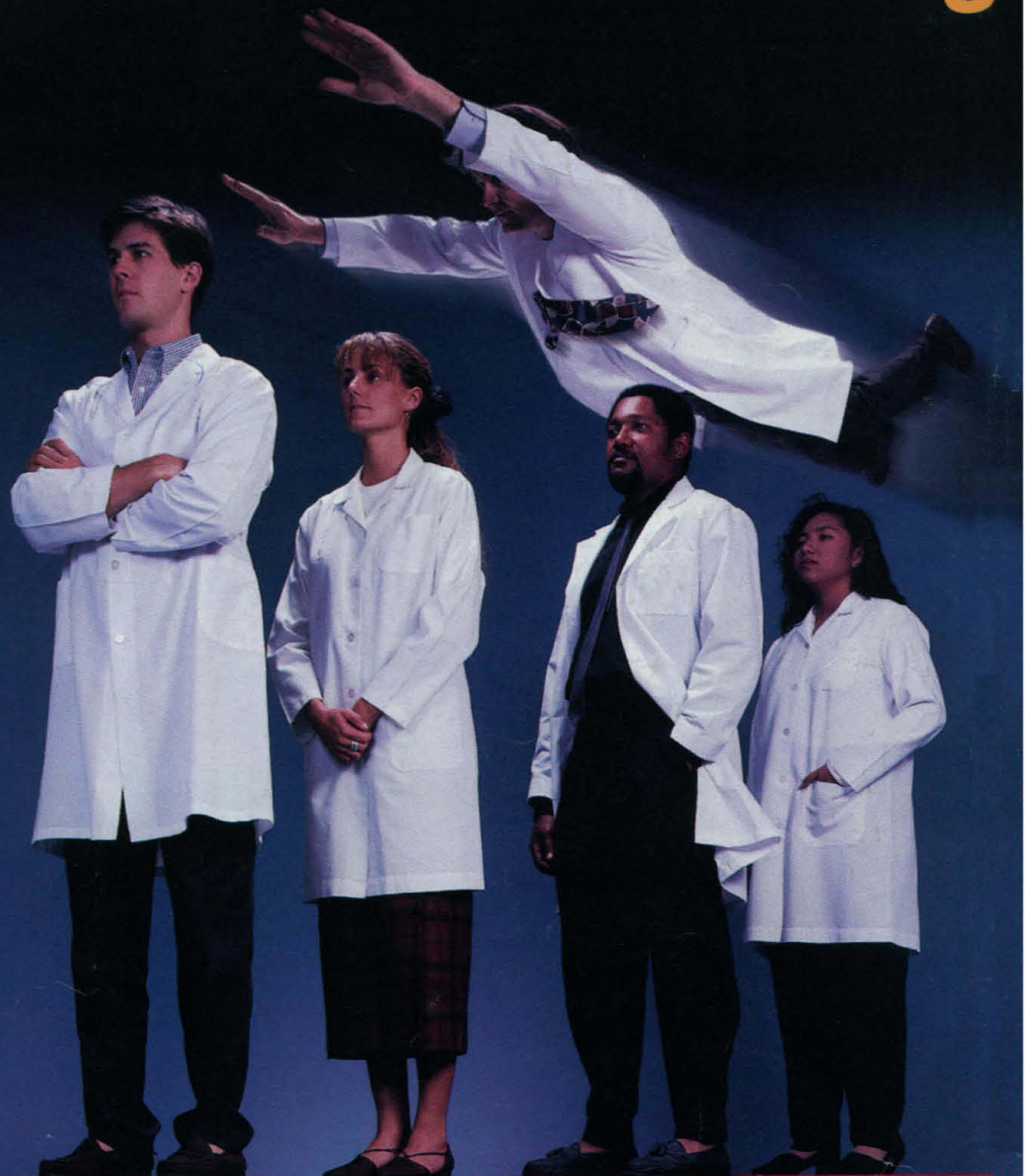
\$6.00

VOL. 264 • PAGES 1637-1816

Genes & Behavior



A BOLD LEAP in Cloning



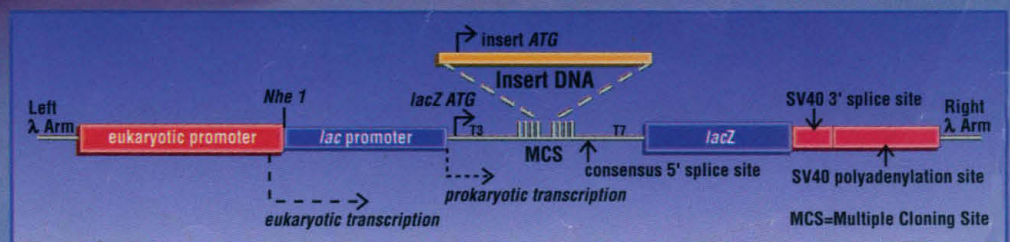
lambda ZAP
Express/pBK

lambda
ZAP/pBluescript

lambda phage

filamentous
phage

plasmids



Vector Technology

Introducing: The ZAP Express™ Vector*

- Eukaryotic Expression
- Prokaryotic Expression
- Increased Cloning Capacity
- 12 Unique Cloning Sites:
Xho I and *Eco*R I for library construction
Sal I and *Eco*R I for antisense library construction
*Bam*H I for genomic libraries
Sma I for blunt-ended cloning
Hind III, *Sac* I, *Apa* I, *Kpn* I, *Spe* I, *Xba* I, *Not* I
- Blue/White Color Selection
- Kanamycin and G418 Selection

Stratagene has developed the most powerful Lambda ZAP® vector* to date, the multifunctional ZAP Express™ vector, which allows both eukaryotic and prokaryotic expression. In addition, the ZAP Express vector offers 12 unique cloning sites and an insert capacity of up to 12 kb.

The introduction of Stratagene's Lambda ZAP vectors has increased the appeal of phage cloning by providing the ability to excise the Bluescript® SK (-) phagemid from the vector using M13 helper phage.¹⁻⁴ Inserts cloned into the ZAP Express vector can be excised rapidly out of the phage in the form of the kanamycin-resistant pBK-CMV phagemid. This *in vivo* excision feature significantly reduces the time and effort required to analyze the DNA insert.

The ZAP Express vector now makes it possible to construct, screen and analyze clones or cDNA libraries in an excisable lambda phage vector by DNA hybridization, prokaryotic expression or eukaryotic expression, without the need for subcloning.

* U.S. Patent No. 5,128,256

References:

1. Altling-Mees, M.A., et al. (1992) *Strategies*. Volume 5, Number 3.
2. Altling-Mees, M.A., Vaillancourt, P., and Short, J.M. (1993) "Phagemids and Other Hybrid Vectors" in *Plasmids A Practical Approach* (K.G. Hardy, ed.) pp 197-223.
3. Short, J.M., et al. (1988) *Nucleic Acids Res.* 16: 7583-7600.
4. Short, J.M., and Sorge, J.A. (1992) *Methods Enzymol.* 216: 495-508.

ZAP Express™ cDNA Synthesis Kit

Stratagene's new ZAP Express cDNA synthesis kit allows the construction of cDNA fragments ready for directional insertion. The kit is guaranteed to produce up to 2.0×10^6 pfu/5 μ g of control poly(A)⁺ mRNA and includes sufficient reagents to produce five vector-ligated cDNA libraries.

ZAP Express™ Vector Kits

Undigested Vector	Catalog # 239201
<i>Eco</i> R I/CIAP-Treated	Catalog # 239211
<i>Bam</i> H I/CIAP-Treated	Catalog # 239212
<i>Eco</i> R I/ <i>Xho</i> I/CIAP-Treated	Catalog # 239213
pBK-CMV Vector	Catalog # 212209
pBK-RSV Vector	Catalog # 212210
ZAP Express™ cDNA Synthesis Kit	Catalog # 200403

Please call Stratagene or the Stratagene distributor nearest you for complete details on our new systems and full line of innovative products and services.



USA:

Corporate Headquarters

Telephone: (800) 424-5444

Fax: (619) 535-0034

Internet:

tech_services@stratagene.com

Germany:

Stratagene GmbH

Telephone: (06221) 400634

Telefax: (06221) 400639

United Kingdom:

Stratagene Ltd.

Telephone: (0223) 420955

Telefax: (0223) 420234

Switzerland:

Stratagene GmbH

Telephone: (01) 3641106

Telefax: (01) 3657707

GENEAMP PCR INSTRUMENT SYSTEMS





There's No Limit To What You Can Achieve With Our Thermal Cyclers.

In research and product development, being first makes all the difference. GeneAmp® PCR Instrument Systems get you started quickly and easily. They are available with pretested reagents and protocols. Our standard of quality—the highest in the industry—translates into consistently superior performance and unmatched reliability.

In fact, our track record in reliability has allowed us to reduce prices on all GeneAmp PCR Instrument Systems and offer an extended warranty.

What about the future? GeneAmp PCR Instrument Systems are the tools for continuing innovations in laboratories around the world, including our own. This means new methodologies can be applied to your research as soon as they are available. Our new Applied Biosystems Division integrates our expertise and experience in PCR with a reputation for innovation, leadership and support in nucleic acid synthesis, genetic analysis and protein research. Together, we offer you the most comprehensive range of systems, technologies and support for your research.

Invest in the PCR instrument system that won't limit your achievements. For information about our new reduced prices and extended warranty, call 1-800-345-5224 in the U.S., or contact your local Perkin-Elmer sales representative.

PERKIN ELMER

Europe Weiterstadt, Germany Tel: 49-6150-101-0 Fax: 49-6150-101-101
Canada Mississauga, Canada Tel: 800-668-6913 Fax: 905-821-8246
Japan Tokyo, Japan Tel: 81-4-7380-8500 Fax: 81-4-7380-8505
Latin America Mexico City, Mexico Tel: 52-5-651-7077 Fax: 52-5-593-6223
Australia Melbourne, Australia Tel: 61-3-212-8585 Fax: 61-3-212-8502

Perkin-Elmer PCR reagents are developed and manufactured by Roche Molecular Systems, Inc., Branchburg, New Jersey, U.S.A.



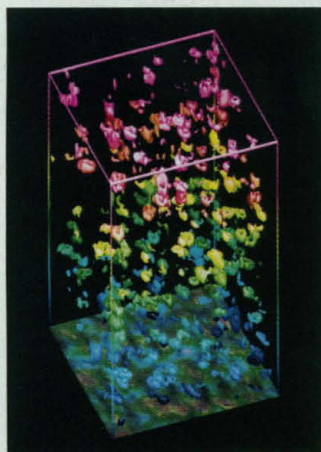
Perkin-Elmer is a registered trademark of The Perkin-Elmer Corporation.
GeneAmp is a registered trademark of Roche Molecular Systems, Inc.
The GeneAmp PCR process is covered by U.S. patents owned by Hoffmann-La Roche Inc. and F.Hoffmann-La Roche Ltd.

