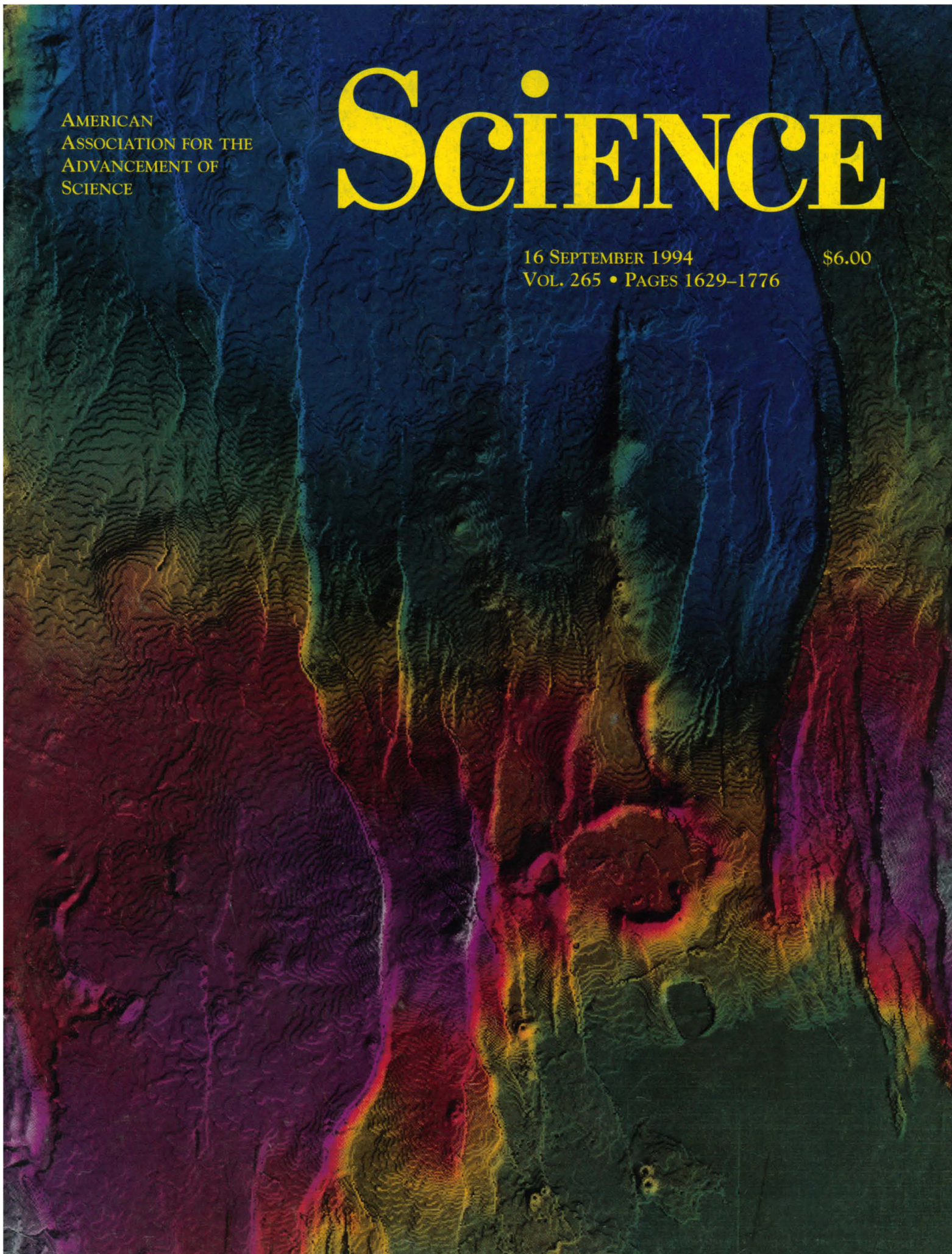


AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

SCIENCE

16 SEPTEMBER 1994
VOL. 265 • PAGES 1629-1776

\$6.00



PREMADE LIBRARIES



TO MEET YOUR SPECIFIC RESEARCH NEEDS.

