

<text>

CLONE RESOURCES GENE ENPRESSION GENE SCREENING MOUSE HNOCHOUTS PLASTICS ROBOTIC SERVICES

IncyteGenomics

Easier online ordering! www.incyte.com

for hybridization screening.

Services - We guarantee at least one positive clone when we screen our genomic libraries for you (PCR or high-density nylon filter formats).

Choose from human, mouse, rat, soybean, maize, Arabidopsis, Drosophila, and more. See our full library list online.

Find out more! www.incyte.com

Or call toll-free in the United States 800.430.0030 International callers, dial +1 314.427.3222

800.430.0030 (U.S.) +1 314.427.3222 (International) www.incyte.com

Copyright 2000 Incyte Gene Circle No. 41 on Readers' Service Card

44 (0) 1223 454 900 (U.K.

Expressions are revealing. *Start your analysis with <u>the best RNA</u>!*





HUMAN TOTAL RNA

- * High-quality, pure RNA from specific tissues
- * Eliminates tedious, time-consuming lab procedures
- * Highest level of quality control
- * Useful for microarray interrogation
- * Well-documented donor and tissue pathology information
- * Matched sets of normal and diseased tissue
- * Convenient and dependable source







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

STRATAGENE EUROPE Beigium, Germany, The Netherlands, Switzerland, United Kingdom ORDER: 00800 7000 7000 TECHNICAL SERVICES: 00800 7400 7400 Austria

Ż



MARL: techservices@stratagene.com WEBSITE: <u>www.stratagene.com</u>

Stratagene's Human

Total RNA is subjected to stringent quality assurance, including tests to assure freedom from RNases, and functional testing by Northern analysis and by RT-PCR. Detailed quality control testing data is included with every shipment.

Eatal Eamala	
Brain	738006
Heart	738012
Kidney	738014
Liver	738018
Lung	738020
Spleen	738034
Fetal Male	
Bladder	738001
Brain	738005
Heart	738011
Kidney	738013
Liver	738017
Lung	738019
Adult Female	705014
Breast	735044
Cervix	735261
Colon	735010
Kidney	735012
Liver	735014
Ovary	735260
Skeletal Muscle	735030
Stomach	735038
Thyroid	735040
Uterus	735042
Adult Male	
Colon	735009
Liver	735017
Lung	735019
Rectum	735258
Cell Lines	
HeLa-S3	735400
Primary Cells	
Pulmonary Artery Smooth Muscle	780066
Skeletal Muscle	780074
Diseased Female Tissues	
lleum, Chronic Inflammation	735200
Matched set, Stomach	735250
normal and adenocarcinoma	
.154 .111	
ne l'antal	
Thinstilling	

Human Total RNA (100ug)







For an up-to-date list of Human Total RNA, visit www.stratamedicine.com

Martinessa / Martinessa

18 AUGUST 2000

NEWS OF THE WEEK

BIOTECHNOLOGY: Perseverance Leads to

MARS EXPLORATION: Plan for Two Rovers

TUMOR ANGIOGENESIS: Gene Expression

AGRICULTURE: Variety Spices Up Chinese

cience a

1118

1119

1121

1122

1197

1188

www.sciencemag.org

COVER Atomistic simulations of liquid nanojets extend hydrodynamics to the nanoscale. The image shows the leading part of a 6-nm-wide, 200-nm-long propane jet propagating in vacuum at 200 m/s (individual molecules, small blue spheres). Molecular evaporation and thermal stress fluctuations that accelerate neck-shaped instabilities lead to droplet formation. Such nanojets may find use in patterning, printing, and biotechnology. [Image: U. Landman, M. Moseler, M. D. Wolf]

1125

1126

1130

1131

NUMBER 5482

1123 MICROBIOLOGY: A Weak Link in TB Bacterium Is Found

Hint at Hard-Knock Life

Ancient Extinctions?

From Bacteria to Birds

Brightly?

PLANETARY SCIENCE: Newfound Worlds

NEWS FOCUS PHYSICS: Will Livermore Laser Ever Burn

Will NIF Live Up to Its Name?

EARTH SCIENCE: Did Volcanoes Drive

EVOLUTION 2000: Evolutionary Trends



NEWS

Cloned Pig in Japan

Patterns Identified

Squeezes NASA Budget

1122 MARINE CONSERVATION: Virginia Gets

Crabby About Harvest Limits

1126 NIF's golden opportunity

DEPARTMENTS

NETWATCH 1103

THIS WEEK IN SCIENCE 1105

EDITORS' CHOICE 1109

CONTACT SCIENCE 1114

SCIENCESCOPE 1121

RANDOM SAMPLES 1135

New Products 1211

R E S E A R C H

Rice Yields

Cytochrome c Release and Apoptosis Induced by Mitochondrial Targeting of Nuclear Orphan Receptor TR3 H. Li, S. K. Kolluri, J. Gu, M. I. Dawson, X. Cao, P. D. Hobbs, B. Lin, G. Chen, J. Lu, F. Lin, Z. Xie, J. A. Fontana, J. C. Reed, X. Zhang

REPORTS

- 1165 Formation, Stability, and Breakup of Nanojets M. Moseler and U. Landman
- 1170 Forming Electrical Networks in Three Dimensions by Self-Assembly D. H. Gracias, J. Tien, T. L. Breen, C. Hsu, G. M. Whitesides
- 1172 A [2]Catenane-Based Solid State Electronically Reconfigurable Switch C. P. Collier, G. Mattersteig, E. W. Wong, Y. Luo, K. Beverly, J. Sampaio, F. M. Raymo, J. F. Stoddart, J. R. Heath
- 1176 Isotopic Evidence for Variations in the Marine Calcium Cycle Over the Cenozoic C. L. De La Rocha and D. J. DePaolo



- ▼1178 Earthquake Potential Along the Northern
 1147 Hayward Fault, California R. Bürgmann, D.
 Schmidt, R. M. Nadeau, M. d'Alessio, E. Fielding,
 D. Manaker, T. V. McEvilly, M. H. Murray
- 1182 Remobilization in the Cratonic Lithosphere Recorded in Polycrystalline Diamond D. E. Jacob, K. S. Viljoen, N. Grassineau, E. Jagoutz
- 1185 Degradation of Outer Membrane Protein A in *Escherichia coli* Killing by Neutrophil Elastase A. Belaaouaj, K. S. Kim, S. D. Shapiro



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 © 2000 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): \$112 (\$62 allocated to subscription). Domestic institutional subscription (51 issues): \$340; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$90. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Publications Mail Agreement Number 1069624. Printed in the U.S.A.

SCIENCE'S COMPASS

EDITORIAL

Reflections on a Retraction 1137

LETTERS

1139 Ancient DNA: Do It Right or Not at All A. Cooper and H. N. Poinar. Search for the Origin of HIV and AIDS E. Hooper. Responses B. Korber, T. Bhattacharya, J. Theiler, R. Gupta, A. Lapedes, B. Hahn, F. Gao, M. Muldoon, S. Wolinsky; S. A. Plotkin and H. Koprowski. Nuclear Power and Climate without Proliferation C. Bastin. Retraction R. B. Tracy, C.-L. Hsieh, M. R. Lieber. Corrections and Clarifications

POLICY FORUM

ETHICS: Protecting Communities in 1142 Biomedical Research C. Weijer and E. J. Emanuel

BOOKS ET AL.