Circle No. 31 on Readers' Service Card



**1663
&
1772**

Tracking
ALS in a
mouse



1740

Points of light

NEWS & COMMENT

Japan Holds Firm to Shaky Science 1656
Hopes Fade for Earthquake Prediction

Electromagnetic Fields: Breast Cancer
Link Claimed, Criticized 1658

Bonn Trades Bureaucrats for Scientists 1659

Bolivian Quake Deepens a Mystery 1659

AIDS Vaccines: Will Media Reports
KO Upcoming Real-Life Trials? 1660

New Soil Erosion Model Erodes
Farmers' Patience 1661

Science in Canada: Report Condemns
Pressure to Publish 1662

RESEARCH NEWS

Mouse Model Found for ALS 1663

Canine Distemper Virus: Serengeti's
Big Cats Going to the Dogs 1664

Flesh-Eating Bacteria: Not New, But
Still Worrisome 1665

GENES & BEHAVIOR

NEWS REPORTS

Behavioral Genetics in Transition 1686

From Fruit Flies, Rats, Mice: 1690

Evidence of Genetic Influence

A New Tool for Examining Multigenic Traits

Highs and Lows on the
Research Roller Coaster 1693

A Cautionary Genetic Tale:
The Sobering Story of D₂ 1696

Additional Readings 1697

PERSPECTIVES

The Mind of a Worm 1698
J. H. Thomas

Geophysicists Celebrate Two Satellites,
Mourn a Third 1666

Hints of First Amino Acid Outside
Solar System 1668

Star Writes Its Own History 1668

DEPARTMENTS

THIS WEEK IN SCIENCE 1645

EDITORIAL 1647
Genetics and Behavior
T. N. Wiesel

LETTERS 1649
NIH R&D Priorities: H. Varmus • Risks in Using
Transgenic Plants?: R. Hull; M. Gibbs; G. Bruening
and B. W. Falk • NIST: What's in a Name?:
R. M. White • Fire Ant Control: D. F. Williams
and S. D. Porter; C. C. Mann

SCIENCESCOPE 1655

RANDOM SAMPLES 1669

Comparative Biology • Iceman Gets Real • Anti-
body Marker Flags Future Diabetics

BOOK REVIEWS 1781

Chemical Sciences in the Modern World, reviewed by
W. H. Brock • *Geologic Evolution of the Red Sea*,
R. W. Girdler • *Venus*, R. Grimm • *The Transition
from Infancy to Language*, M. Shatz • Vignettes •
Books Received

PRODUCTS & MATERIALS 1791

Board of Reviewing Editors

Frederick W. Alt
Don L. Anderson
Michael Ashburner
Stephen J. Benkovic
David E. Bloom
Floyd E. Bloom
Piet Borst
Henry R. Bourne
Michael S. Brown
James J. Bull

Kathryn Calame
C. Thomas Caskey
Dennis W. Choi
John M. Coffin
Paul J. Crutzen
Robert Desimone
Bruce F. Eldridge
Paul T. Englund
Richard G. Fairbanks
Douglas T. Fearon

Harry A. Fozzard
Klaus Friedrich
Theodore H. Geballe
John C. Gerhart
Roger I. M. Glass
Stephen P. Goff
Peter N. Goodfellow
Corey S. Goodman
Ira Herskowitz
Eric F. Johnson

Stephen M. Kosslyn
Michael LaBarbera
Nicole Le Douarin
Charles S. Levings III
Alexander Levitzki
Harvey F. Lodish
Richard Losick
Diane Mathis
Anthony R. Means
Shigetada Nakanishi

Roger A. Nicoll
Stuart L. Pimm
Yeshayau Pocker
Dennis A. Powers
Ralph S. Quatrano
V. Ramanathan
Douglas C. Rees
T. M. Rice
David C. Rubie
Erkki Ruoslahti

Gottfried Schatz
Jozef Schell
Ronald H. Schwartz
Terrence J. Sejnowski
Ellen Solomon
Thomas A. Steitz
Michael P. Stryker
Robert T. N. Tjian
Emil R. Unanue
Geerat J. Vermeij

Bert Vogelstein
Harold Weintraub
Arthur Weiss
Zena Werb
George M. Whitesides
Owen N. Witte
William A. Wulf
Keith Yamamoto

COVER

The *Clock* mutant mouse has an abnormally long circadian period, which causes rhythmic behaviors—such as locomotor activity—to cycle every 27 to 28 hours instead of the usual 24. The generation of this behavioral mutation in *Clock* and other advances in

the behavioral genetics of humans and animals are discussed in this special issue on Genes & Behavior. See the special section beginning on page 1685. [Photo: Dewey Hentges, Chicago, IL]



Genes, Environment, and Personality 1700

T. J. Bouchard Jr.

ARTICLES

The Mating of a Fly 1702

J. C. Hall

Genetic Animal Models of Alcohol and Drug Abuse 1715

J. C. Crabbe, J. K. Belknap, K. J. Buck

Forward and Reverse Genetic Approaches to Behavior in the Mouse 1724

J. S. Takahashi, L. H. Pinto, M. H. Vitaterna

The Genetic Basis of Complex Human Behaviors 1733

R. Plomin, M. J. Owen, P. McGuffin

Conducting Polyaniline Filaments in a Mesoporous Channel Host 1757

C.-G. Wu and T. Bein

Role of Deep Cloud Convection in the Ozone Budget of the Troposphere 1759

J. Lelieveld and P. J. Crutzen

Attenuation of Fungal Virulence by Synthetic Infectious Hypovirus Transcripts 1762

B. Chen, G. H. Choi, D. L. Nuss

Recovery of Visual Response of Injured Adult Rat Optic Nerves Treated with Transglutaminase 1764

S. Eitan, A. Solomon, V. Lavie, E. Yoles, D. L. Hirschberg, M. Belkin, M. Schwartz

Silencers and Domains of Generalized Repression 1768

S. Loo and J. Rine

Motor Neuron Degeneration in Mice That Express a Human Cu,Zn Superoxide Dismutase Mutation 1772

M. E. Gurney, H. Pu, A. Y. Chiu, M. C. Dal Canto, C. Y. Polchow, D. D. Alexander, J. Caliendo, A. Hentati, Y. W. Kwon, H.-X. Deng, W. Chen, P. Zhai, R. L. Sufit, T. Siddique

Molecular Genetic Analyses of the Tyrolean Ice Man 1775

O. Handt, M. Richards, M. Trommsdorff, C. Kilger, J. Simanainen, O. Georgiev, K. Bauer, A. Stone, R. Hedges, W. Schaffner, G. Utermann, B. Sykes, S. Pääbo

TECHNICAL COMMENTS

Vapor Deposits in the Lunar Regolith 1779

B. Hapke, W. Cassidy, E. Wells; T. J. Bernatowicz, R. H. Nichols Jr., C. M. Hohenberg, M. Maurette; L. P. Keller and D. S. McKay

RESEARCH ARTICLE

Near-Field Spectroscopy of the Quantum Constituents of a Luminescent System 1740

H. F. Hess, E. Betzig, T. D. Harris, L. N. Pfeiffer, K. W. West

REPORTS

Rotating Spiral Waves Created by Geometry 1746

K. Agladze, J. P. Keener, S. C. Müller, A. Panfilov

High-Resolution Nuclear Magnetic Resonance Spectroscopy in a Circularly Polarized Laser Beam 1748

A. D. Buckingham and L. C. Parlett

Multiplex Spectroscopy: Determining the Transition Moments and Absolute Concentrations of Molecular Species 1750

G. J. Germann and D. J. Rakestraw

Higher Order Self-Assembly of Vesicles by Site-Specific Binding 1753

S. Chiruvolu, S. Walker, J. Israelachvili, F.-J. Schmitt, D. Leckband, J. A. Zasadzinski



1762

Biocontrol of a tree fungus

AAAS Board of Directors

Eloise E. Clark
Retiring President,
Chairman
Francisco J. Ayala
President
Rita R. Colwell
President-elect

William A. Lester Jr.
Simon A. Levin
Anna C. Roosevelt

Alan Schriesheim
Jean'ne M. Shreeve
Chang-Lin Tien
Warren M. Washington
Nancy S. Wexler

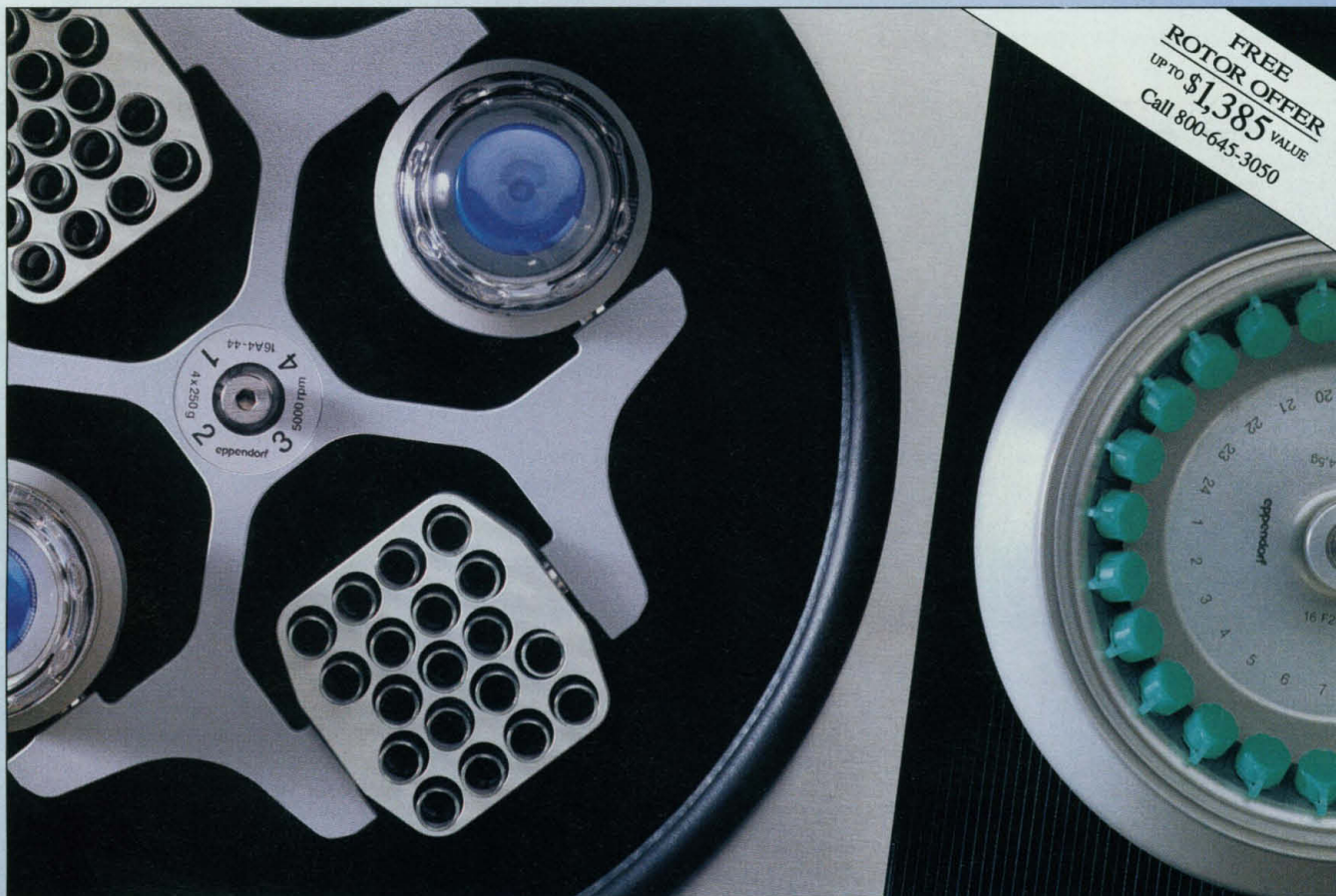
William T. Golden
Treasurer
Richard S. Nicholson
Executive Officer

■ **SCIENCE** (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005. Second-class postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 1994 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): \$92 (\$50 allocated to subscription). Domestic institutional subscription (51 issues): \$215. Foreign postage extra: Mexico, Caribbean (surface mail) \$50; other countries (air assist delivery) \$95. First class, airmail, student and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Printed in the U.S.A.