- **Constantly Growing, Diverse Collection**
- **Actin Screened for Quality**
- **Packaged for Optimal Efficiency and Representation**
- **Custom Library Service Also Available**

Stratagene Constructs the Highest Quality Libraries Available



Novel Vectors

Stratagene's libraries are constructed using novel vectors that simplify screening and analysis. For cDNA libraries, our exclusive Lambda ZAP® Vectors* combine the high efficiency of lambda cloning with the ease of a plasmid system. Clones isolated from Lambda ZAP® Vectors can be easily excised into the pBluescript® Vector, eliminating time-consuming subcloning. For genomic libraries, our Lambda DASH® II, Lambda FIX® II and Cosmid Vectors contain T3 and T7 promoters flanking the inserts, allowing rapid genomic walking and restriction mapping. To simplify gene manipulation and mapping, the insert can be removed as a cassette by using *Not* I to digest these vectors.

Host Strains

Our libraries are provided with powerful host strains like XL1-Blue and SRB(P2). Our new SOLR™ strain facilitates single-clone and mass library excisions. Stratagene is constantly developing new strains to clone the previously unclonable.

Actin Screened

All cDNA libraries are actin screened for quality. Since actin is a common sequence with considerable homology between species and tissues, screening with an actin cDNA probe provides valuable information about the probability of finding your clone.

Amplified Only Once

Stratagene's libraries are amplified only once, avoiding the problem of skewed representation caused by overamplification. Single amplification prevents fast-growing clones from "taking over" and making rare clones harder, if not impossible, to find. Our newest libraries are amplified in the SURE™ strain to minimize rearrangements and deletions.

Custom Library Service

Stratagene's growing collection of libraries is updated continually. We also offer a Custom Library Service and high quality reagents for constructing your own libraries.

Circle No. 54 on Readers' Service Card



Gigapack® Packaging Extract

All of Stratagene's libraries are made with Gigapack® Packaging Extracts, which allow high packaging efficiency and construction of representative libraries. Especially critical for genomic libraries, the absence of restriction activity in Gigapack® II Packaging Extracts prevents the degradation of methylated sequences.

Please call Stratagene or a Stratagene distributor to discuss your library needs.



STRATAGENE®

USA:

Corporate Headquarters
Telephone: 800-424-5444
Fax: 619-535-0034

Germany:

Stratagene GmbH
Telephone: (06221) 40 06 34
Telefax: (06221) 40 06 39

United Kingdom:

Stratagene Ltd.
Telephone: (0223) 42 09 55
Telefax: (0223) 42 02 34

France:

Stratagene France
Telephone: (0590) 72 36
Telefax: (1) 44 28 19 00

Switzerland:

Stratagene GmbH
Telephone: 01-3641106
Telefax: 01-3657707

* U.S. Patent Number 5,128,256



Increased productivity

Spiraling beneath a school of fish, several humpback whales use their blowholes to create a circular "net" of bubbles. The open-mouthed whales then swim up through the school and engulf the disoriented prey. This communal "bubble-netting" enables the whales to take in more food than normal surface feeding by individuals.

Boehringer Mannheim's complete line of nonradioactive alternative products can help you generate similar productivity increases in your lab.

Accomplish more in less time

Our nonradioactive kits and reagents let you obtain experimental results faster. Many of them save you hours, even days, per experiment. Even when experimental time remains the same, you save the set-up, clean-up, and record-keeping time required for the use of radioactive compounds.

Alternatives for common techniques

Boehringer Mannheim now offers products that allow you to greatly reduce or completely eliminate the use of radioactive compounds in your lab, creating a safer, less stressful working environment.