- 1145 ARCHAEOLOGY: The Mythic Past Biblical Archaeology and the Myth of Israel T. L. Thompson, reviewed by T. E. Levy
- **HISTORY OF SCIENCE:** Defining Features 1146 Scientific and Medical Portraits 1660-2000 L. Jordanova, Curator, and Defining Features Scientific and Medical Portraits 1660-2000 L. Jordanova, reviewed by B. B. Fortune

PERSPECTIVES

- **1147** SEISMOLOGY: Watching the 1178 Hayward Fault R. W. Simpson
- **v**1148 **NEUROSCIENCE: More to** 1206 Seeing Than Meets the Eye B. de Gelder
 - **ASTRONOMY: The Distance to** 1149 the Large Magellanic Cloud A.A. Cole
- **v**1150 APOPTOSIS: Mitochondriathe Death Signal Integrators C. Brenner and G. Kroemer
- 1152 **GENETICS: L1 Retrotransposons** Shape the Mammalian Genome H. H. Kazazian Jr.

TECH.SIGHT

- PARTICLE PHYSICS: Neutrinos Underground 1155 M. Nakahata
- 1157 TechSightings

1150 The mighty mitochondrion





SCIENCE ONLINE www.scienceonline.org

> SCIENCE THE IOURNAL www.sciencemag.org

SCIENCENOW DAILY NEWS SERVICE www.sciencenow.org

NEXT WAVE **RESOURCES FOR** YOUNG SCIENTISTS www.nextwave.org

GRANTSNET RESEARCH FUNDING DATABASE www.grantsnet.org

NEUROAIDS EXPERIMENTAL WEB SITE www.sciencemag.org/NAIDS

SCIENCE'S STKE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT www.stke.org



Fibroblast Nuclei A. Onishi, M. Iwamoto, T. Akita, S. Mikawa, K. Takeda, T. Awata, H. Hanada, A. C. F. Perry

Microinjection of Fetal

Pig Cloning by

▼1188 1118

- 1190 **Twists in Catalysis: Alternating** Conformations of Escherichia coli **Thioredoxin Reductase** B. W. Lennon, C. H. Williams Jr., M. L. Ludwig
- 1194 Asef, a Link Between the Tumor Suppressor APC and G-Protein Signaling Y. Kawasaki, T. Senda, T. Ishidate, R. Koyama, T. Morishita, Y. Iwayama, O. Higuchi, T. Akiyama
- **1197 Genes Expressed in Human Tumor** 1121 Endothelium B. St. Croix, C. Rago, V. Velculescu, G. Traverso, K. E. Romans, E. Montgomery, A. Lal, G. J. Riggins, C. Lengauer, B. Vogelstein, K. W. Kinzler

1148

1188 Xena the clone

- 1202 Inflammation Dampened by Gelatinase A **Cleavage of Monocyte Chemoattractant** Protein-3 G.A. McQuibban, J.-H. Gong, E. M. Tam, C. A. G. McCulloch, I. Clark-Lewis, C. M. Overall
- v 1206 Modulation of Human Visual Cortex by Crossmodal Spatial Attention E. Macaluso, C. D. Frith, J. Driver

TECHNICAL COMMENTS

Summary appears on page 1107; full text is available online at www.sciencemag.org/cgi/content/full/289/5482/1107a

The Position of Moving Objects

B. Krekelberg and M. Lappe; D. Whitney and P. Cavanagh. Response D. M. Eagleman and T. J. Sejnowski

Change of address: allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to Science, P.O. Box 1811, Danbury, CT 06813–1811. Single copy sales: \$8.00 per issue prepaid includes surface postage; bulk rates on request. Authorization to photo-copy 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 Cuide to Residence I in coursel in diverse. Guide to Periodical Literature and in several specialized indexes



The power unleashed when science and technology are combined can result in tremendous improvements in scientific research. Amersham Pharmacia Biotech and SciQuest.com proudly announce a strategic alliance.

www.apbiotech.com and www.sciquest.com now united

Our alliance will help make studying life science easier, more efficient and productive. And offers you significant time savings by ensuring you can order, purchase and get full information about all Amersham Pharmacia Biotech products from one source: www.sciquest.com/apbiotech.

It's an alliance that gives you on-line access to the technical and applications support specialists from a leading biotech knowledge and solutions provider. Combined with fast and efficient on-line ordering and payment from a leading e-commerce provider in the life science industry.

Come discover how much time you can save on your next lab purchase. Go to www.sciquest.com/apbiotech.We're wired up and ready to serve you better.



amersham pharmacia biotech

The future of cloning is here. You may proceed.

In the future, there will be a fast, efficient way to get from gene cloning to gene analysis without subcloning. Guess what? The future is here and it's the Echo" Cloning System. Now, you can clone your gene into as many expression vectors as you choose and:

- · Save hours by eliminating repetitive cloning, subcloning, and sequencing
- · Get the expression results you need by expressing in multiple systems
- Experience flexibility by easily Echo[™]-adapting your favorite expression vector for use in the system

The Key to the Future. The key to the Echo[∞]Cloning System is the donor vector, pUni/V5-His-TOPO.[®] In five minutes you can create a universal donor construct that contains your gene of interest. Now you're ready to unlock the power of the Echo[™] Cloning System.

In the Future, There's No Subcloning. With your donor vector construct, you can recombine or "Echo" your gene into an unlimited number of expression vectors. Vectors are currently available for expression in the most advanced bacterial, yeast, insect, and mammalian systems. Without ever subcloning, your gene is ready for expression.



Think About the Future. The Echo[®] Cloning System is the future of cloning. No more time-consuming subcloning. No more repetitive cloning. Clone your gene in five minutes, recombine it into as many expression vectors as you want, and get the expression results you need. The next time you need to clone a gene into an expression vector, stop and think about the future. Then call Invitrogen.

Circle No. 18 on Readers' Service Card



1600 Faraday Avenue • Carlsbad, California 92008 Tel: 1-800-955-6288 • Fax: 760-603-7201 Email: tech_service@invitrogen.com • www.invitrogen.com

Finland: Tel: 990800 5345 5345 Fax: 990800 7890 7890

Distributors: Czech Republic 0800 124 68324 Hungary 01 280 3728 Israel 02 584 1111 Italy 02 38 19 51 Poland 058 341 47 26 Portugal 021 453 708 Spain 091 729 0332

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

European Headquarters: Invitrogen BV P.O. Box 2312 9704 CH Groningen The Netherlands Tel: +31 (0) 50 5299 299 Fax: +31 (0) 50 5299 281 Email: tech_service@invitrogen.nl International Toll Free Numbers Tel: 00800 5345 5345° Fax: 00800 7890 7890° *These numbers operate in all European countries excluding Finland

THIS WEEK IN SCIENCE

edited by GILBERT CHIN

A REALLY FINE SPRAY

The formation of a fluid jet from a nozzle and its breakup into smaller droplets is a venerable problem (Lord Rayleigh developed one of the first thorough treatments). Nanometer-scale fluid jets also have been considered, but hydrodynamic theories begin to break down when the size of the nozzle orifice narrows to a few multiples of molecule diameters. Moseler and Landman (p. 1165; see the cover) now present molecular dynamics simulations of liquid propane forced through gold nozzles several nanometers in diameter and show how heating and wetting of the nozzle can prevent blocking of the orifice. By integrating their results with continuum hydrodynamic models, they show that thermally triggered fluctuations play an important role in the breakup and evolution of the nanojets.

SWITCH HIGH, READ LOW

A magnetic bit is read at much lower fields than are needed for the writing operations that actually switch the spin direction-in this way, a bit can be set once, read several times, and then reset. Collier et al. (p. 1172) have developed a solid-state electronic switch that exhibits similar hysteresis—it can be opened with a +2-volt (V) pulse, closed with a -2 V-pulse, and read between 0.1 and 0.3 V. The larger voltage pulses oxidize or reduce a tetrathiofulvalene group in one ring of a [2]catenane molecule and force that ring to rotate within the other ring. This isomerization changes the potential of the junction.