■ Indicates accompanying feature

Change of address: allow 6 weeks, giving old and new addresses and 11-digit account number. **Postmaster:** Send change of address to *Science*, P.O. Box 2033, Marion, OH 43305-2033. **Single copy sales:** \$6.00 per issue prepaid includes surface postage; Guide to Biotechnology Products and Instruments, \$20. 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 the base fee of \$1 per copy plus \$0.10 per page is paid directly to CCC, 27 Congress Street, Salem, MA 01970. The identification code for *Science* is 0036-8075/93 \$1 + .10. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

NEW EPPENDORF® CENTRIFUGES WITH MICRO AND MACRO CAPABILITIES...



MORE VERSATILITY THAN EVER BEFORE.

Eppendorf, the name you trust for quality and innovation, expands your options for centrifugation with new benchtop designs.

Our expanded line of centrifuges now includes new Model 5416 and Refrigerated Model 5403. Both models accommodate *interchangeable* rotors for tube sizes from 0.25 mL to 100 mL. The variable-speed, brushless motor generates up to 15,000 rpm and over 23,000 x g. Refrigerated Model 5403 features a temperature control range of -10°C to 40°C and uses a *CFC-free* refrigerant to protect the environment.

In addition, our new economical Micro Centrifuge Model 5410 offers outstanding value without sacrificing important operating features.

When you're looking for a reliable benchtop centrifuge, there's just one name to remember—Eppendorf.



eppendorf
BRINKMANN Quality products for research and control.

Brinkmann Instruments, Inc., One Cantiague Road, P.O. Box 1019, Westbury, NY 11590-0207 • 800-645-3050, FAX: 516-334-7506
Brinkmann Instruments (Canada) Ltd., 6670 Campobello Road, Mississauga, Ont. L5N 2L8 • 800-263-8715, FAX: 416-826-5424

Eppendorf® is a registered trademark of Eppendorf-Nethelner-Hinz GmbH. BRK-10556 5201-303

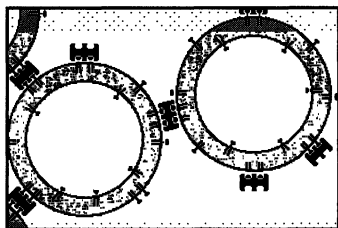
For information circle reader service number 29
For a demonstration circle reader service number 30

Absolute values

Spectroscopy is a powerful method for determining the structure and properties of molecules, but the intensity of spectroscopic transitions depends not only on the number of molecules present but also on the strength of the transition dipole moments. Line strengths can be measured for stable species by absorption spectroscopy, but not for transient or unstable species, such as those in a flame or an astrophysical environment. Germann and Rakestraw (p. 1750) show that by combining the measurements of a molecular transition from two different spectroscopic techniques, for example, absorption and infrared degenerate four-wave mixing, it is possible to measure absolute concentrations of the carriers of molecular spectra.

Vesicle assembly

Assembly of vesicles into larger arrays could have applications in areas as diverse as drug delivery and the formation of soft composite materials. Chiruvolu *et al.* (p. 1753) investigated the



self-assembly of lipid vesicles and found that while vesicles will adhere to one another through nonspecific van der Waals forces, the resulting structures are stressed and unstable. However, they found that specific receptor interactions could be used to stabilize vesicle assembly. They coupled biotin to a lipid group so that biotin could be incorporated into the vesicle

Quantum emitters, one at a time

Photoluminescence is a powerful tool for studying the energetics of quantum-confined, two-dimensional systems such as quantum wells. Of necessity, measurements with this technique are averages of a distribution of the light-emitting centers. Hess *et al.* (p. 1740) report the use of near-field optical scanning spectroscopy to examine individual emission sites in a gallium arsenide quantum well. The combination of high spatial and energy resolution permits analysis of single optically active centers in layered materials.

wall; addition of streptavidin produced stable aggregates. This process could be reversed by adding excess biotin.

Polymer nanowires

Zeolites contain arrays of angstrom-wide channels that presumably could form the insulating grid that would hold wires of conducting polymers that could interconnect nanoscale devices. Polymer filaments can be grown in these channels, but trapping severely limits their electrical conductivity. Wu and Bein (p. 1757) formed filaments of polyaniline in the mesoporous aluminosilicate material MCM-41, which has wider channels (2.7 nanometers). They adsorbed aniline vapor into the dry material and then reacted it with peroxodisulfate. Wider is indeed better; these encapsulated filaments, which are in the protonated emeraldine salt form, show significant conductivity as measured by microwave absorption methods.

Churning up pollutants

Thunderstorms rapidly redistribute air and associated trace pollutants vertically and thus efficiently mix the troposphere. The induced upward transport of pollutants, particularly NO_x (the main precursor to ozone), tends to enhance production of

tropospheric ozone. Lelieveld and Crutzen (p. 1759) evaluate both this process and the more gradual descent of air rich in natural NO_x and ozone (from the stratosphere, for example) in a series of numerical simulations. The net effect globally of the convection produced by thunderstorms is a reduction in tropospheric ozone and an enhancement of the oxidative capacity of the atmosphere.

Infecting fungi

Fungal infections can have devastating effects on a plant species, as has occurred in chestnut blight. However, the chestnut blight fungus *Cryphonectria parasitica* can itself become infected by the mycoviruses of the *Hypovirus* genus, and such infection attenuates the virulence of this fungus. Virally infected fungi would be useful in the biological control of disease, but mycoviruses are transmitted only during anastomosis (fusion of hyphae). Chen *et al.* (p. 1762) overcame the difficulties of inducing mycovirus infection by introducing a synthetic copy of the hypovirus RNA-coding strand into fungus spheroplasts by electroporation. By using this approach, they were able to infect not only *C. parasitica* but other fungal species. For example, infection of *Endothia gyrosa*, which infects mainly pin oak, resulted in attenuated virulence.

Stimulating recovery

One part of our body that does not heal well is the adult central nervous system (CNS). The regrowth of damaged nerve cells is inhibited by molecules produced by supporting cells of the CNS, oligodendrocytes. Eitan *et al.* (p. 1764) injected transglutaminase into the injured optic nerves of rats. This enzyme is known to have a cytotoxic effect on oligodendrocytes in vitro. This treatment promoted restoration of neural function as assessed by recovery of a visually evoked response and the appearance of unmyelinated axons that resemble those of growing neurons.

Mice and ALS

Mice that express one of the mutant forms of human Cu,Zn superoxide dismutase (SOD) that has been associated with familial amyotrophic lateral sclerosis (ALS) become paralyzed and die prematurely due to motor neuron degeneration. Gurney *et al.* (p. 1772; see news story by Marx, p. 1663) produced transgenic mice that expressed mutant forms of human SOD, either Val substituted for Ala⁴ or Ala substituted for Gly⁹³. The former mutation substantially reduces enzyme activity, but mice expressing this form of SOD did not exhibit neurological symptoms. The latter mutation has little effect on enzyme activity, but mice expressing large amounts of this mutant SOD developed hind limb weakness at 3 to 4 months of age. The gait of these mice became affected, limb paralysis and tremors developed, and after 5 to 6 months the mice died. Pathological analysis revealed a severe loss of spinal motor neurons that contained choline acetyltransferase.

Larger
Pack Sizes
Lower Prices*

ENZYMES

*Expect the best in
performance and value...*

- **Thermostable**—
Exceptional activity remains, even
after incubation at 95°C.
- **Performance**—
Thoroughly tested by Promega to
assure optimal results.
- **Satisfaction Guaranteed**—
You must be 100% satisfied with
Promega's *Taq* DNA Polymerase
or it's free!
- **Freshness Dating**—
Every tube is expiration dated,
providing extra assurance of full
performance.

Taq DNA Polymerase

Size (u)	Buffer A	Buffer B
100	M1861	M1661
5x100	M1862	M1662
1x500	M1865	M1665
25x100	M1866	M1666
5x500	M1867	M1667
1x2500	M1868	M1668
5x2500	M1869	M1669

Taq DNA Polymerase, Sequencing Grade

Size (u)	Sequencing Grade
100	M2031
5x100	M2032
1x500	M2035
25x100	M2036
5x500	M2037
1x2500	M2038
5x2500	M2039

...Promega.

*Large volume users should inquire about special pricing.

For Direct Sales in USA: Promega Corporation • 2800 Woods Hollow Road • Madison, Wisconsin • 53711-5399 • Toll Free 800-356-9526 • Fax 800-356-1970
Promega products may also be purchased from Fisher Scientific • Toll Free 800-766-7000 • Fax 800-926-1166

Branch Offices:		Australia China	008 225 123 01 256 3159	France Netherlands	05 48 79 99 071 21 71 21	Switzerland United Kingdom	01 830 70 37 0800 378994		
Worldwide Distribution:		Finland	90 708 0900	India	11 684 6565	Luxembourg (see Netherlands)		South Africa	11 896 4710
Argentina	1 381 7962	France	1 45 33 67 17	Indonesia	21 739 0320	Malaysia	3 735 1559	Spain	93 404 52 14
Austria	1 80105 324	Germany	06221 502122	Ireland	01 8426644	Mexico	5 525 8579	Sweden	0346 83050
Belgium	(see Netherlands)	Ger. Export	49 6221 502 114	Israel	8 406 530	New Zealand	9 570 3200	Taiwan	02 733 6877
Brazil	031 275 12 40	(Hungary, Poland, Czech Rep., Slovakia)		Italy	055 5001871	Norway	035 541999	Thailand	2 284 0950/0951
Canada	800 267 7424	Greece	01 643 6138	Japan	03 3270 0536	Portugal	1 458 1641	Turkey	216 385 8321
Denmark	44 94 88 22	Hong Kong	751 9488	Korea	02 571 0440	Russia	095 135 43 07	Venezuela	2 320 891
Egypt	2 245 1785	Iceland (see Sweden)			or 02 588 5961	Singapore	273 0898		

Copyright 1993, 1994, Promega Corporation. All Rights Reserved. Specifications subject to change without prior notice.

Revised 5/9/94

This product has not been licensed for use in the polymerase chain reaction (PCR). The PCR process for amplifying nucleic acids is covered by U.S. Pat. Nos. 4,683,195 and 4,683,202, assigned to Hoffmann-La Roche. Patents pending in other countries.