Isotope Eliminated	Nonradioactive Alternative
$^3\text{H}/^{51}\text{Cr}$	Cell Proliferation Assays, Cell Death Assays, Reverse Transcriptase Assay
^{14}C	CAT ELISA, Glycoconjugate Analysis System
^{35}S	Biotin <i>In Vitro</i> Translation System
^{125}I	Chemiluminescent Western Blotting Kits
$^{32}\text{P}/^{33}\text{P}$	Genius™ System, Tyrosine Kinase/Phosphorylase Assays

A full-service focus

In addition to quality products, customer-focused services combine to increase the productivity of your lab:

- **Accurate, next business day delivery**, so you have the products when you need them
- **Highly trained technical and sales representatives** to help you attain your laboratory objectives.



Your nonradioactive future is a phone call away

Take the first step towards a safer, more productive nonradioactive laboratory by contacting Boehringer Mannheim for more information. Or call us to place your order at 1-800-428-5433 (514-686-7141 in Canada).

Federal Express trademark used by permission.

© 1994 Boehringer Mannheim. All Rights Reserved.



Biochemicals

BOEHRINGER MANNHEIM Corporation

9115 Hague Road
P.O. Box 50414
Indianapolis, IN 46250-0414
USA

Circle No. 59 for Protein Analysis

Circle No. 60 for Cellular Parameters

Circle No. 61 for Nonradioactive Nucleic Acid Alternatives

Pierce linked in disappearance of slow, radioactive Oligonucleotide labeling

Further investigation uncovers development of new OligoLink™ Derivatization and Alkaline Phosphatase Conjugation Kits.

By Pierce Research Staff

Evidence is mounting against Pierce in the case of the mysterious disappearance of traditional oligonucleotide labeling. The accused has reportedly replaced the conventional time-consuming radioactive labeling procedure with *fast, easy-to-use* kits for labeling any oligo or other nucleic acid probe. According to eyewitness accounts, users of the new kits *avoid the need for custom conjugation, derivatized nucleotides or enzyme reactions.*

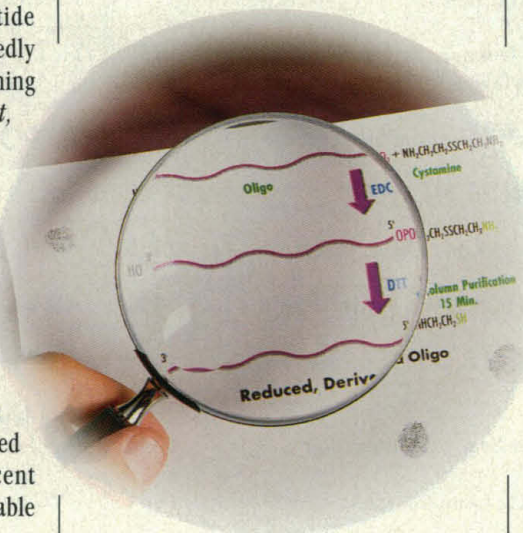
The kits are described as being a *sensitive, non-radioactive labeling method*, and have drawn considerable attention, as alkaline phosphatase-labeled probes detected with chemiluminescent substrates are the most sensitive and viable safe alternative to radioisotopes.

Sources close to the case have learned that the new kits are *versatile*, allowing users to *label an oligonucleotide with any conjugate, including cross-linkers, fluorescent labels or biotinylation reagents.* There are also reports claiming that probes labeled with this "OligoLink™" remain *stable for months—or even years.*

Detectives on the case are hindered by the unusually large number of crime scenes to investigate—reported as being hundreds of labs worldwide. Officials believe a recovery of the missing labeling procedure is highly unlikely.

Watch for these suspects - and their M.O.

The Pierce OligoLink™ Derivatization Kit utilizes a simple cross-linking step to



end modify any oligonucleotide with a 5'-phosphate group. The resulting derivatized oligo can then be coupled to the label or protein of your choice, or attached to a

solid support. If you want to label with alkaline phosphatase, the Pierce OligoLink™ Alkaline Phosphatase Conjugation Kit allows users to form stable oligonucleotide-alkaline phosphatase conjugates which are useful in detecting the presence of specific sequences in colony lifts, Southern Blots and DNA Dot Blots. This kit has been optimized for use with the OligoLink™ Derivatization Kit, but it will conjugate any oligo containing a free sulfhydryl group. Because any synthetic oligo can be labeled with this alkaline phosphatase conjugation kit, the preparation of custom conjugates is not needed.