A CHANGE IN THE WEATHERING

The stable isotopic compositional history of calcium in the ocean reflects how its calcium inventory has changed in response to weathering of rocks and calcium carbonate sedimentation. These same two processes control the concentration of atmospheric CO_2 , the most important trace greenhouse gas, over geological time scales. De La Rocha and DePaolo (p. 1176) report significant variations in the isotopic composition of marine calcium during the past 80 million years, and these measurements coupled with estimates of oceanic pH should allow atmospheric CO_2 content to be calculated.

A QUIETER HAYWARD FAULT?

The northern Hayward fault runs through Berkeley, California, and has been assigned the highest probability of a magnitude 7 earthquake during the next 30 vears within the San Francisco Bay area. Bürgmann et al. (p. 1178; see the Perspective by Simpson) developed a model of the amount and type of slip on the northern Hayward fault by combining global positioning system and interferometric synthetic aperture radar surface deformation measurements with microearthquake data and field measurements of aseismic creep along the fault. They found that the northern segment of the fault, to a depth of about 6 kilometers, creeps along slowly without producing seismicity, and thus its seismic hazard probably should be downgraded.

SELF-ASSEMBLED 3D CIRCUITS

Although self-assembly normally is associated with molecular-scale objects, the principles of recognizing shape and forming bonds selectively can be applied to macroscopic objects and used to assemble chips on flat substrates. Gracias *et al.* (p. 1170) show how elec-



trical circuits in three dimensions can be built up from millimeter-scale polyhedra that were patterned with wires, light-emitting diodes, and solder dots. When placed in solution just warm enough to melt the solder, the polyhedra assembled into larger structures in a manner determined by the placement of the dots and wires.

YOUNG MELTS IN OLD CRATONS

Cratons represent fragments of the oldest continental crust, which formed more than 3 billion years ago. Jacob *et al.* (p. 1182) analyzed the trace element and isotopic characteristics of garnet inclusions in polycrystalline diamonds from a kimberlite within the South African craton and found evidence for remobilization of the craton about 533 million years ago. Their analyses reveal the mixing of a carbonatitic melt with eclogite to produce these diamonds and suggest that cratons may have been deformed by recent tectonism.

MOVING IN FOR A KILL

The TR3 protein (also named nur77 or NGFI-B) is a member of the nuclear hormone receptor family and is required for T cell receptor-induced apoptosis. These receptors are thought to act primarily as ligand-dependent transcription factors. However, Li *et al.* (p. 1159; see the Perspective by Brenner and Kroemer) found that TR3 function does not require the DNA binding domain of the protein. Instead, TR3 promotes apoptosis by translocating to the mitochodria, where it causes release of cytochrome c.

KILLING BACTERIA

Neutrophils kill invading bacteria with a variety of cellular weapons. Belaaouaj *et al.* (p. 1185) report that an enzyme known as neutrophil elastase (NE) specifically cleaves one of the bacterial outer membrane proteins, OmpA, damaging membrane integrity and causing bacterial cell death. This finding is of note both as a potential antibacterial target and because NE has been considered for use in treating cystic fibrosis.

SWINGING OUT OF THE WAY

Thioredoxin reductase (TrxR) transfers reducing equivalents from NADPH (the reduced form of nicotinamide adenine dinucleotide phosphate) to thioredoxin via a flavin adenine dinucleotide (FAD) cofactor and an enzyme disulfide. Lennon et al. (p. 1190) have determined the structure of the flavin-reducing conformation of Escherichia coli TrxR and show that the nucleotide binding domain rotates by almost 70° between cycles of reduction and reoxidation of FAD. A homologous enzyme, glutathione reductase, acts on small molecule substrates and does not undergo a conformational transition, which may have evolved to allow access of a large protein substrate to the active site.

PIGS FROM PIGSKIN

The ability to clone pigs from differentiated cells has implications in animal husbandry and in generating genetically modified organs for xenotransplantation. Although animals from other species have been cloned from somatic cells, Onishi *et al.* (p. 1188; see the news story by CONTINUED ON PAGE 1107



Discover A Clear Array of Possibilities. ExpressChip[™] DNA Microarrays from Mergen.



If you need to simultaneously analyze over one thousand gene expressions, there's no better choice than ExpressChip™DNA Microarrays from Mergen. Each ExpressChip kit contains two duplicate glass slides pre-spotted with oligonucleotides, and reagents for probe hybridization and signal amplification.



Simple, Flexible and Affordable.

- · Choose among human, mouse, rat, or custom ExpressChip kits
- Use low amount of total RNA as starting material
- Process slides with your choice of laser scanners and image analysis software
- · Customized services available

High Quality.

- Off-chip oligo synthesis for high coupling efficiency and optimized quality control
- Sequences individually tested for cross-homologies in GenBank database
- · Superb spot geometry and uniform density
- Hybridization without cover slip for clear images across the array with minimal artifacts

Differential Expression Results You Can Trust.

- High specificity and sensitivity
- · Linearity over large dynamic range

Get started today with ExpressChip[™] DNA Microarrays from Mergen and discover an endless array of possibilities. Visit us on the web at www.mergen-ltd.com, or call us toll-free at 1-877-4MERGEN (463-7436).

THIS WEEK IN SCIENCE

CONTINUED FROM PAGE 1105

Normile and Pennisi) have generated a cloned pig by microinjecting skin fibroblast nuclei into enucleated oocytes, stimulating them to develop with electrical pulses, and transferring the embryos in large numbers to surrogate mothers.

VASCULAR SIGNATURES

Tumors require a blood supply for growth, and several cancer therapies now in clinical trial are designed to disrupt that blood supply by targeting the tumor vasculature. In a comprehensive analysis, St. Croix et al. (p. 1197; see the news story by Marx) found that the blood vessels in tumors and normal tissue show qualitative differences in the expression of 79 genes. Most of the genes differentially expressed in the tumor vessels are of unknown function; the majority of the known genes play a role in extracellular matrix formation. The genes marking the tumor vessels were expressed in tumors derived from a variety of tissue types and, importantly, were also expressed in vessels induced by other pathophysiological states, such as wound healing.

CUT AND DRIED UP

During inflammation, leukocytes are recruited to target areas in response to chemokines. However, cessation of this response is important for tissue healing and wound repair. McQuibban *et al.* (p. 1202) propose that matrix metalloproteinases (MMPs) are key effectors of downregulating chemokine activity. When the chemokine monocyte chemoattractant protein (MCP)–3 is cleaved by the MMP gelatinase A, it is converted from a chemokine receptor agonist to an antagonist. This conversion blocks the response of leukocytes to a variety of chemoattractants that utilize the same receptors.

A SPREADING SIGNAL

The gene encoding the *adenomatous polyposis coli* tumor suppressor protein (APC) is mutated in most colon cancers, so there is much interest in determining the cellular signaling pathways through which it functions. Kawasaki *et al.* (p. 1194) show that APC binds to a guanine nucleotide exchange factor called Asef, stimulating cell spreading, membrane ruffling, and lamellipodia formation. These results suggest that disruption of the APC-Asef complex may inhibit normal migration of colon epithelial cells.

A TOUCHY SUBJECT

What mechanism underlies the phenomenon in which touching one's hand can improve vision in the nearby area? In a functional magnetic resonance imaging study, Macaluso *et al.* (p. 1206; see the Perspective by de Gelder) showed that a sudden touch enhances activity in a brain area called the visual cortex. This enhancement is the result of neuronal input from higher multimodal association cortex areas back-projecting onto the visual cortex.