Promega

In USA Call

800-356-9526

Fax 800-356-1970 or

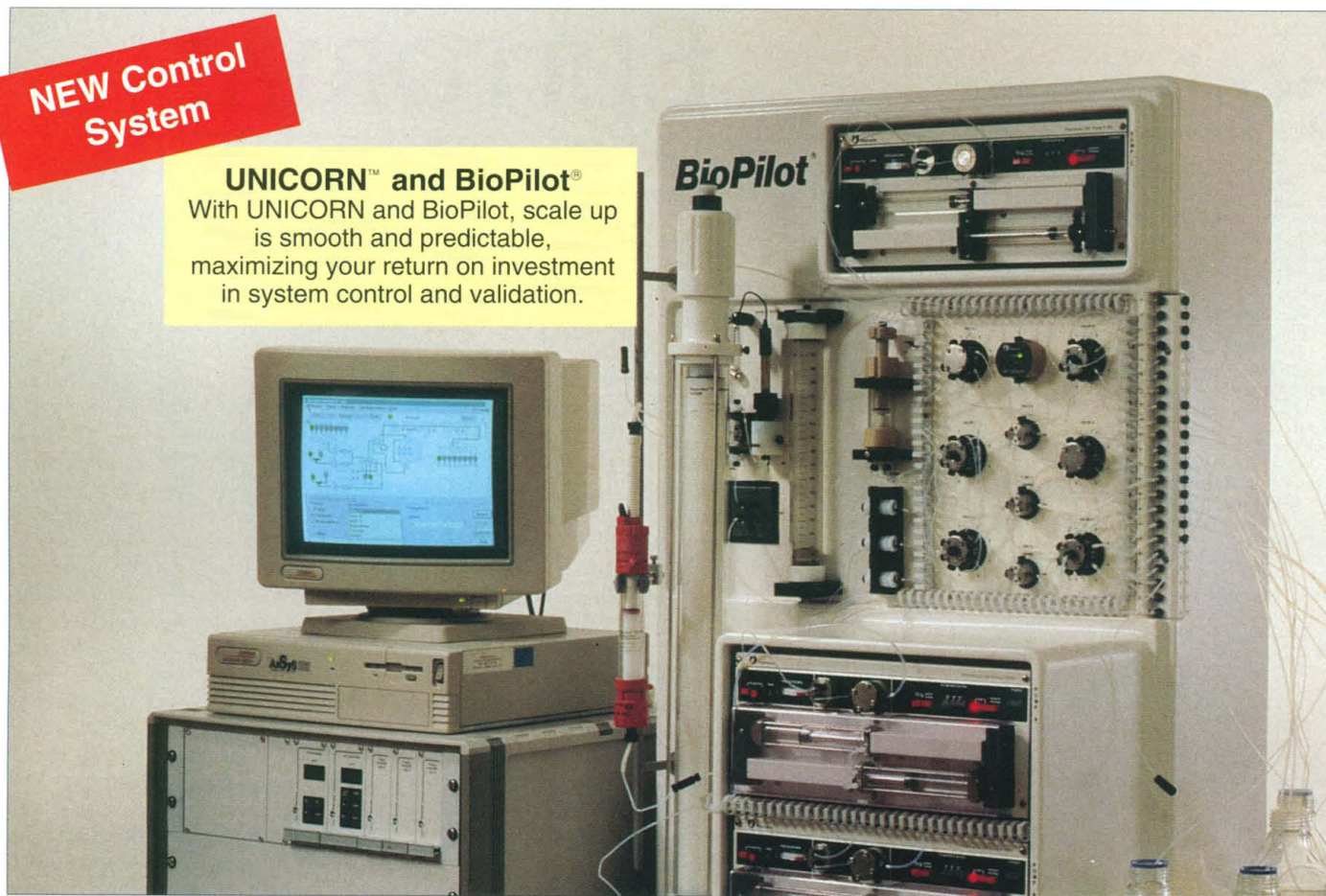


Fisher Scientific
800-766-7000

Circle No. 42 on Readers' Service Card

NEW Control System

UNICORN™ and BioPilot®
With UNICORN and BioPilot, scale up is smooth and predictable, maximizing your return on investment in system control and validation.

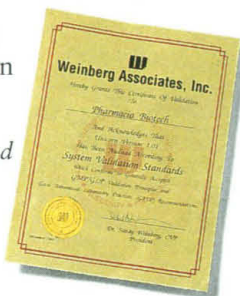


A smoother path from laboratory bench to production floor

Smooth transfer from one scale of operation to another is vital when bringing products to market. With UNICORN and BioPilot that transfer is both swift and efficient.

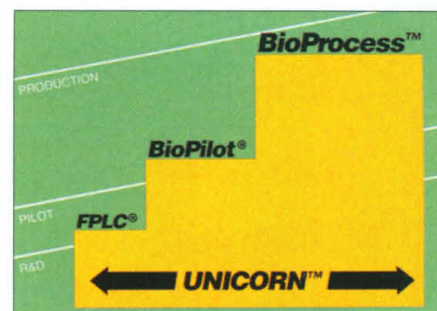
UNICORN is the new control system for BioPilot, the chromatography system for process development, scale up and small scale production. UNICORN complies fully with GLP/GMP requirements and includes validation support.

UNICORN is issued with a Validation Certificate and Report.



UNICORN Control System:

- Developed according to current FDA guidelines for software validation
- Simultaneously supervises up to four liquid handling units of any scale and complexity with control at unit level
- Displays the actual liquid flow path and the readings of the process monitors on a unique dynamic flow diagram
- Keeps the same documentation and user interface during scale up to routine production on BioProcess™ System



UNICORN control system is scaleable. It supervises BioPilot and BioProcess systems keeping documentation and user interface constant.

Ask for new information



Pharmacia Biotech. For information in US: 1-800-526-3593.
In Canada: 1-800-463-5800.

Circle No. 32 on Readers' Service Card

The value
of doing
business with
New England
Biolabs...

just keeps adding up

Beginning with recombinant methodologies that have driven our prices down ten-fold in ten years.

NEB recombinant methodologies drive prices down ten-fold.



Actual price reductions in a bin of 36 native (1984) vs recombinant (1994) enzymes.

All due to our remarkable successes in cloning and overexpressing restriction endonucleases. And our uncommon philosophy of doing business. Which is, quite simply, to encourage loyalty among our customers by passing along the benefits of our impressive production efficiencies in the form of lower prices and improved purity – two direct results of our proprietary recombinant methodologies. And if you need more convincing, consider our additional offerings: one of the world's largest and most reliable collections of recombinant enzymes; our non-exclusive freezer program; dedicated e-mail service line (info@neb.com); all backed by our scientific expertise, and you begin to get the total picture. For more information on how New England Biolabs' recombinant enzymes can become a valuable part of your work, call us at 1-800-NEB-LABS.

Bgl II now has twice the units per package, with no price increase! A 50% savings!

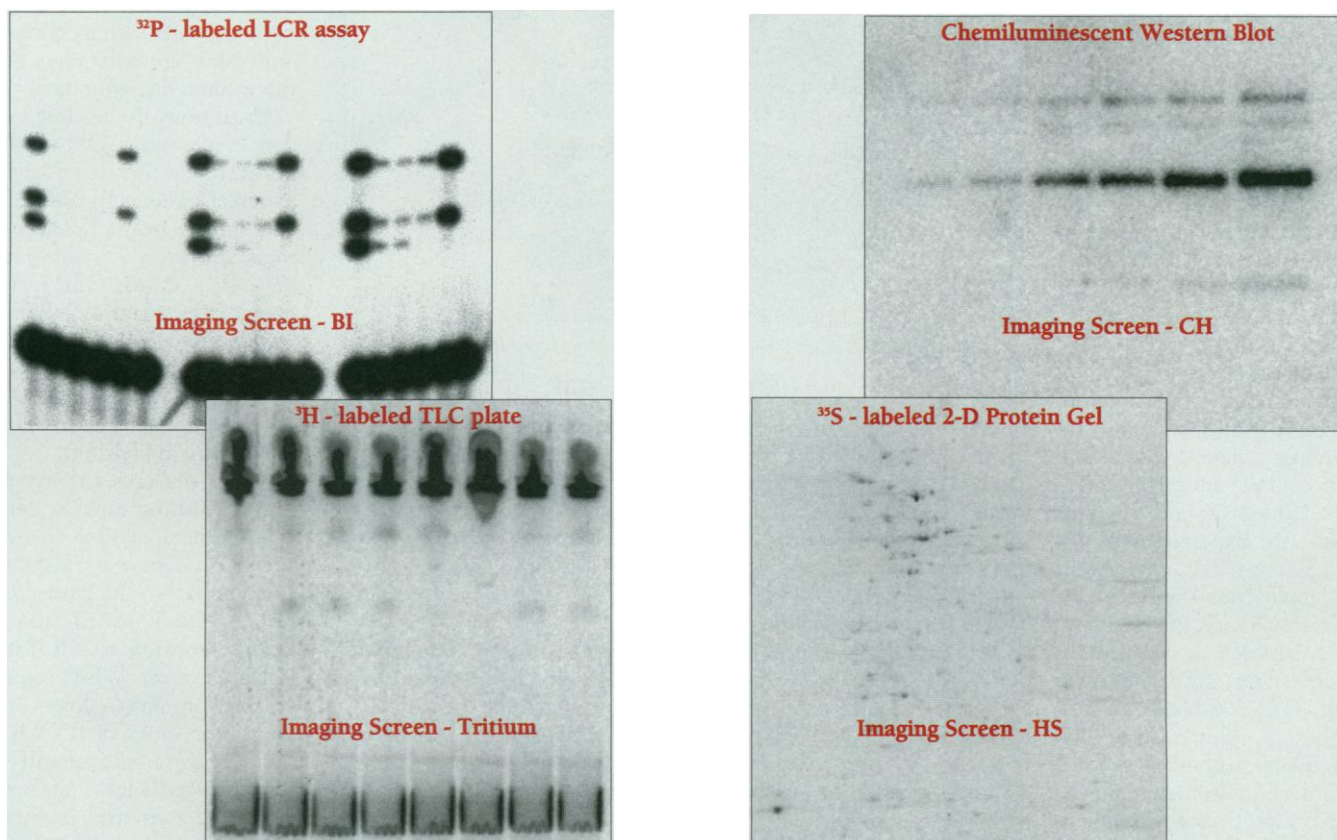
- New England Biolabs Inc. 32 Tozer Road, Beverly, MA 01915 USA Tel. 1-800-NEB-LABS (508) 927-5054 Fax (508) 921-1350 info@neb.com
- New England Biolabs Ltd., Canada Tel. (800) 387-1095 (905) 672-3370 Fax (905) 672-3414 info@ca.neb.com
- New England Biolabs GmbH, Federal Republic of Germany Tel. (0130) 83 30 31 (06196) 3031 Fax (06196) 83639 info@de.neb.com
- New England Biolabs Ltd., UK Tel. (0800) 31 84 86 (0462) 420616 Fax (0462) 421057 info@uk.neb.com

DISTRIBUTORS: Australia (075) 94-0299; Belgium 078 119815; Brazil (011) 66-3565; Denmark (31) 56 20 00; Finland (90) 420-8077; France (1) 34 60 24 24; Greece (01) 5226547; India (542) 311473; Israel (03) 535-1205; Italy (02) 38103171; Japan (03) 3272-0671; Korea (02) 5560311; Mexico (5) 519-3463; Netherlands (033) 95 00 94; New Zealand (09) 418-3039; Norway 22 22 04 11; PR of China (1) 2544399; Portugal (01) 858 15 64; Singapore 445 7927; Spain (01) 594 0806; Sweden (08) 734 8300; Switzerland (061) 481 47 13; Taiwan (02) 8964437

Circle No. 43 on Readers' Service Card



Superior Software Innovative Phosphor Screen Chemistry



We Give You The Flexibility You Need To Build the Image Analysis Systems You Want.

Bio-Rad Laboratories, the technology leader in image analysis, brings you a variety of imaging systems to meet all of your research needs.

- Innovative Imaging Systems
 - Phosphorescence based imaging
 - Densitometry
 - Gel documentation
 - Confocal imaging
- Unique Phosphorescence Screen Technology
 - Chemiluminescence
 - ^{125}I , ^{32}P , ^{14}C , ^{33}P , ^{35}S detection
 - Reusable ^3H screens

- Comprehensive Software Packages
 - Fingerprinting analysis
 - RFLP analysis
 - DNA Sequence analysis
 - 1-D and 2-D analysis
- Powerful Image Analysis Software
 - Macintosh, PC, and UNIX software
 - Superior user interface
 - Free upgrades

For information, call
1-800-4BIORAD
(1-800-424-6723)
today.



Bio-Rad, Advanced Imaging Systems
Your Edge in a Competitive World.

BIO-RAD

**Bio-Rad
Laboratories**

Life Science Group

(US) (800) 4BIORAD • (AU) 02-805-5000 • (AT) (1)-877 89 01 • (BE) 09-385 55 11 • (CA) (905) 624-0713 • (CN) (01) 2563148 • (FR) (1) 49 60 68 34 • (DE) 089 31884-0 • (IT) 02-21609 1 • (JP) 03-3534-7515 • (HK) 7893300 • (NL) 08385-40666 • (NZ) 09-443 3099 • (SG) (65) 443 2529 • (ES) (91) 661 70 85 • (SE) 46 (0) 8-735 83 00 • (CH) 01-810 16 77 • (GB) 0800 181134

Circle No. 17 on Readers' Service Card

SIG 093093

The new WILD MZ8 stereomicroscope

The WILD MZ8 –
Innovation in design,
in technology, in environ-
mentally-conscious manu-
facturing. Compatible
interfaces create a host
of outfits for a multitude
of applications.
Uncompromising ergo-
nomics and functionality.
WILD MZ8 –
The confident decision
for optical quality and
fatigue-free work.