Also Wanted: OligoLink™ Hybridization Kit—believed to be headed for the area soon.

Product #	Description	U.S. Price
17700	OligoLink™ Derivatization Kit Includes sufficient materials for two phosphorylated oligonucleotide derivatizations. Contents: Derivatization Reagent, OligoLink™ Purification Matrix, EDC, DTT, Binding Buffer, Wash Buffer, Spin Columns with accessories, Collection Tubes and Instructions	\$175
17701	OligoLink™ Alkaline Phosphatase Conjugation Kit Includes sufficient materials for two oligonucleotide-alkaline phosphatase conjugations. Contents: Activated Alkaline Phosphatase, Conjugation Buffer, Desalting Units, SuperFreeze™ Phosphatase Stabilizer and Instructions	\$100

To order in the U.S.A.: Pierce • 3747 N. Meridian Rd. • P.O. Box 117 • Rockford, IL 61105 • Telephone: 800.874.3723 FAX: 800.842.5007 • Internet E-mail Address: PierceChem@mcimail.com
European Office: Pierce Europe B.V. • P.O. Box 1512 • 3260 BA Oud Beijerland • The Netherlands • Telephone: 31.1860.19277 FAX: 31.1860.19179

European Distributors:
Austria 018891819
Belgium 036465511

Denmark 44948822
France 070038855
Germany 0224196850

Italy 025097220
Holland 0206113133 or
076795795

Norway 22722100
Spain 017290333
Switzerland 0217287772

United Kingdom 0244382525
Sweden 087460035

Outside Europe and the U.S., contact Pierce U.S. for your local Pierce distributor. Telephone: 815.968.0747 FAX: 815.968.8148

PIERCE

a Perstorp Biotec Company



1656

Chromosomal
end game

NEWS & COMMENT

- Science Standards Near Finish Line 1648
- Dioxin Report Faces Scientific Gauntlet 1650
- DOE Urged to Go Slow in Building Free Electron Lasers 1651
- Science in Ireland: Scientists' Lobbying Wins a Review of Research Funding 1652
- CNRS Head Orders a Brief Freeze 1653

RESEARCH NEWS

- Chromosome Ends Catch Fire 1656
- How Comets Stay Frisky in the Cold 1658
- Long-Awaited Probe Gets New View of the Sun 1659
- A Constant Star Suddenly Flares Up 1660
- Will Primate Genetics Split One Gorilla Into Two? 1661

PERSPECTIVE

- Probing Solid Catalysts Under Operating Conditions 1675
J. M. Thomas and G. N. Greaves

ARTICLE

- Kinematics of the Asal Rift (Djibouti) Determined from the Deformation of Fieale Volcano 1677
J.-B. De Chabaliér and J.-P. Avouac

REPORTS

- Magnetism from the Atom to the Bulk in Iron, Cobalt, and Nickel Clusters 1682
I. M. L. Billas, A. Châtelain, W. A. de Heer
- All-Polymer Field-Effect Transistor Realized by Printing Techniques 1684
F. Garnier, R. Hajlaoui, A. Yassar, P. Srivastava
- The Unidentified Interstellar Infrared Bands: PAHs as Carriers? 1686
S. Schlemmer, D. J. Cook, J. A. Harrison, B. Wurfel, W. Chapman, R. J. Saykally
- X-ray Variability in the Hot Supergiant ζ Orionis 1689
T. W. Berghöfer and J. H. M. M. Schmitt

DEPARTMENTS

- THIS WEEK IN SCIENCE** 1637
- EDITORIAL** 1639
The Time Traveler
- LETTERS** 1641
Meeting the Competition: A. S. Matlack; G. Calton • Predicting Protein Crystal Structures: S. A. Benner, D. L. Gerloff, T. F. Jenny • Glioblastoma Treatment: D. N. Slatkin • Correction: Incorrect References: M. B. Dalva and L. C. Katz
- SCIENTESCOPE** 1647