TECHNICAL COMMENT SUMMARIES

The Position of Moving Objects

The full text of these comments can be seen at www.sciencemag.org/cgi/content/full/289/5482/1107a

Eagleman and Sejnowski (Reports, 17 March, p. 2036), studying the visual illusion known as the flash-lag effect, framed a "postdictive" model in which the flash resets motion integration in the visual system and "the percept attributed to the time of the flash is a function of events that happen in the ~80 milliseconds after the flash." Their results, they suggested, do not support the two previously proposed models, predictive motion extrapolation and differential latency.

Krekelberg and Lappe agree that "the flash-lag effect is due to motion ... after the flash," but argue that there is no reason to assume that the flash resets motion integration. "That motion after the flash influences the percept generated by the flash," they conclude, "merely shows that visual processing takes time." In a separate comment, Whitney and Cavanagh note that the arguments of Eagleman and Sejnowski against a differential-latency model assume that the flash-lag effect and another visual illusion, the Fröhlich effect, are caused by the same mechanism. Whitney and Cavanagh present data that suggest that "the two phenomena are actually caused by distinct mechanisms," and maintain that postdiction can explain neither phenomenon. The differential-latency model, in their judgment, "remains a viable explanation of flash-lag data." In response, Eagleman and Sejnowski present additional data to argue that the observations in both comments "can be explained within the postdictive framework we have proposed."

Custom Shotgun Libraries



- Custom Libraries from Cosmids, BACs and Genomes
- M13 or pUC
 Vectors
- Ready in 1-2 Weeks
- Clones Shipped in 96 or 384-Well Plates

Custom Gridding & Arraying

- Arraying of Libraries to Nylon Filters
- Up to 29,000 Double Spotted Clones/Filter

Shotgun Sequencing

- Clones Picked & Prepped
- High Throughput
- Sequencing &
- Assembly
- Full-Length
 Sequencing

Call For Pricing on Your Project Today



THE FASTEST SERVICE IN THE INDUSTRY, WITH GUARANTEED RESULTS.

Tel:1-800-720-4363 Web: www.seqwright.com

Any Assay Any Format Any Method of Detection One Instrument...



Packard's New Universal Microplate Analyzer...

If your research takes you from solution to cell based assays, in 6- to 1536-well formats, using virtually any non-isotopic method of detection, the Fusion[™] universal microplate analyzer is the only instrument that can meet your ever changing needs.

From basic research to assay development to high throughput screening, Fusion is the first multidetection platform that you configure to suit both your research requirements and budget.

So call, write, fax, or visit our Web site today to learn how one instrument can do so much in so many ways.



www.packardinstrument.com/fusion.htm

Fluorescence Intensity

Lominescence

Absorbance

AlnhaScreen



Packard Instrument Company 800 Research Parkway Meriden, CT 06450 U.S.A. Tel: 203-639-2598 Toll Free: 1-800-323-1891 Fax: 203-639-2172

For international offices visit our Web site or contact the Packard U.S.A. office.

The Order "Okay, all 25 are in stock. They'll ship today. Deliver tomorrow. Here's your total cost."

The Information

"Oh yeah, and just click here and it will print off the MSDS too."

What You Need...And What You Need To Know

Ordering from Sigma-Aldrich has never been easier with PipeLine[®], our convenient, on-line procurement system.

With PipeLine , you have instant access to over 200,000 products and can order from all brands (Sigma, Aldrich, Fluka, Supelco, and Riedel-de Haën) in a single transaction. Plus, because we are a manufacturer, we provide the technical information and support you won't find elsewhere. The information you give us is encrypted using the Secure Socket Layer (SSL) protocol, so you can rest assured that all transactions are private and secure.

To make on-line ordering even simpler, we have recently added :

- On-Line Product Availability
- On-Line Order Status
- Total Delivered Price

These new features allow you to see "real time" inventory and to track the status of every order you place (phone, fax or web).

Best of all. you have millions of product documents at your fingertips including: MSDS's, certificates of analysis, structures and structure searching, application notes, data sheets and much more.

Log on today....it will make your job easier.



www.sigma-aldrich.com

A D V A N C I N G LIFE THROUGH SCIENCE SIGMA-ALDRICH • BOX 14508 • ST. LOUIS • MISSOURI 63178 • USA Circle No. 21 on Readers' Service Card



break through

access to the best gene view of the human genome—like you have never had before





www.incyte.com

Only Incyte has LifeSeq[®] Public—free and enhanced public domain data linked

to a proprietary, easy-to-use sequence database and clones.

Only Incyte has LifeSeq® Gold—120,000 gene transcripts (60,000 not available anywhere else),

gene data based on actual expression, not prediction, and physical clones for every gene transcript.

with incyte.com

	1 A.	1000																
E. C. C.	م م م م د	C	A	Т	G	C	A	С	G	Т		А						
C A C	A	T	G	С	А	С	G	T	С	А								
GALCIG	Ĺ	А	C	G	Т	А	C	С	A	С					G			
C C G	T	С	A	Т	G	С	A	С	G	-	С	A						
A C T A	С	G	Т	А	С	С	A	C	G									

Announcing a brand new site that provides you with the most powerful and complete view of the human genome. Plus, 24/7 access to the most upto-date, highest quality data, reagents and supplies. Join us as we come together to create a dedicated online community of collaboration and dynamic online tools. Enhance your research. Accelerate your discovery. Achieve your breakthrough. **www.incyte.com**.



Circle No. 42 on Readers' Service Card

www.sciencemag.org **cien**

1200 New York Avenue, NW Washington, DC 20005 Editorial: 202-326-6550, FAX 202-289-7562 News: 202-326-6500, FAX 202-371-9227 Permissions: 202-326-7074, FAX 202-682-0816 Subscriptions: 800-731-4939 or 202-326-6417, FAX 202-842-1065

Bateman House	e, 82-88 Hills Road
Cambridge	e, UK CB2 1LQ
(44) 1223-326500,	FAX (44) 1223-326501
EDITOR-IN-CHIEF	Donald Kennedy

EDITOR Ellis Rubinstein MANAGING EDITOR Monica M. Bradford

DEPUTY MANAGING EDITORS NEWS EDITOR R. Brooks Hanson Katrina L. Kelner Colin Norman

EDITORIAL/COMPASS SUPERVISORY SENIOR EDITORS Barbara Jasny, Guy Riddihough, Phillip D. Szuromi; SENIOR EDITOR/PERSPECTIVES Orla Smith; SENIOR EDITORS Gilbert J. Chin, Pamela J. Hines, Paula A. Kiberstis (Boston), L. Bryan Ray; Associate EDITORS Lisa D. Chong, Beverly A. Purnell, Linda R. Rowan, H. lesse Smith, Valda Vinson; Associate BOOK REVIEW EDITOR Sherman J. Suter; Associate LETTERS EDITOR Christine M. Pearce; Associate TC/WEB EDITOR Stewart Wills: INFORMATION SPECIALIST lanet Kegg; CONTRIBUT-

PUBLISHER Richard S. Nicholson ASSOCIATE PUBLISHER Beth Rosner MEMBERSHIP/CIRCULATION DIR. Michael Spinella