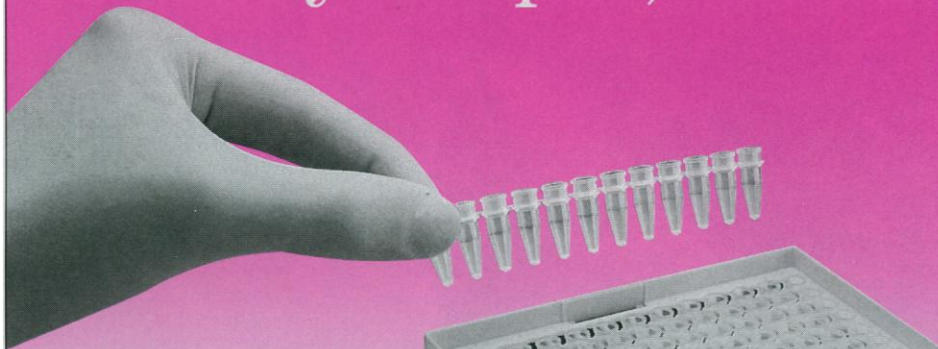
Leica AG · CH-9435 Heerbrugg (Switzerland) · Telephone +41 71 70 31 31 · Fax +41 71 72 16 38

**Leica –
Natural reliability**

Circle No. 25 on Readers' Service Card

Leica

So Many Samples, So Little Time.



Prepare 12 Samples in the Time it Takes for One With New Strip-Ease® PCR Tubes.

Introducing Strip-Ease-12, convenient strips of twelve thin wall, 0.2ml PCR* tubes and matching strips of caps. Strip-Ease-12 joins our widely popular Strip-Ease-8 and single thin wall tubes for today's 96 tube thermal cyclers.

- Strip-Ease "strip-of-tubes" format streamlines sample handling. Use with 8 or 12 channel pipettors.
- Thin wall construction and domed caps for short cycle times and high yields without oil.

- Offered in seven distinctive colors for easy sample identification.
- Certified RNase and DNase free/available sterile or nonsterile.
- Compatible with nearly all brands of 96 tube thermal cyclers.
- Thin wall 0.6 ml PCR tubes also available for first generation thermal cyclers.

*PCR patents are owned by Hoffmann-LaRoche, Inc., Nutley, NJ.

For a free sample or to request our new PCR product guide, contact Robbins Scientific at **800-752-8585**. Outside the U.S., contact your local Robbins distributor.

Robbins Scientific® Robbins Scientific Corporation
814 San Aleso Ave., Sunnyvale, CA 94086-1411 (408) 734-8500 (800) 752-8585 Fax (408) 734-0300

Circle No. 46 on Readers' Service Card

NEW FROM THE SCIENCE REPRINT LIBRARY!

Women in Science 1994

Women in Science 1994: Comparisons Across Cultures, \$4.00. Full-color, 31 pages, from SCIENCE March 11, 1994. Sections: Germany: Scientist Homemakers; Italy: A Warm Climate for Women; Sweden: Leveling the Playing Field; Additional features on women in science in Turkey, The Philippines and India; Policy Forums: Status and Prospects of Women in Science in Europe, Interventions to Increase Participation of Women in Physics.

Women in Science 1993: Gender & Culture, \$3.00. Full-color, 49 pages, from SCIENCE April 16, 1993. Sections: The Female Style; Industrial R&D; Science Education; A Case Study: Primatology. (Limited stock)

Women in Science 1992: Survey issue, \$3.00. Full-color, 28 pages, from SCIENCE March 13, 1992. Sections: Profile of a field: Neurosciences, Chemistry, Mathematics; Key Issues: Mentoring, Two-career Science Marriage, Datapoints. (Limited stock)

Women in Science: 1992, 1993, 1994, Set: \$8.00
One copy of all three issues as described above.

SCIENCE

To Order call: (202) 326-6527, or fax: (202) 682-0816. Ask us about bulk order discounts!

☐ **Yes! Send me the SCIENCE 1994 Women in Science reprint!** I have listed the quantities of each issue I need and included payment information on this order form.

Payment Method (\$25 minimum for credit card orders)

☐ Check ☐ Mastercard ☐ Visa

Credit Card Number _____ Exp. date _____

Signature _____

Name _____

Address _____

Telephone (_____) _____

Please allow six weeks for delivery.

Please send me:

____ copies of Women in Science '94: Comparisons Across Cultures @ \$4.00/each

____ copies of Women in Science '93: Gender & Culture @ \$3.00/each.

____ copies of Women in Science '92: Survey issue @ \$3.00/each.

____ Set of three: Women in Science: '92, '93, '94 @ \$8.00/each set

Amount Enclosed \$ _____ CA residents please add sales tax.

Please make all checks out to AAAS. Send PREPAID order to:

AAAS Reprint Department, Attention: Corrine Harris,
1333 H Street, NW, Washington, DC 20005 USA

WISHAD 5/94

INTERCIENCIA

Interciencia is a tri-lingual journal of science and technology in the Americas. Edited and published bi-monthly under the direction of Dr. Marcel Roche in Caracas, Venezuela, **Interciencia** accepts articles and research notes in English, Portuguese, and Spanish. Feature articles focus on development-related issues such as agriculture and nutrition, health, tropical forests and arid lands, forestry, and environmental and marine sciences.

Interciencia is published by Interciencia Association, a non-profit organization founded in 1974 in Recife, Brazil, and chartered in Caracas. Interciencia Association aims to unite and strengthen the scientific communities of the Americas. The American Association for the Advancement of Science (AAAS) serves as U.S. liaison to the association.

To subscribe, send your name and complete mailing address with payment (check or purchase order payable to INTERCIENCIA) to: Ms. Helen A. Thomas, Interciencia, c/o AAAS International Programs, 1333 H Street, N.W., Washington, DC 20005 USA; fax: 202-289-4958; internet: hthomas@aaas.org

SUBSCRIPTION RATES
INDIVIDUAL SUBSCRIPTION US \$25.00

INSTITUTIONAL SUBSCRIPTIONS:

DEVELOPING COUNTRIES	US \$45.00
USA AND CANADA	US \$60.00
EUROPE	US \$63.00
ASIA AND AUSTRALASIA	US \$65.00

GENSET GUARANTEED OLIGOS™

Automated DNA plant

range of synthesizers
capacity > 350 oligos/day

+

Total quality

E-mail direct ordering
bar-code sequences follow-up
robots for post-synthesis steps
highest quality controls

=

Guaranteed oligos

unpurified oligos
fully deprotected
fully desalted
PAGE controlled
delivered dosed
ready to use
sequence guaranteed

in 2 days
from \$2.5 to \$4.0/base

GENSET CORP.

505 Coast Blvd South, La Jolla CA 92037

For inquiries

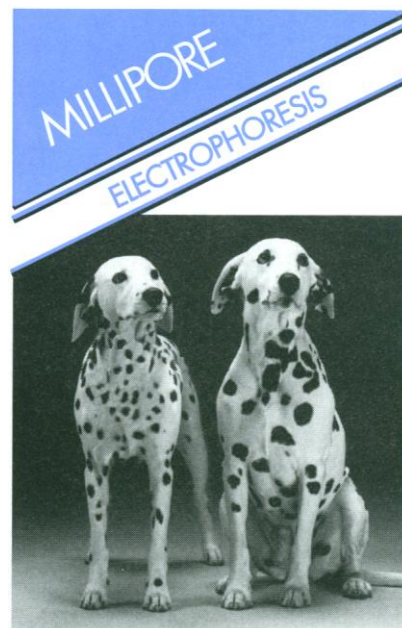
West: 800 995 03 08 East: 800 892 1956
(Europe & Asia: 33 (1) 43 56 59 00)

To order

Fax: 800 551 5291
E-mail: oligos@gensetlj.com



Circle No. 47 on Readers' Service Card



Spot the difference!

2-D electrophoresis has long been acknowledged as a powerful tool for purifying proteins on an analytical scale, but not on a preparative scale because of limited loading capacity. Until now.

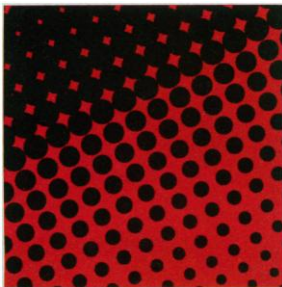
Using Millipore's Investigator™ 2-D Electrophoresis System and a Preparative Accessories Package, you can prepare enough protein for sequencing or other assays. Load up to 1 mg and retrieve 1-10 µg from a purified spot. You can even run five gels simultaneously for duplicate samples – with the same high resolution that has made the Investigator 2-D Electrophoresis System the most widely used dedicated 2-D system.

On a free gel!

Place your order for a Preparative Accessories Package (with or without an Investigator System) by September 30, 1994 and receive a free package of pre-cast gels. For more information call 1-800-MILLIPORE or our fax on demand information retrieval system at 1-800-MILLIFX and request #1703. In Japan, call (81) (3) 3471-8191. In Europe, contact the local office or fax us in France (33) (1) 30.12.7189.

MILLIPORE

Circle No. 41 on Readers' Service Card



MOLECULAR RESEARCH CENTER, INC.

Introduces a splendid isolation for life science and clinical research

TRI REAGENT™

*The most capable reagent in molecular biology
simultaneously isolates total RNA, poly A⁺ RNA, DNA and Proteins*.*

The simultaneous isolation of RNA, DNA and proteins from the same sample by TRI REAGENT™ is the newest version of the single-step liquid-phase separation method (P. Chomczynski, *Biotechniques*, Vol. 15 No. 3 1993). This highly reliable method performs well with small and large quantities of tissues or cultured cells, and allows simultaneous processing of a large number of samples of human, animal, plant, yeast, bacterial and viral origin. For the simultaneous isolation of RNA, DNA and proteins from liquid samples such as whole blood, serum and CSF we offer TRI REAGENT™ LS.

- **Total RNA** is isolated in 1 hour and is ready for Northern (See Figure) and dot blotting, RT-PCR (Hoffmann LaRoche Corp. patent), RNase protection assay and molecular cloning. 1ml of the reagent isolates 50-200 µg of total RNA.
- **Poly A⁺ RNA** is isolated in 1.5 hours by application of the aqueous phase containing total RNA on the oligo dT-cellulose column.
- **High molecular weight DNA** is isolated in 3 hours and is ready for restriction analysis, Southern (See Figure) and dot blotting, PCR and molecular cloning.
- **Proteins** are isolated in 3 hours and are ready for Western blotting (See Figure).

Introductory discount of 20% for first time orders (U.S. only): 50ml TRI REAGENT™ (cat. no. TR-118-IS), 50 ml TRI REAGENT™LS (cat. no. TS-120-IS), 5 reusable oligo dT-cellulose columns (cat. no. OT-125). We guarantee that TRI REAGENT™ will outperform RNA, poly A⁺ RNA, and DNA isolation methods currently used in your laboratory. For more information or to place an order call 1-800-462-9868, 513-841-0900, or contact us by Fax 513-841-0080.