- RANDOM SAMPLES** 1654
Weighing the Atom • Tracking a Silicone Leak • New Head for Kinsey? • Interferon With Infertility • Alcoholic Brain Waves • Site Visits to "Chilly Climates" • Making Up the Ancients
- BOOK REVIEWS** 1743
The Hubble Wars, reviewed by G. B. Field • *Exotic Ants*, K. G. Ross • *Time Series Prediction*, A. R. Solow • Vignettes • Books Received
- PRODUCTS & MATERIALS** 1753

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
James E. Dahlberg
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

COVER

Shaded topography of the 12-kilometer-long Asal rift (Djibouti, East Africa). Colors indicate elevations, from -150 meters below (dark blue) to 350 meters above (purple) sea level. The topography results from the tectonic dismemberment over the past 100,000 years

of a large central volcano (Fieale) that formed astride the rift zone 300,000 to 100,000 years ago. Reconstruction of this volcano indicates a spreading rate across the rift of 17 to 29 millimeters per year. See page 1677. [Image: J.-B. De Chaballier and J.-P. Avouac]



Stabilization of Atomic Hydrogen in Both Solution and Crystal at Room Temperature

R. Sasamori, Y. Okaue, T. Isobe, Y. Matsuda

1691

Stern-Volmer in Reverse: 2:1 Stoichiometry of the Cytochrome c-Cytochrome c Peroxidase Electron-Transfer Complex

J. S. Zhou and B. M. Hoffman

1693

Nanosecond Dynamics of the R→T Transition in Hemoglobin: Ultraviolet Raman Studies

K. R. Rodgers and T. G. Spiro

1697

iaglu, a Gene from *Zea mays* Involved in Conjugation of Growth Hormone Indole-3-Acetic Acid

J. B. Szerszen, K. Szczygłowski, R. S. Bandurski

1699

An Interleukin-4-Induced Transcription Factor: IL-4 Stat

J. Hou, U. Schindler, W. J. Henzel, T. C. Ho, M. Brasseur, S. L. McKnight

1701

Regulation of Alternative Splicing in Vivo by Overexpression of Antagonistic Splicing Factors

J. F. Cáceres, S. Stamm, D. M. Helfman, A. R. Krainer

1706

Coaxially Stacked RNA Helices in the Catalytic Center of the *Tetrahymena* Ribozyme

F. L. Murphy, Y.-H. Wang, J. D. Griffith, T. R. Cech

1709

Binding of 14-3-3 Proteins to the Protein Kinase Raf and Effects on Its Activation

E. Freed, M. Symons, S. G. Macdonald, F. McCormick, R. Ruggieri

1713

Stimulatory Effects of Yeast and Mammalian 14-3-3 Proteins on the Raf Protein Kinase

K. Irie, Y. Gotoh, B. M. Yashar, B. Errede, E. Nishida, K. Matsumoto

1716

Molecular Evidence That the Myxozoan Protists Are Metazoans

J. F. Smothers, C. D. von Dohlen, L. H. Smith Jr., R. D. Spall

1719

Inhibitory CA1-CA3-Hilar Region Feedback in the Hippocampus

A. Sik, A. Ylinen, M. Penttonen, G. Buzsáki

1722

Molecular Determinants of State-Dependent Block of Na⁺ Channels by Local Anesthetics

D. S. Ragsdale, J. C. McPhee, T. Scheuer, W. A. Catterall

1724

Role of a Conserved Retinoic Acid Response Element in Rhombomere Restriction of *Hoxb-1*

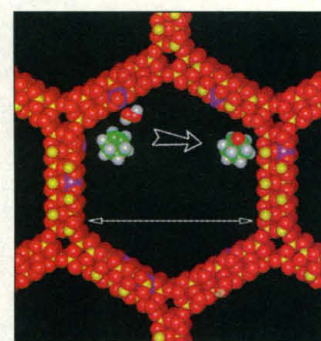
M. Studer, H. Pöpperl, H. Marshall, A. Kuroiwa, R. Krumlauf