MEMBERSHIP/CIRCULATION (membership@aaas.org) DEPUTY DIRECTOR Marlene Zendell: MEMBER SERVICES: MANAGER Michael Lung: SUPERVISOR Mary Curry; coordinator Jantell Stone; senior representatives Laurie Baker, Pat Butler, REPRESENTATIVES Elizabeth Early, Katrina Smith; MARKET ING: MANAGER Scott Oser; Associates Lauri Sirois, Deborah Stromberg; EUROPE MANAGER lane Pennington: SENIOR EXECUTIVE Ruth lackson: EXECU-TIVE Martin Paine; RESEARCH: MANAGER Renuka Chander; BUSINESS AND FI-GER Teressa Ellis; COMPUTER SPECIALIST Charles Munson

SUBSCRIPTION SERVICES For change of address, missing issues new orders and renewals, and payment questions: 800-731-4939 or 202-326-6417, FAX 202-842-1065. Mailing addresses: AAAS, P.O. Box 1811, Danbury, CT 06813 or AAAS Member Services, 1200 New York Avenue, NW, Washington, DC 20005

REPRINTS Ordering/Billing/Status 800-407-9190; Corrections 202-326-6501

MEMBER BENEFITS For Credit Card: MBNA 1-800-847-7378; Car Rentals: Hertz 1-800-654-2200 CDP#343457, Dollar 1-800-800-4000 #AA1115: AAAS Travels: Betchart Expeditions 1-800-252-4910; Life Insurance: Seabury & Smith 1-800-424-9883; Other Benefits: AAAS Member Services 1-202-326-6417

FINANCE AND ADVERTISING BUSINESS MANAGER Deborah Rivera-Wienhold; SENIOR ANALYST Randy YI; FINANCIAL ANALYSTS LISA DONOVAN, JESSICA TIER NEV: RIGHTS AND PERMISSIONS: ASSOCIATE Emilie David: Assistant Karen Lentz

ING EDITORS Kevin Ahem, David F. Voss; EDITORIAL MANAGER Cara Tate; SENIOR COPY EDITORS Cay Butler, Harry Jach, Etta Kavanagh, Barbara P. Ordway, COPY EDITORS JEFFrey E. Cook, Jason Llewellyn, Joshua Marcy, Monique Martineau; EDITORIAL COORDINATORS Carolyn Kyle, Ellen E. Murphy, Beverly Shields; PUBLICATIONS ASSISTANTS Chris Filiatreau, Joi S. Granger, Jeffrey Hearn, Charlene King; Gail Murphy, Anita Wynn; EDITORIAL ASSISTANTS Elise Laffman, Kathy Libal: EDITORIAL SUPPORT ASSISTANTS Osa Atoe, Patricia M. Moore, Brian White, Karen Yuan; EXECUTIVE ASSISTANT Sylvia S. Kihara; ADMINISTRATIVE SUPPORT Patricia F. Fisher

science_editors@aaas.org science_letters@aaaas.org science_reviews@aaas.org science_bookrevs@aaas.org (for book review queries)

(for general editorial queries) (for letters to the editor) (for returning manuscript reviews)

NEWS SENIOR CORRESPONDENTS Eliot Marshall, Jean Marx; DEPUTY NEWS EDITORS ROBert Coontz, Jeffrey Mervis, Leslie Roberts; CONTRIBUTING ED ITORS Elizabeth Culotta, Polly Shulman; NEWS WRITERS Martin Enserink, Laura Helmuth, Constance Holden, Jocelyn Kaiser, Richard A. Kerr, Andrew Lawler (Boston), David Malakoff, Elizabeth Pennisi, Charles Seife, Robert F. Service (Pacific NW), Gretchen Vogel, John MacNeil (intern): PATHWAYS OF DISCOVERY EDITOR IVAN Amato: CONTRIBUTING CORRES-PONDENTS Marcia Barinaga (Berkeley, CA), Barry A. Cipra, Ion Cohen (San Diego, CA), Ann Gibbons, Robert Inon, Charles C. Mann, Anne imon Moffat, Virginia Morell, Evelyn Strauss, Gary Taubes, Ingrid Wickelgren; copy formors Linda B. Felaco, Daniel T. Helgerman; ADMIN-ISTRATIVE SUPPORT Scherraine Mack, Fannie Groom; BUREAUS: Berkeley, CA: 510-652-0302, FAX 510-652-1867, Boston, MA: 617-542-5098, San Diego, CA: 760-942-3252, FAX 760-942-4979, Pacific Northwest: 541-342-6290

PRODUCTION DIRECTOR James Landry; MANAGER Wendy K. Shank; ASSISTANT PRODUCTION MANAGER ROD MASSON; ASSOCIATES Rebecca

MARKETING: DIRECTOR John Meyers; Associates Mary Ellen Crowley, Amanda Donathen, Allison Pritchard ELECTRONIC MEDIA: MANAGER David Gillikin; ASSISTANT PRODUCTION MANAGER Wendy Green: SENIOR PRODUCTION ASSOCI-ATE Lisa Stanford: PRODUCTION ASSOCIATES Carla Cathey, Mark Croatti, Robert Owens, Louis Williams administrative support loyce Murray

PRODUCT ADVERTISING (science advertising@aaas.org) NATIONAL SALES MANAGER NORTHEAST AND E. CANADA Richard Teeling: 973-694-9173, FAX 973-694-9193 • West Coast/W. Canada Neil Boylan: 415-673-9265, FAX 415-673-9267 • MID-ATLANTIC AND U.S. INSIDE SALES Christopher Breslin: 443-512-0330, FAX 443-512-0331 NEW MEDIA SALES MANAGER Chris Peterson: 410-560-3960, FAX 410 560-3961 • uk/scandinavia/france/italy/belgium/netherlands Andrew Davies: (44) 7-071-226-216, FAX (44) 7-071-226-233 · GERMANY/SWITZ ERLAND/AUSTRIA Tracey Peers: (44) 1-260-297-530, FAX (44) 1-260-271-022 JAPAN Mashy Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852 • TRAFFIC MANAGER CAPOL Maddox; TRAFFIC ASSOCIATE Halimah S. Whitby; SENIOR SALES ASSOCIATE Sheila Myers

RECRUITMENT ADVERTISING (science_classifieds@aaas.org); production MANAGER Jennifer Rankin u.s.: sales MANAGER Gabrielle Boguslawski: 718-491-1607, FAX 202-289-6742; WEST COAST SALES MANAGER Kristine von Zedlitz; east coast sales manager Jill Steinberg; internet sales manager Beth Dwyer; Assistant sales manager Daryl Anderson; senior sales coor-DINATOR Erika Bryant; SALES COORDINATORS Rohan Edmonson, Caroline Gallina, Shirley Young; SALES REPRESENTATIVES Kathleen Clark, Jody Fenty, Christina Geiger, Bren Peters-Minnis; Assistants Sussy Castilla, Emnet Tesfave: Associates Christine Borkowski, Dawn Bruno, Chris Scannce: PUBLICATIONS ASSISTANTS Robert Buck, Jane Vaughn; UK/EUROPE: SALES MANAG ER Debbie Cummings; PROMOTIONS COORDINATOR Richard Walters; Assis TANT Elisabeth Py: (44) 1223-326500, FAX (44) 1223-326532 AUS

Doshi, Vicki J. Jorgensen, Tara L. Kelly, Jessica K. Moshell

ART DESIGN DIRECTOR C. Faber Smith: ART DIRECTOR Alan T. Stonebraker: ASSOCIATE ART DIRECTOR Stephanie D. Halvorson: III USTRATORS Carin Cain Katharine Sutliff; Associates Holly Bishop, Joshua Moglia, Debra J. Morgenegg, Preston Morrighan; PHOTO RESEARCHER Leslie Blizard