* Patent pending

North America

MRC
MOLECULAR RESEARCH CENTER, INC.
5645 Montgomery Rd.
Cincinnati, OH 45212

United Kingdom

MOLECULAR RESEARCH CENTRE OXFORD
Oxford, U.K.
PHONE: 44-865-351-511
FAX: 44-865-351-511

Italy

BIO-OPTICA MILANO SpA
Milano, Italy
PHONE: 39-2-26-40-274
FAX: 39-2-21-53-000

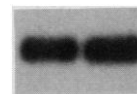
Israel

TAL-ROW
Rehovot, Israel
PHONE: 972-8-472563
FAX: 972-8-471156

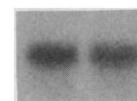
Taiwan

PAN ASIA BIOMEDICAL TECHNOLOGY, INC.
Taipei, Taiwan
PHONE: 886-2-7418169
FAX: 886-2-7764372

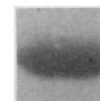
Northern blot of rat
growth hormone
(rGH) mRNA (1 kb)



Southern blot of EcoR1
rGH gene fragment
(11.4 kb)



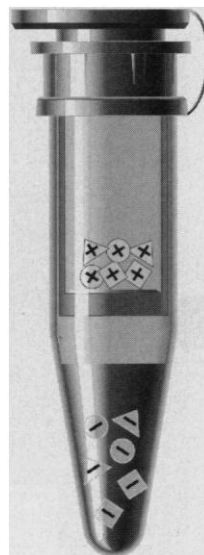
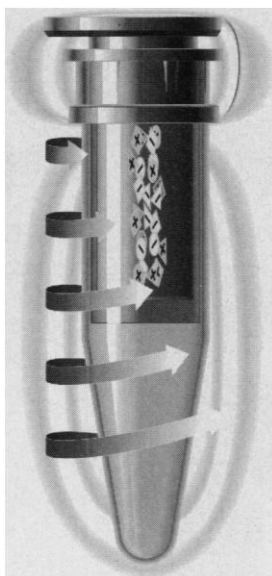
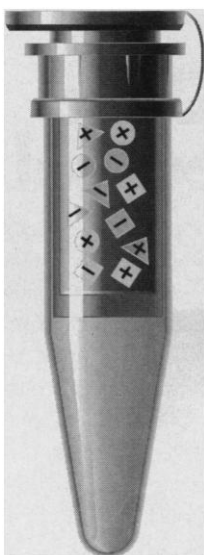
Western blot of rGH
(22 kD)



Circle No. 10 on Readers' Service Card

A New Spin On DEAE-Based Separations.

The Power Of DEAE. With A Twist.



Now you can achieve, on a microscale level, very fine separations of complex protein mixtures—fast. Introducing the Ultrafree®-MC DEAE centrifugal filter from Millipore. The only device that gives you the speed and ease of centrifugal filtration and the selectivity of an anion-exchange chromatography membrane.

How about a test spin? Call us for a free sample. US and Canada, 1-800-MILLIPORE ext. 8017. Japan, (03) 3474-9116. Europe (fax to our Paris headquarters), +33.1.30.12.71.83.

MILLIPORE

© 1994 Millipore Corporation

Circle No. 40 on Readers' Service Card

THE NEW BIOMEK® 2000 AUTOMATES LIFE SCIENCE... YOUR WAY

Automate virtually any liquid-handling procedure *the way you want* with the Biomek® 2000 Laboratory Automation Workstation from Beckman. Choose the labware, tools and accessories you require to perform your research with the powerful and easy-to-use Windows®-based BioWorks™ operating system.

EXTENSIVE APPLICATIONS

Years of reliability, versatility and innovation have made Biomek the benchmark system for BioRobotics in Pharmaceutical, Human Genome and Bioresearch laboratories worldwide. This new generation Workstation provides the productivity and throughput you need today for:

- **Immunology** — ELISA and RIA
- **DNA** — Sequencing, Mapping and PCR** Processes
- **Drug Discovery** — Receptor Binding and Cytotoxicity Assays
- **Biochemistry** — Total Protein and Enzymatic Assays
- **Molecular Diagnostics** — HLA Typing and Prenatal Screening
- **Quality Control** — Endotoxin Testing and Liquid Extractions
- **Tissue Culture** — Cell-based and Sterile Techniques
- **Clinical Research** — HIV and Hepatitis Screening

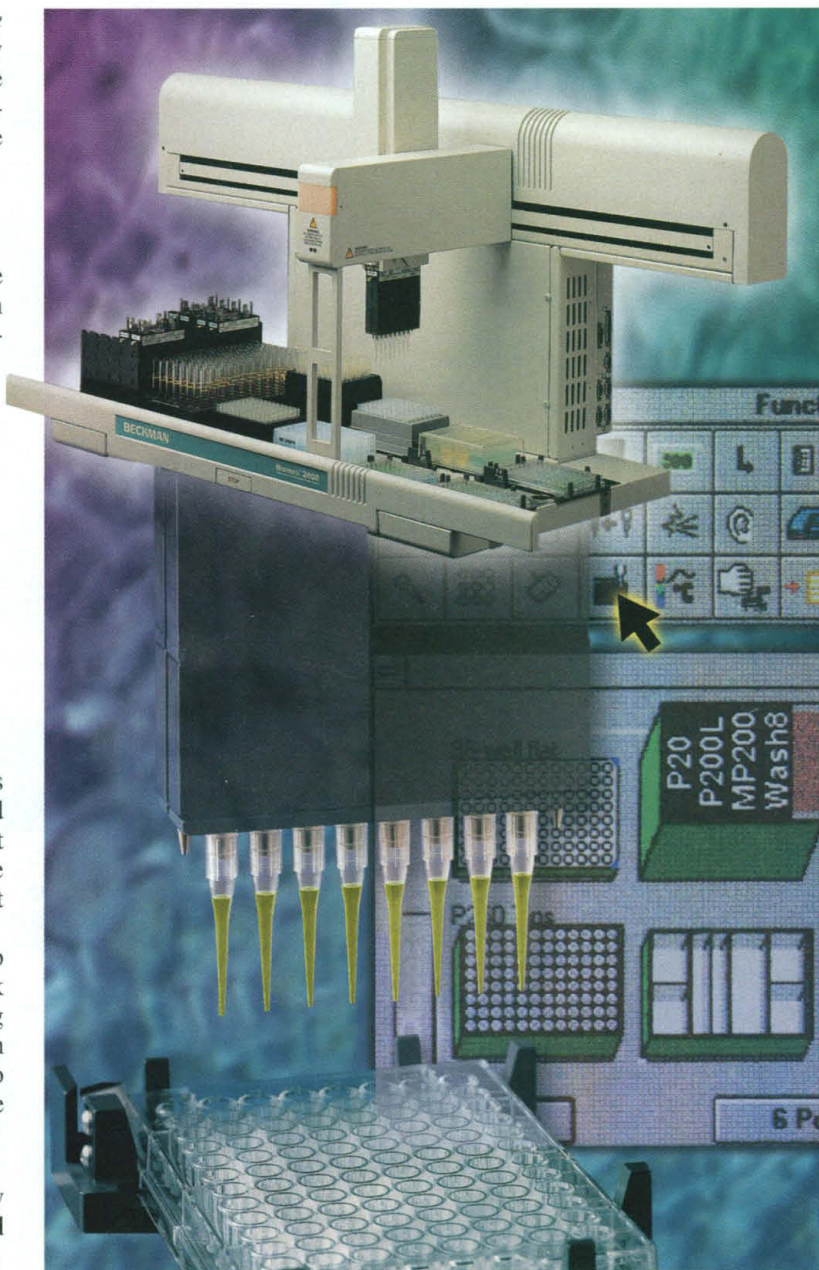
INTELLIGENT PERFORMANCE

Intuitive icon-based BioWorks software intelligently automates your protocols in minutes. Advanced workstation features and fast motion translate operating system commands into efficient performance. The Biomek easily integrates other software programs and devices into a complete automation solution that includes temperature control, detection and quantitation.

For greatest flexibility in automating repetitive tasks, up to 12 user-defined positions are available on the large Biomek worksurface. The unique interchangeable liquid-handling tools deliver accurate volumes from 1.0 µL to 150 mL with exceptional precision. And the modular design allows you to add options as you need them, such as the high-capacity Side Loader system for extended periods of unattended operation.

Find out how you can Automate Life Science...Your Way by contacting your local Beckman office for *free* technical information about the new Biomek 2000 BioRobotics System.

* Windows is a trademark of Microsoft Corporation.
** PCR is covered by patents owned by Hoffmann-La Roche Inc.



BECKMAN

Worldwide Offices: Africa, Middle East, Eastern Europe (Switzerland) (22) 994 07 07. Australia (61) 02 816-5288. Austria (2243) 85656-0. Canada (800) 387-6799. China (861) 5051241-2. France (33) 1 43 01 70 00. Germany (49) 89-38871. Hong Kong (852) 814 7431. Italy (39) 2-953921. Japan 3-3221-5831. Mexico 525 575 5200, 525 575 3511. Netherlands 02979-85651. Poland 408822, 408833. Singapore (65) 339 3633. South Africa (27) 11-805-2014/5. Spain (1) 358-0051. Sweden (8) 98-5320. Switzerland (22) 994 07 07. Taiwan (886) 02 378-3456. U.K. (0494) 441181. U.S.A. 1-800-742-2345.

©1994 Beckman Instruments, Inc.

Circle No. 15 on Readers' Service Card

Thermalase Tbr™ Thermostable DNA Polymerase



- Higher fidelity than Taq DNA polymerase
- Higher thermostability than Taq polymerase
- Long (6kb) primer extensions routinely achieved
- Economically priced

AMRESCO is proud to announce the addition of Thermalase Tbr™ Thermostable DNA Polymerase to

its offering of enzymes and reagents for molecular biology. Isolated from a proprietary strain of *Thermus brokianus*, Thermalase Tbr offers some distinct advantages over Taq polymerase in primer extension reactions.

amresco®

AMRESCO Inc.
30175 Solon Industrial Pkwy. • Solon, OH 44139
(800) 829-2805 • FAX: (216) 349-1182

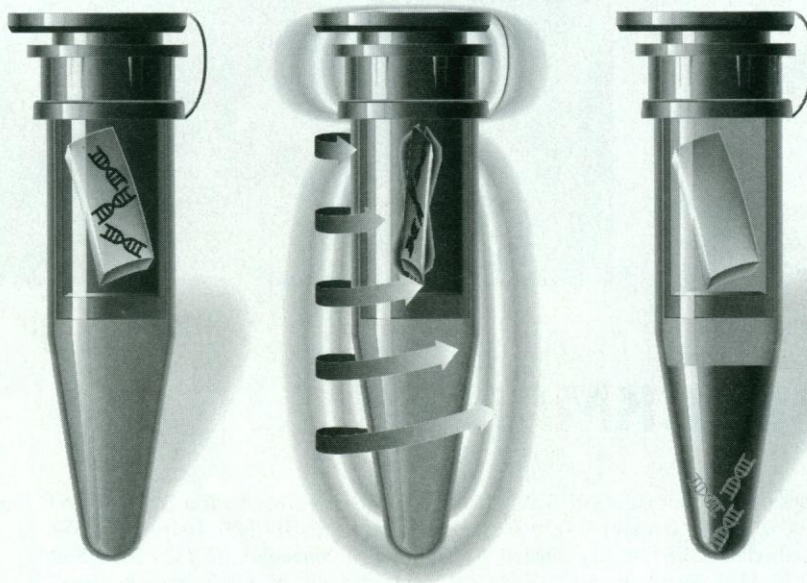
©1994 by AMRESCO Inc. All rights reserved. AMRESCO® is a registered trademark of AMRESCO Inc. 4/94
Circle No. 13 on Readers' Service Card

AUSTRALIA: +61-2-5402055 AUSTRIA: +43-1-889-18-19 CANADA: +416-470-2570 CHINA: +852-8983008
CZECH REPUBLIC: +42-5-740-938 FRANCE: +33-70-03-88-55 GERMANY: +49-51-50-686-0
GREECE: +30-1-7235523 HONG KONG: +852-8983008 HUNGARY: +42-5-740-938
INDIA: +91-1160-8710 IRELAND: +353-1-391212 ISRAEL: +972-2-520279
ITALY: +39-2-5097-221 JAPAN: +81-3-3663-3271 KOREA: +82-2-203-0707
MALAYSIA: +65-288-6388 MEXICO: +52-5-654-4245 NETHERLANDS: +31-75-31-05-53
PANAMA: +507-26-0948 POLAND: +42-5-740-938 SINGAPORE: +65-288-6388
S. AFRICA: +27-11-886-1900 SPAIN: +34-1-551-14-91 SWEDEN: +46-31-36-3000
SWITZERLAND: +41-21-728-77-72 TAIWAN: +886-2-381-0844
THAILAND: +66-2-2748331-3 U.K.: +44-622-678872
VENEZUELA: +58-2574-8434 YUGOSLAVIA: +41-21-728-30-66

Stop and see us at the AACC Meeting – Booth 2152

A New Spin On DNA Recovery From Agarose.