1728

Control of Thalamocortical Afferent Rearrangement by Postsynaptic Activity in Developing Visual Cortex

Y. Hata and M. P. Stryker

1732

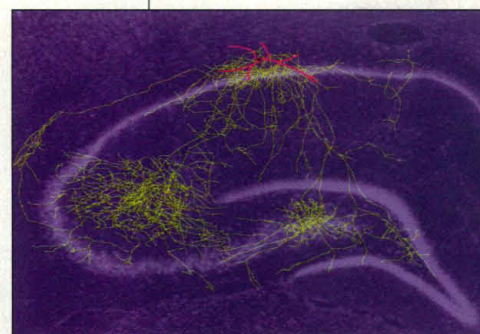


1675

Catalysts at work

1722

Long-range inhibitory neurons in the hippocampus



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

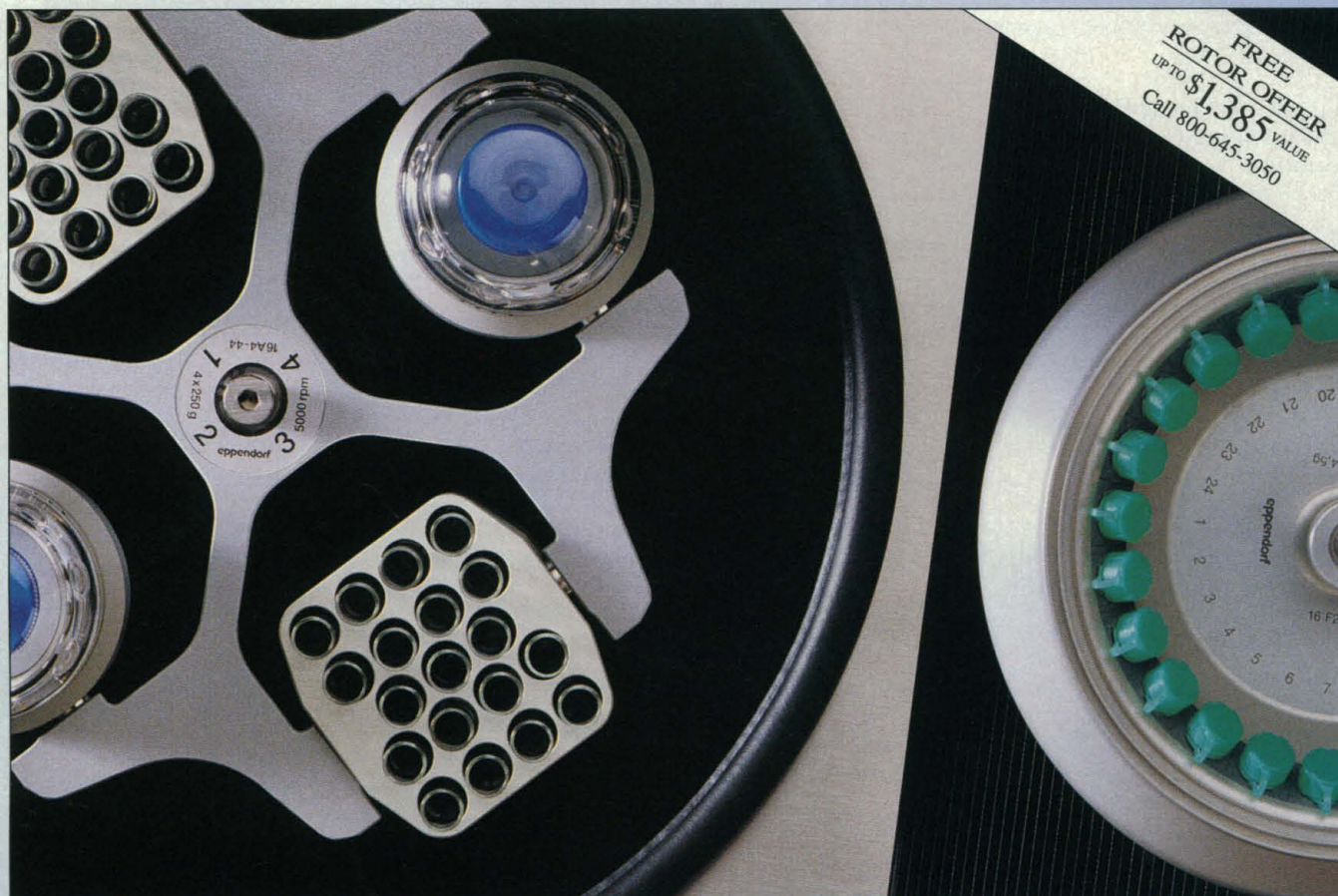
William T. Golden
Treasurer
Richard S. Nicholson
Executive Officer