SCIENCE INTERNATIONAL

EUROPE (science@science-int.co.uk) Editorial Supervisory Senior Editor Andrew M. Sugden; SENIOR EDITOR/PERSPECTIVES Julia Uppenbrink; ASSO-CIATE EDITORS Caroline Ash, Stella M. Hurtley, Ian S. Osborne, Stephen J. Simpson, Peter Stern; Editorial Support Jenny Parker; Administrative SUPPORT Janet Mumford, Liz Ellis; NEWS: EUROPEAN NEWS EDITOR Richard Stone, correspondent Michael Hagmann; contributing correspon-DENTS Michael Balter (Pans: (33) 1-49-29-09-01, FAX (33) 1-49-29-09-00); Robert Koenig (Bern)

ASIA Japan Office: Asca Corporation, Eiko Ishioka, Fusako Tamura, 1-8-13, Hirano-cho, Chuo-ku, Osaka-shi, Osaka, 541-0046 Japan; (81) 6-6202-6272, FAX (81) 6-6202-6271; asca@os.gulf.or.jp JAPAN NEWS BUREAU: Dennis Normile (contributing correspondent, (81) 3-3335-9925, FAX (81) 3-3335-4898; dnormile@twics.com); сніла REPRESENTATIVE Hao Xin, (86) 10-6255-9478; science@public3. bta.net.cn; INDIA Pallava Bagla (contributing correspondent (91) 11-271-2896; pbagla@ndb.vsnLnet.in)

SCIENCENOW (www.sciencenow.org) EDITOR Erik Stokstad

SCIENCE'S NEXT WAVE (WWW.nextwave.org) EDITORIAL MANA Crispin Taylor; EDITORS Robert Metzke (Germany), Kirstie Urquhart (UK); CONTRIBUTING EDITORS Charles Boulakia (Canada), Mark Sincell; RITER Vid Mohan-Ram; MARKETING: MARKETING MANAGERS Karen Horting (US and Canada), Hazel Crocker (Europe); PROGRAM DIRECTOR Emily Klotz; Associate Peter Cherukuri

TRALLA/NEW ZEALAND: Keith Sandell: (61) 02-9922-2977, FAX (61) 02-9922-1100 JAPAN: Mashy Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852

AAAS BOARD OF DIRECTORS RETIRING PRESIDENT, CHAIR Stephen Jay Gould; PRESIDENT Mary Lowe Good; PRESIDENT-ELECT Peter H. Raven; TREASURER William T. Golden: EXECUTIVE OFFICER Richard S. Nicholson: BOARD Lewis M. Branscomb; Nina V. Fedoroff; Robert D. Goldman; Alice S. Huang; Sally Gregory Kohlstedt; Robert C. Richardson; Neena B. Schwartz; David E. Shaw

Published by the American Association for the Advancement of Science (AAAS), Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews-are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

INFORMATION FOR CONTRIBUTORS See pages 147 and 148 of the 7 January 2000 issue or access www.sciencemag.org/misc/con-info.shtml

DEPUTY EDITORS: Philip H. Abelson (Engineering and Applied Sciences); John I. Brauman (Physical Sciences)

		BO	ARD OF REVIEWING EDIT	ORS		
Frederick W. Alt Children's Hospital, Boston Edouard Bard Univ. d'Aix-Marseille III Frank S. Bates Univ. of Minnesota Ray H. Baughman Honeywell International Stephen J. Benkovic Pennsylvania State Univ. Michael J. Bevan Univ. of Washington Seth S. Blair Univ. of Washington Seth S. Blair Univ. of Wisconsin Mark Boguski NCBI, NIH Henry R. Bourne Univ. of California, San Francisco james J. Bull Univ. of Texas at Austin Joseph A. Burns	Dennis W. Choi Washington Univ. School of Medicine, St. Louis Joanne Chory The Salk Institute David Clapham Children's Hospital, Boston Jonathan D. Cohen Princeton Univ. Daniel G. Colley Centers for Disease Control F. Fleming Crim Univ. of Wisconsin James E. Dahlberg Univ. of Wisconsin Medical School Robert Desimone NI/MH. NIH Hans Eklund Swedish Univ. of Agricultural Sciences Gerhard Ertl Fritz-Haber-Institut, Berlin	BO. Douglas T. Fearon Univ. of Cambridge Jeffrey S. Flier Harvard Medical School Richard Fortey The Natural History Museum, London Harry A. Fozzard Univ. of Chicago Chris D. Frith Univ. College London James Gimzewski IBM Research, Ruschlikon, Switzerland Jack F. Greenblatt Univ. of Toronto Philip C. Hanawalt Stanford Univ. Paul Harvey Univ. of Oxford Michael P. Hassell Imperial College at Silwood Park	ARD OF REVIEWING EDIT Evelyn L. Hu Univ. of California, Santa Barbara Eric F. Johnson The Scripps Res. Inst. Hans Kende Michigan State Univ. Marc Kirschner Harvard Medical School Elliott Kieff Harvard Medical School Elliott Kieff Harvard Medical School Christian Kömer Botanisches Institut, Basel Anne Krueger Stanford Univ. Michael LaBarbera Univ. of Chicago Antonio Lanzavecchia Inst. of Res. in Biomedicine, Bellinzona, Switzerland Anthony J. Leggett Univ. of Illinois, Urbana- Champaign Norman L. Letvin Beth Icreal Dasconers	ORS Susan K. McConnell Stanford Univ. Raul Madariaga École Normale Supérieure, Paris George M. Martin Univ. of Washington Diane Mathis Harvard Medical School Anthony R. Means Duke Univ. Medical Center Douglas A. Melton Harvard Univ. Andrew Murray Univ. of California, San Francisco Elizabeth G. Nabel NHLBI, NIH Shigekazu Nagata Osaka Univ. Medical School Roger Nicoll Univ. of California, San Francisco Staffan Normark Sweedish Institute for	Suzanne Pfeffer Stanford Univ. School of Medicine Stuart L. Pimm Columbia Univ. David C. Rubie Universität Bayreuth Erkki Ruoslahti The Burnham Institute Ronald H. Schwartz NIAID, NIH Terrence J. Sejnowski The Salk Institute Manfred Sigrist Kyoto Univ. Susan Solomon National Oceanic and Atmospheric Adm. Christopher R. Somerville Carnegie Institute of Washington, Stanford Will J. Stewart Marconi Caswell, Towcester Cliff Tabin	Yoshinori Tokura Univ. of Tokyo Joan S. Valentine Univ. of California, Los Angeles Michiel van der Klis Astronomical Inst. of Amsterdam Derek van der Kooy Univ. of Toronto Bert Vogelstein Johns Hopkins Arthur Weiss Univ. of California, San Francisco Zena Werb Univ. of California, San Francisco George M. Whitesides Harvard Univ. Ian A. Wilson The Scripps Res. Inst. Martin Zatz NIMH, NIH Walter Zieglgänsberger Max-Planck-Institute
Joseph A. Burns Cornell Univ. Kathryn Calame Columbia Univ. College of Physicians and Surgeons	Paul G. Falkowski Rutgers Univ. Gary Felsenfeld NIDDKD, NIH	Max-Planck-Institute for Biogeochemistry, Jena Tasuku Honjo Kyoto Univ.	Beth Israel Deaconess Medical Center, Boston Richard Losick Harvard Univ.	Infectious Disease Control Michele Parrinello Max-Planck-Inst. for Solid State Research, Stuttgart	Cliff Tabin Harvard Medical School Tomoyuki Takahashi Univ. of Tokyo	of Psychiatry, Munich Maria Zuber Massachusetts Inst. of Technology

Boost Your Gene Expression with BoosterExpress[™] Reagent Kit



Without BoosterExpress™ reagent kit

- Highest gene expression in diverse cell types
- Excellent enhancement with all GenePORTER[™] transfection reagents
- Great boost with other transfection reagents
- Effective for both transient and stable transfections
- Extended shelf life, easy to use, and economical

BoosterExpress[™] reagent kit is a set of chemical cocktails developed by Gene Therapy Systems, Inc. This kit increases expression levels when used with synthetic nonviral DNA delivery systems such as GenePORTER[™] or GenePORTER[™] 2 transfection reagents. The BoosterExpress[™] kit also can be used with other commercially available transfection reagents. Three unique reagent formulations are included for a variety of cell types.* BoosterExpress[™] reagents are very easy to use: Simply add the appropriate booster to your culture medium 4 hours post-transfection. Enhance your gene expression up-to 12-fold with the BoosterExpress[™] reagent kit.