Painless Elution. Literally.



When it comes to DNA elution from agarose gels, it doesn't get any easier than Millipore's Ultrafree®-MC 0.45µm centrifugal filters. Just cut out the DNA band. Freeze/thaw. Macerate the gel. Place in an Ultrafree-MC unit. Spin a couple of times. That's all it takes for clean, concentrated DNA. It's simple. Painless. And with our special trial offer, it's free.

For an Ultrafree-MC sample, give us a call. US and Canada, 1-800-MILLIPORE ext. 8017. Japan, fax to (03) 3424-9141. Europe (fax to our headquarters in Paris), +33.1.30.12.71.83.

MILLIPORE

© 1994 Millipore Corporation

Circle No. 48 on Readers' Service Card

Half-Day DNA. And That's Just The Half Of It.



Synthesizing primers, probes, linkers, or gene fragments? Cut your time — and your reagent use — in half with the Millipore Expedite™ Nucleic Acid Synthesis System.

For instance, a pair of 20-mer PCR primers can be synthesized in about an hour and worked up in about 15 minutes, so you can start using your new DNA before noon.

How's that possible? Because no matter how many columns you're running — 1, 2, 3, or 4 — the total cycle time is under 4 minutes. The Expedite system's exclusive alternating phase synthesis allows columns to act independently, so each is always synthesizing.

Expedite reagents speed things along further. Oligonucleotides made with Expedite brand

chemistry can be deprotected in only 15 minutes at 55°C or 2 hours at room temperature.

But speed is just half the story. The Expedite system's patented microfluidics plate provides for extremely low internal volume. Reagent delivery to the column is cut by as much as 50% over other systems. So, you get more couplings per chemistry changeout; more DNA synthesized per dollar.

Now you've got the whole picture. Just give us a call and we'll send you more information, expeditiously. In the U.S. and Canada 1-800-872-0071.

In Japan (03) 3471-8191 and Europe (44) 0923 816375.



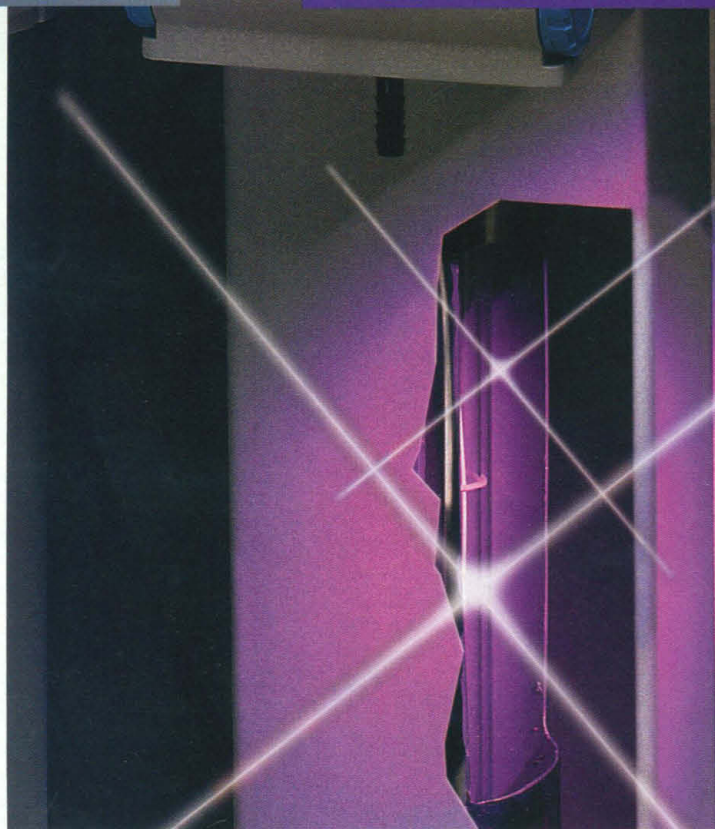
BIOSEARCH
Subsidiary of Millipore

Circle No. 14 on Readers' Service Card



The NANOpure™ UV
Reagent Grade Water
System from Barnstead.

Pure. Purer. Purerer.



When your work requires absolutely the purest water possible, our new NANOpure UV is for you. By using dual wavelength ultraviolet light in a sealed chamber, the NANOpure UV produces reagent grade water up to 18.3 megohm with **less than 3 parts per billion of Total Organic Carbon** – pure enough for your most rigorous application. Of course the NANOpure UV also offers the convenience, reliability and value for your limited research dollar that you've come to expect from our extensive line of ultrapure water products.

For over 100 years, Barnstead has been defining water purification technology. Today, Barnstead NANOpure systems continue to be the number one choice for any application requiring consistently ultra-pure water.

For more information about our water purification systems, call us at 1-800-553-0039.



Barnstead
Barnstead | Thermolyne a subsidiary of SYBRON CORPORATION

2555 Kerper Blvd. • P.O. Box 797
Dubuque, Iowa 52004-0797

The Barnstead/Thermolyne Lab...
a family of innovative products for
scientific research.

The simplest solution to complex photomicrography.

If you think advanced photomicrography is as difficult as it looks, or that the system you'd like won't fit the microscope you have, here's a simple solution.

The new Olympus PM30 Photomicrographic System.

Ideal for researchers who want consistent, optimum results made easier than ever, the PM30 combines auto-exposure accuracy with innovations like a CCD 2-dimensional matrix sensor and unique .01% micro-spot metering. And it works on virtually any microscope, especially the Olympus B-Max Systems, to provide the highest standards of publication-quality photomicrography.

Capturing Fluorescence.

The PM30 takes the guesswork out of fluorescence photomicrography—and with the B-Max Research Microscope System, your fluorescence comes with brightfield, Nomarski DIC modes and more. All instantly accessible with a Universal Vertical Illuminator and the first Universal Plan Apochromat objectives designed for use with both polarized light and high transmission of low UV wavelengths.

For precise color rendition. For perfect exposure in Nomarski DIC, phase contrast and darkfield with the ease of brightfield. And for unprecedented resolution, contrast and light transmission for your most challenging photomicrographs.

- Super Fluorescence Auto mode with new CCD 2-dimensional matrix exposure sensor measures only the areas of the specimen

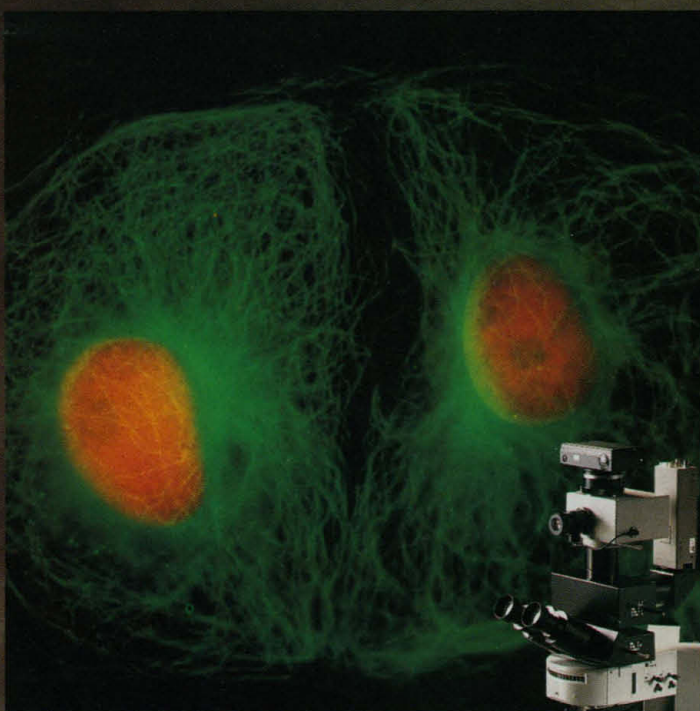
- Internal data storage for up to 4 photomicrographic parameter settings, or optional multi-user memory cards.

- Data imprinting on all film formats.
- Convenient Jog Dial for accessing and setting controls.
- Auto-bracketing for sequential photos with increased/decreased exposure times.

Photocustomize.

Customize the Olympus PM30 to your microscope and we'll include just the adaptor you need. Or apply it to a new era of responsive microscopy with our revolutionary B-Max Series Microscopes.

Either way, you'll see how simple the choice can be. For a demonstration, call **1-800-446-5967.**



showing fluorescence excitation.

- The PM30 viewing prism swings out of the light path, so all available light goes to the film to ensure the shortest possible exposure times.
- 3 optional measuring areas: Exclusive .01% micro-spot measurement—the most precise today—predicates exposure on a minute part of the field of view; or a 1% spot and 30% averaging exposure metering.



For more information write: Olympus America Inc., Precision Instrument Div., 4 Nevada Drive, Lake Success, NY 11042-1179, Fax: 516-222-7920. Canada: Carsen Group, Inc., Markham, Ontario, 905-479-4100, Fax: 905-479-1610. Latin America: Miami, FL, 305-266-2332, Fax: 305-261-4421.

Circle No. 20 on Readers' Service Card

Announcing...

**NO ANNUAL FEE and a Special
9.9%[†] Annual Percentage Rate
(APR) on Cash Advances and
Balance Transfers for AAAS Members.**



*Introducing the AAAS Visa® Gold
card, with NO ANNUAL FEE. Many AAAS*

*members have already discovered the bene-
fits of the AAAS Visa Gold card. Now, through
this special offer, you can join your colleagues
in carrying the only credit card endorsed by*

the AAAS.

The American Association for the

*Advancement of Science is pleased to present
a special introductory 9.9% APR on cash*

advances. As a part of your welcome package
you will receive two Premium Access Checks*

*that you can use to pay off or pay down other
credit cards and installment loans.*

Extra benefits include:

- A very low 13.9% variable APR on purchases
- Higher lines of credit ... up to \$50,000
- 30 minute credit line increases
- Convenient year-end summary of charges for
active Visa Gold accounts**

**Now you can carry the AAAS card with these
and many other unsurpassed benefits and
pay no annual fee.**



1-800-847-7378, ext. 400
Call Now!