■ **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...



FREE
ROTOR OFFER
UP TO \$1,385 VALUE
Call 800-645-3050

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-Netheler-Hinz GmbH. BRK-10556 5201-303

See Us at NIH — Booths #411, 412, 413 & 414
For information circle reader service number 30
For a demonstration circle reader service number 31

THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Bulking up

How many metal atoms are needed in a cluster for it to start exhibiting the properties of the bulk metal? Billas *et al.* (p. 1682) measured the magnetic moment of different sizes of clusters of iron, cobalt, and nickel. Ferromagnetism is observed for even the smallest clusters, but for 30 atoms or fewer the cluster's magnetic moment is atomlike. Bulk magnetism becomes the norm for clusters of several hundreds of atoms.

Not the culprit

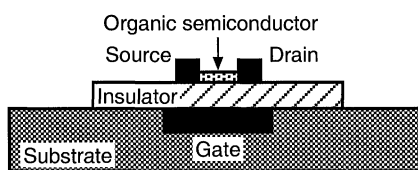
Astronomers have documented a number of absorption and emission features that appear in infrared spectra of a wide variety of astronomical sources, but the molecules responsible for these features have not yet been identified. Polycyclic aromatic hydrocarbons (PAHs) have been frequently mentioned as candidates for the task, but Schlemmer *et al.* (p. 1686) provide laboratory evidence against this hypothesis. A sensitive photon-counting technique was used to obtain emission spectra of gas-phase naphthalene and pyrene, and strong features were found at wavelengths where no astronomical emission or absorption is known. Because the spectra of PAHs of all kinds, in both neutral and ionized forms, are closely related, these specific results cast doubt on the PAH hypothesis in general.

Two for one

Binding between biomolecules is often studied through a Stern-Volmer experiment: The excited-state decay of probe molecule is monitored for different concentrations of a quencher. For weakly bound complexes, it

Putting it on plastic

Although one thrust of semiconductor research is miniaturization, another is to make the various device elements with organic-based molecules and materials. Garnier *et al.* (p. 1684) have constructed such a polymer-based transistor whose active element consists of thiophene oligomers 40 nanometers in thickness. Different polymer layers are built up with a printing technique, thus avoiding costly processing steps under high vacuum conditions.



can be difficult to observe a limiting value. Zhou and Hoffman (p. 1693) show that weakly bound complexes can be analyzed by performing the titration in reverse, holding the quencher constant, and varying the probe concentration. They then show that, over a wide range of ionic strengths (including physiological conditions), the 2:1 complex of cytochrome c and cytochrome c peroxidase, rather than a 1:1 complex, is the one that has a high rate for electron transfer.

Well connected

The hippocampus is a part of the brain that appears to participate in some forms of learning and memory. It receives input from other parts of the cortex through the perforant pathway that targets the dentate granule cells of the hippocampus. These cells send their output to the CA3 region via mossy fibers, and the cells of CA3 send their output to the CA1 region via the Schaffer collaterals. Sik *et al.* (p. 1722) have reconstructed two inhibitory CA1 neurons that, unlike known locally ramifying inhibitory neurons, project back to what are thought to be earlier stages of processing in the hilar region and granule cell layer. These

connections could help to organize individual neurons into populations that are responsible for temporally coherent activity of the hippocampus.