 Additional information about these reagents are available on our website.



To Order: 888-428-0558 Fax: 858-623-9494

10190 Telesis Court, San Diego, CA 92121, USA Check out the Gene Therapy Systems web site @ http://www.genetherapysystems.com Circle No. 46 on Readers' Service Card



With BoosterExpress[™] reagent kit



Gene Therapy Systems International Distributors

Australia • Astral 61-2-9540-2055 Austria • BIO-TRADE +43 1 889 18 19 Benelux • BIOzymTC BV +31 + (0)45 532 77 55 China • Shanghai Haojia Tech. 86-21-5453-0107 Denmark • KEBO Lab A/S +45 43 86 87 88 Finland • Kebo Lab +358 9 8045 5300 France • 02YME +33 1 30 85 92 92 Germany • PEQLAB 49-9131-691-470, Biozym +49 5152-9020 Israel • Biotech Appl. 972 8 928 5353 Italy • Duotech 39 02 331 066 30 Japan • Funkoshi 81-3-5684-1622, Takara +81-77-543-7231 Korea • Core Bio 82 2 841-7530 Norway • Kebo Lab A/S +47 22 90 00 00 Sweden • KEBO Lab +46 8 621 35 07 South Africa • Millinium 27 12 8034-876 Spain • bioNova +34 91 551 54 03 Switzerland • Axon Lab AG +41 56/484 80 80 Taiwan • PROtech 886-2-23810844 United Kingdom • Lifescreen Lid 01895 453700

FEBRUARY 15-20 : 2001 ► SAN FRANCISCO : CA



Annual Meeting & Science Innovation Exhibition

Building the Future through Science, Engineering and Technology

www.aaas.org/meetings

Please send me information about the following topics:

- □ 2001 Meeting
- □ Exhibiting at Meeting
- □ Student Session Aide
- Call for Contributed Poster Papers
- □ AAAS Membership

Mail: AAA	S Meetir	igs Dej	partment
1200	New Yo	rk Ave	nue, NW
Was	hington,	DC 20	005

E-mail: aaasmeeting@aaas.org

Name			
Affiliation			
Address			
City		_State	Zip
Country			
Phone	Fax		
E-mail			

Circle No. 12 on Readers' Service Card

NOW, TIME IS ON YOUR SIDE ...

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

The Mini-Prep 24 uses a new method of plasmid purification based on agarose

electrophoresis and subsequent recovery by electroelution. The Mini-Prep 24 uses premanu-

factured sample cassettes that come ready for direct loading of up to 2 ml of culture.

Call now to learn how the new Mini-Prep 24 can give you quality DNA while saving you more time than you can imagine.

NO CENTRIFUGATION STEPS

High Purity - sufficient for automateα fluorescent and manual sequencing. Consistent Results - up to 6 μg of plasmid per ml. Fast - up to 24 preps per hour. Quality - time and time again.

en de la compañía de

Sking Listers Je

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

1-800-466-7949

11339 SorrentoValley Rd • San Diego, CA 92121

 92121
 Phone: (619) 452-2603
 Fax (619) 452-6753

 Circle No. 11 on Readers' Service Card
 www.macconnell.com

You'll Never Lose in the Mutation Detection Game with the LightCycler System

Precisely control temperature transitions during melting curve analysis for accurate sample characterization.

otect samples in a seal capillary tube during nplification and analysi Amplify and analyze 32 samples in just 30 minut by exploiting the instrument rapid thermal transfer.

Detect reaction products during each amplification cycle. Monitor PCR kinetics on-line.

For a new spin on mutation detection, visit the Roche Molecular Biochemicals website at http://biochem.roche.com/lightcycler or contact your local representative at (800) 428-5433.

Roche Diagnostics Corporation Roche Molecular Biochemicals Indianapolis, IN Circle No. 7 on Readers' Service Card

Prime RNase Inhibitor Your best defense against RNases

RNases are insidious proteins just lying in wait to destroy your experiments. You need the most powerful weapons to defeat them. DEPC and other treatment methods are great for destroying RNases that are already in solutions and on your labware, but to fight the exogenous RNases that can ruin your experiments you need a more powerful weapon. That weapon is Prime RNase Inhibitor!

Prime RNase Inhibitor exhibits the same specificity as Human Placental RNase Inhibitor (HPRI) but has several advantages, including:

- Inhibits greater than 90% of RNase activity, where Human Placental RNase Inhibitors (HPRI) inhibit only 50%
- Stable under a broad range of pH concentrations
- Temperature stable to 65°C for at least 20 minutes
- Inhibits RNases A, B and C, and does not interfere with RNases T1, T2, H, U1, U2, or CL3
- Costs less than 1/2 the price of HPRI

Prime RNase Inhibitor works by non-covalently binding RNases and preventing RNA degradation. It can be used for all your RNA experiments including: *in vitro* transcription and *in vitro* translation, first and second strand cDNA synthesis, preparation of RNA and mRNA, and RT-PCR*. So contact your Eppendorf representative today, because the best defense is a superior offense.

For more information, visit us on the web at www.rnase.com.

Potency of Prime RNase Inhibitor compared to HPRI 100 90 1 , 30 units Prime RNase 80 Inhibitor 70 nhibition of RNase A 60 50 30 20 30 units Placenta 10 RNase Inhibito 10 100 ng RNase A

8602-A101

Eppendorf" is a registered trademark of Eppendorf-Netheler-Hinz GmbH. - PCR is licensed under U.S. patent numbers 4,683,202, 4,683,195, 4,965,188, and 5,075,216 or their toreign counterparts, owned by Hoffmann-La Roche Inc. and F. Hoffman-La Roche Ltd.

Specializing in cell and molecular biology.

Eppendorf Scientific, Inc. One Cantiague Road · Westbury, NY 11590-0207 · Phone 800-421-9988 or 516-876-6800 · Fax 516-876-8599 e-mail: eppendorfsi.com · website: www.eppendorfsi.com

Eppendorf-Netheler-Hinz GmbH · 22331 Hamburg · Germany · Life Science Application-Hotline: +49 180-3666789 · Fax +49 40-5 38 01-556 e-mail: eppendorf@eppendorf.com · eppendorf home page: http://www.eppendorf.com

– ADRB2 Thr164lle

Five million Americans are living with congestive heart failure.' For 175,000 of them, current therapies may not be effective. This SNP could mark the difference.

SNPstream[®]

Automated Genotyping Systems

SNP-IT and SNPstream are trademarks of Orchid BioSciences, Inc. Orchid logo and icon are trademarks of Orchid BioSciences, Inc. ©2000 Orchid BioSciences, Inc. Living with Heart Failure American Heart Association, 1999. http://www.americanheart.org

Another application for SNPstream[™] Automated Genotyping Systems using SNP-1T[™] Technology.