Please use this priority code when calling: **MREM.**

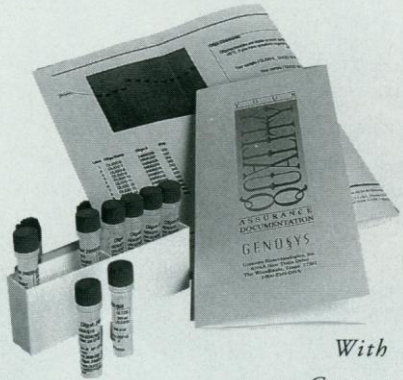
†The Annual Percentage Rate (APR) for purchases is 13.9%, which may vary. The APR is 9.9% on cash advances through your first six statement closing dates commencing on the month after your account is opened and may vary thereafter (applies to both new and outstanding cash advance balances). The current indexed rate for cash advances is 13.9%, which may vary. Transaction fee for two specifically designated Premium Access Checks* or Preferred Access Checks* will be waived. The information about the cost of the card described in this application is accurate as of 5/94. The information may have changed after that date. To find out what may have changed, call 1-800-847-7378.
Certain restrictions apply to these and other benefits as described in the benefits brochure that accompanies your Premium Access Checks or Preferred Access Checks*.
MBNA America, Premium Access Checks and Preferred Access Checks are federally registered service marks of MBNA America Bank, N.A. MasterCard® is a federally registered service mark of MasterCard International, Inc., used pursuant to license. Visa® is a federally registered service mark of Visa U.S.A., Inc., used pursuant to license.
© 1994 MBNA America Bank, N.A.

GENOSYS

CUSTOM OLIGONUCLEOTIDE AND PEPTIDE SYNTHESIS

Arbitrary 10-mer primer kits for fingerprinting and genetic mapping

Each kit includes ten arbitrary 10-mers, selected on the basis of a 50%, 60%, 70% or 80% G+C content, your choice. The arbitrary sequences avoid the presence of complementary ends and palindromes. Additional kits contain 10-mers with common restriction sites, so that amplified products may be digested and cloned for further study. All primers are supplied dry with a guaranteed yield of 0.5 O.D. units. Prices start at \$65 per kit.



With every Genosys oligo, the proof is in the package. Your Quality Assurance Certificate includes a digitized PAGE image, measured yield in O.D.s and µg, and valuable information about your oligo, such as melting temperature, molecular weight and %AT.

**Custom Oligos
\$2.50 Per Base,
Plus \$20. Setup**

Turn down the heat with non-radioactively labeled oligos.

If it's too hot in the lab, Genosys can help cool things down — with non-isotopically labeled custom oligos.

The process is simple. We synthesize your oligo, attach the label of your choice, and deliver your purified product in 7–10 days.

For chemiluminescent or colorimetric detection, any custom oligo can be labeled with biotin or digoxigenin (licensed from Boehringer Mannheim).

For fluorescent detection, choose from fluorescein, the ABI dyes, Texas

red, or rhodamine. You always receive at least 1.5 O.D.s of labeled product.

Standard Sequencing Primer Kits

All of the most commonly used sequencing primers are also available labeled with either biotin, fluorescein, or all four ABI dyes. These off-the-shelf primers are shipped within 24 hours. And they're supplied purified, dried, and ready-to-use — enough for over 100 sequencing reactions.

For more information, fax back or return the coupon below. Or call 1-800-234-5362.

NOW YOU CAN ORDER WHOLE GENES AS EASILY AS PROBES AND PRIMERS

We'll work with you to design a coding sequence to suit your application. We'll clone it into the vector of your choice, verify the sequence, and deliver a guaranteed product, complete with restriction maps and QC autoradiographs.

ORDER NOW AND GET A FREE STANDARD PRIMER OR PROBE!

Return or fax this coupon for details, or call

1-800-234-5362

- ☐ Free standard primer or probe ☐ Custom oligo synthesis ☐ Non-isotopic labeled oligos
☐ Custom gene synthesis ☐ Arbitrary 10-mer primers ☐ Non-isotopic sequencing primer kits

Name

Company/Institution

Address

City State Zip

Phone Fax

GENOSYS

Genosys Biotechnologies, Inc.
 1442 Lake Front Circle, Suite 185, The Woodlands, TX 77380-3600
 Phone: (713) 363-3693 Fax: (713) 363-2212

S

Copyright © 1994 Geonsys Biotechnologies, Inc.

Circle No. 5 on Readers' Service Card

Putting a value on information may be difficult, but consider the cost of *misinformation*.

In this, the information age, your company's information base is its most important asset. This is especially true for companies where chemical research is critical to new product development, and where profitability depends on filing patent applications perhaps only days ahead of your competition.

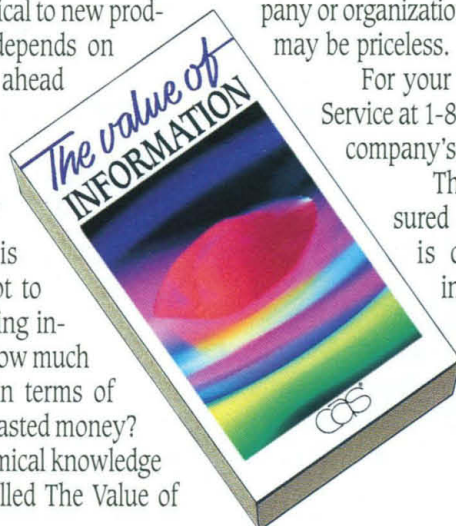
So how do you quantify the value of information? Or perhaps more important, how do you determine the real cost of misinformation, or of information that is prohibitively time-consuming to access (not to mention the totally hidden cost of reproducing information that is available, but unknown)? How much is misinformation costing your company in terms of wasted time, wasted human resources and wasted money?

CAS, the foremost compendium of chemical knowledge in the world, has produced a new video called *The Value of*

Information that explores these issues and offers some new perspectives on defining the value of information for your company or organization. Its value to your company's performance may be priceless.

For your \$15 copy, simply call Chemical Abstracts Service at 1-800-753-4CAS. Or fax your request on your company's letterhead to 1-614-447-3751.

The real value of information can be measured only in the effects it produces. And CAS is committed to providing the kind of information that makes scientists and engineers more productive, and companies more competitive.



CAS® *A Division of the
American Chemical Society*

Circle No. 28 on Readers' Service Card



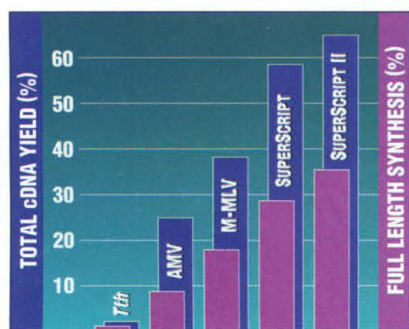
For Superior RT-PCR, Choose GIBCO BRL SUPERSCRIPT™ II RT and *Taq* DNA Polymerase

GIBCO BRL SUPERSCRIPT II RNase H⁻ Reverse Transcriptase[†] (RT) generates > 50% more full length cDNA and greater yields of first strand cDNA than other RTs. It is uniquely engineered by the introduction of point mutations, which result in a 10⁶- to 10⁷-fold reduction in RNase H activity without any loss of DNA polymerase activity. You can amplify *any* region of any message and achieve successful RT-PCR.

SUPERSCRIPT II RT works well on total RNA, eliminating the need to generate poly(A) RNA, which saves you time and reagent costs. It's active up to 50°C to reduce interference by secondary structure in the RNA template.

And now, GIBCO BRL *Taq* DNA Polymerase is both licensed and qualified for PCR.

So for superior RT-PCR, choose high quality GIBCO BRL SUPERSCRIPT II RT and *Taq* DNA Polymerase...only from Life Technologies.



Comparison of Reverse Transcriptases using
1 µg of a 7.5-kb RNA Template.



To Order/TECH-LINESM: (800) 828-6686

Product	Cat. No.	Size
SUPERSCRIPT™ II RNase H ⁻ Reverse Transcriptase & Buffer	18064-014	10,000 units
<i>Taq</i> DNA Polymerase* & Buffer	18038-018	100 units
	18038-042	500 units
	18038-067	1,500 units

LIFE  TECHNOLOGIES™

Producer of GIBCO BRL Products

Corporate Headquarters
8717 Grovemont Circle
P.O. Box 6009
Gaithersburg, MD 20884-9980 U.S.A.
(301) 840-8000

U.S.A. Orders
P.O. Box 68
Grand Island, NY 14072-0068 U.S.A.
Facsimile: (800) 331-2286
To Order/TECH-LINE: (800) 828-6686
Industrial Customers: (800) 874-4226

U.S.A. Office for Latin America
To Order/TECH-LINE: (301) 840-4027
Facsimile: (301) 258-8238

Canada Orders
Burlington, Ontario L7P 1A1 Canada
To Order: (416) 335-2255
TECH-LINE: (800) 757-8257

[†]U.S. Patent No. 5, 244, 797. SUPERSCRIPT™, TECH-LINE™, and the Life Technologies logo are marks of Life Technologies, Inc. For research use only. Not intended for human or animal diagnostic or therapeutic use.

**Taq* DNA Polymerase is sold under licensing arrangements with Roche Molecular Systems and The Perkin-Elmer Corporation.

Purchase of this product is accompanied by a license to use it in the Polymerase Chain Reaction (PCR) process in conjunction with an authorized thermal cycler.

94-067

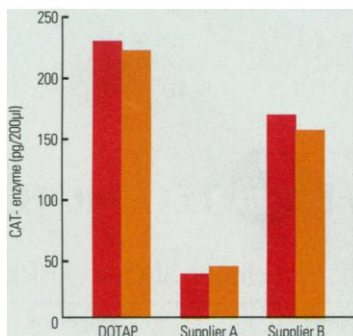
Circle No. 18 on Readers' Service Card



Gentle efficiency

Like the bees and wasps it closely resembles, the hover fly efficiently carries pollen between a vast variety of flowers. But unlike its more dangerous counterparts, this harmless species neither bites nor stings.

In the same way, Boehringer Mannheim's transfection reagent (DOTAP) performs a vital function in your lab, efficiently carrying DNA, RNA, proteins or peptides into a multitude of cell lines. Gentle like the hover fly, DOTAP does not exhibit the cytotoxicity of other liposome-mediated techniques or the inconvenience of more traditional transfection methods.



Comparison of transfection efficiencies of different liposome-mediated reagents. COS-1 cells at 60% confluency were transfected for 8 hours with 5 µg pSV2-CAT DNA in 6 ml of medium containing **10% Fetal Calf Serum**. Liposomal transfection reagents from Boehringer Mannheim, Supplier A, and Supplier B were used in the transfection. After 48 hours of stimulation, the cells were lysed and analyzed for CAT expression with the Boehringer Mannheim nonradioactive CAT ELISA. The CAT expression indicates the efficiency of the transfection. The reproducibility of results is indicated by the orange bars (Experiment 1) and gold bars (Experiment 2).

Avoid the inconvenience of serum removal

DOTAP delivers high-efficiency transfections even in the presence of serum. Eliminate the inconvenience of removing your cells from serum. Avoid a potential risk to your cells.

Efficiency without cytotoxicity

Boehringer Mannheim's DOTAP is gentle and non-toxic to your cells, increasing cell viability and resulting in significantly higher transfection efficiencies. DOTAP's molecular structure includes ester linkages, which are easily cleaved by natural cellular esterases. Other liposomal reagents contain ether linkages that cannot be hydrolyzed by the cell, resulting in cytotoxicity and decreased cell viability.

Flexible, fast, and easy to use

DOTAP produces high-efficiency transfections in most cell lines, including both adherent and suspension cultures. This fact, combined with DOTAP's ability to perform both stable and transient transfections, eliminates the need to use multiple techniques.

For efficient transfections without cytotoxicity, try DOTAP transfection reagent today! For more information or to place your order, contact your Boehringer Mannheim representative or call us at 1-800-262-1640 (514-686-7141 in Canada).

TRANSFECTION

DOTAP

CONVENIENCE
EFFICIENCY

*Leaving the
Limits Behind*

**BOEHRINGER
MANNHEIM**



Circle No. 45 on Readers' Service Card