SNP-IT Technology from Orchid is the genotyping solution with documented accuracy >99.9%, surpassing direct DNA sequence analysis. Using Orchid's patented SNP-IT Technology, SNPstream systems provide cost-effective, high-performance automated screening for any SNP at any scale.

Any SNP-name the SNP, Orchid delivers the fully validated assay.

Any Scale—from 500–25,000 genotypes per day.

For information on SNPstream Automated Genotyping Systems call (609) 750-2200, or visit us at www.orchid.com.

The way people who do SNPs do SNPs.

Orchid™

Orchid BioSciences, Inc. • 303 College Road East • Princeton, NJ 08540 • 609-750-2200 • 888-398-9352 Circle No. 17 on Readers' Service Card

your advantage

Create your own virtual journals - FREE

Draw from over 5000 full-text review articles to create your own personalised journal, and receive an e-mail alert every time it's updated

Make the most of your time, optimize your results.

Please note, the full-text version of Reviews will be available on an institutional subscription Create your own virtual journals

From an expanding database of 5000 full-text review articles from Elsevier Science including:

Sponsored by

Hurry, free trial ends October 1

Research Tools • Reviews • Journal Collection News & Comment • Books & Labware Jobs • Web Links

Bookmark our new address today bmn.com

Circle No. 20 on Readers' Service Card

Like You've Never Seen Before!

The new Leica MZ75, MZ95 and MZ125 high-performance stereomicroscopes

Never before has imaging been so perfect, resolution higher, information content greater or, a stereomicroscope more affordable. Increasingly-complex tasks in science and industry demand custom solutions. Innovative optical characteristics combined with the most extensive offering of accessories allow the new family of Leica Microsystems' stereomicroscopes to fit every person to every task. The new stereomicroscopes offer 7.9:1, 9.5:1 and 12.5:1 zoom ranges, elegant and ergonomic design, and a patented anti-static coating. They are designed today, for tomorrow's needs and represent an excellent long-term investment. To see, and feel, like never before....call Leica Microsystems today!

Leica Microsystems Ltd Business Unit SM CH-9435 Heerbrugg (Switzerland)

Telephone +41 71 727 31 31 Fax +41 71 727 46 76 For local agencies: www.leica-microsystems.com

RevPrep : The only true walk-away solution in DNA sample prep.

Work Less 96-minirotor Array Centrifuge conforms to 96-well plate . format ENEMACHINE MAR a Manual Acar Min Million a MAR MARANIN

(\$2000) Genomic Instrumentation Services, Inc. GonoMachines is a registered trademark and RoxPleo, Array Centrifuge am SUTECH * Technology was developed at the Stanford University ONA Sequencing and Technology Center and is licensitio fro

Do More.

- **1**. 12-hour true unattended runs.
- **2.** Lowest cost per sample.
- **3.** High throughput: 4500+ samples per day.
- **4.** Parallel sample plate processing.
- **5.** Quick setup time.
- **6.** 96/384 compatible.
- **7.** No manual pelleting of *E.coli* cultures.
- **8.** 96-rotor Array Centrifuge.^{**}
- **9.** No filter plates.
- **10.** Med Phred 20: >650 bp.
- **11.** Med yield 190 ng/µl.
- **12.** Med purity (²⁶⁰/₂₈₀) 1.8.
- **13.** Field Applications support.
- **14.** 96-channel pipetter.
- **15.** No re-calibration needed.
- **16.** Ships with validated protocols.
- **17.** Intuitive software interface.
- **18.** High and low level programming options.
- **19.** Bar coding/sample tracking.
- **20.** Available now!

At last, automated DNA sample prep the way it's supposed to be. Fast. Reliable. Simple to use. Low maintenance. At low cost per sample.

The secret? RevPrep's built-in Array Centrifuge⁻ with proprietary SUTECH⁻ technology that eliminates manual centrifugation. Just set up, walk away and come back 12 hours later to find over 2,300 high-purity samples ready and waiting.

So discover what 100% automated sample prep can do for your productivity. Call 1-877-855-GENE (4363) Or visit www.genemachines.com today.

Work Less. Do More.

We can meet your sample needs from inventory or by exercising our Global Collection Network on your behalf. We are adding samples, disease states, and collection sites on a regular basis.

Samples from a mples from a mpl

global collection network

GenomicsCollaborative

has a growing collection of

DNA and serum matched to

phenotypic data from

patients with high prevalence

diseases. These samples are

available to support

your research.

Some examples of samples we currently have, and are actively collecting, in the following disease states are:

- Cardiovascular disease (hyperdipidemia, hypertension, AMI stroke)
- Cancers (Breast, Ovarian, Colon, Prostate, Leukemia, Lymphoma)
- Diabetes
- Asthma
- Renal failure

All material is:

- Collected under IRB approved protocols and compliant with GCP
- Processed and stored under GCP conditions
 For information regarding our current inventory of samples and disease states please contact us.

GenomicsCollaborative

1-877-GENOMIX, extension 248 (877-436-6649) email: getsamples@DNArepository.com www.DNArepository.com

Circle No. 10 on Readers' Service Card

MAMMALIAN GENOTYPING SERVICE

The Mammalian Genotyping Service is funded by the National Heart, Lung, and Blood Institute to assist in linkage mapping of genes which cause or influence disease. Genotyping is carried out using short tandem repeat polymorphisms at Marshfield, Wisconsin under the direction of Dr. James Weber. Capacity of the Service is currently about 6,000,000 genotypes (DNA samples times polymorphic markers) per year and growing. Although the Service was initially established for genetic projects dealing with heart, lung, and blood diseases, the Mammalian Genotyping Service will now consider all meritorious applications.

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

View instructions online: http://www.marshmed.org/genetics

Call or e-mail for an application: (715) 389-3525 <u>cywinsks@mmrf.mfldclin.edu</u>

> Upcoming Deadlines: September 30, 2000 March 31, 2001

NATIONAL ACADEMY OF SCIENCES COLLOQUIUM

Links Between Recombination and Replication Vital Roles of Replication

November 10-12, 2000 - Ivine, California Organized by Charles Radding, Michael Cox, Nicholas Cozzarelli, James Haber and Kenneth Marians

Recombination: An Overview

Michael Cox, Stephen Kowalczykowski, Takehiko Shibata, Charles Radding, Patrick Sung, Gerald Smith and Stephen West **Double-strand Break Repair**

Tomoko Ogawa, John Petrini, Michael Gellert, Stephen Jackson, Alain Nicolas, Rodney Rothstein and Shunichi Takeda

An Overview of Replication

Michael O'Donnell, Steven Benkovic, Jerard Hurwitz, Stephen Bell, I. Robert Lehmann, Nicholas Cozzarelli and Jack D. Griffith

Recombination, Replication and Mutagenesis Gisela Mosig, Myron Goodman, Sataya Prakash, Scott Morrical, Kenneth Kreuzer, Steven Sandler, Kenneth Marians and Hiroshi Nakai

Current Views of Copy-choice Recombination

James Haber, Franklin Stahl, Susan Rosenberg, Susan Lovett, Maria Jasin

Rescue of Replication Forks and Segregation of Recombined Chromosomes

Robert Lloyd, Benedicte Michel, Philip Hanawalt, David Sherrat, Hideo Shinagawa and Andrei, Kuzminov

REGISTRATION: \$175 (Non-refundable/transferable), includes meals

Email: colloquia@nas.edu

Web: www.nas.edu/nas/colloquia Register early, space for this meeting is limited.