Unleashing hormones

A variety of plant hormones are found in conjugated, seemingly inactive, forms that nevertheless may contribute to regulation of the amount and location of the active, unconjugated form of the hormone. Szerszen *et al.* (p. 1699) have cloned the maize gene *iaglu*, which controls the first step in the conjugation pathway for the growth-promoting hormone, indole-3-acetic acid. Hybridization analysis suggests that homologous genes occur in other plants as well. Manipulation of such hormone-conjugation genes may provide a means to control plant growth without the application of exogenous hormones.

Variable control

Alternative splicing of mRNA is an important means of gene regulation. In vitro, SF family proteins and hnRNP A1 have opposing effects on the choice of the 5' splice site. Cáceres *et al.* (p. 1706) overexpressed these

proteins in HeLa cells and found that SF2/ASF and hnRNP A1 mediate 5' splice site choice in vivo. Whereas SF2/ASF activates the proximal 5' splice site and prevents exon skipping, hnRNP A1 promotes distal 5' splice site choice. Thus, variable ratios of such splicing factors may regulate differential splicing in vivo.

Metazoan Myxozoa

The phylum Myxozoa includes a collection of obligate endoparasites that have characteristics of both protozoans and metazoans. Smothers *et al.* (p. 1719) have concluded from analysis of 18S ribosomal RNA sequence data that although the Myxozoa have been considered part of the kingdom Protista, they are more appropriately grouped with the multicellular metazoa. Myxozoa may share an evolutionary history with bilateral animals, and thus offer an extreme example of the loss of complex characteristics that can occur during evolution.

Pores and pain

Local anesthetics reduce or prevent pain by blocking Na⁺ channels that are required for the generation of action potentials in nerves. The channels can exist in either a closed resting state, an open state, or an inactivated state that occurs when an open channel has just closed. The local anesthetics interact differently with channels in each of these states. Ragsdale *et al.* (p. 1724) have used site-directed mutagenesis to reveal the amino acid residues that contribute to drug binding in the various states and their relation to the pore of the channel.

Go full circle.

*From Signal
Transduction...*

Protein Kinase Assay Systems

Introducing Promega's novel Protein Kinase Assay Systems for determination of individual protein kinase enzymatic activity. Each system incorporates a kinase-specific biotinylated peptide substrate which, after phosphorylation, is selectively captured on a unique streptavidin-coated disk and quantitated by liquid scintillation counting. This strategy eliminates background from any non-biotinylated proteins phosphorylated by contaminating kinases or from excess [γ - 32 P]ATP.

Advantages:

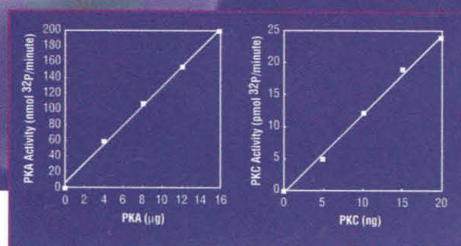
- Specific – quantitation of a specific kinase activity in a mixture of other protein kinases that may be present in a tissue or cellular extract.
- Convenient – ready-to-use reagents provided.
- Fast – assay completed in 10 minutes after termination of reaction.
- Accurate – only the biotinylated peptide substrate binds to the streptavidin disk, providing a more accurate estimate of the specific kinase activity.
- Systems available:
PKA Assay System
PKC Assay System
Additional assays will be available.

... to Cell Cycle Research

Reagents for Cell Cycle Research

pp34^{cdc2} Kinase
cdc2 Protein Kinase Peptide Substrate
Olomoucine (cdc2 Protein Kinase Inhibitor)
Anti-pp34^{cdc2} Kinase N Terminus pAb
Anti-pp34^{cdc2} Kinase C Terminus pAb
p9^{CksHs2} Agarose

... with Promega.



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	1 800 225 123	France	05 48 79 99	Switzerland	01 830 70 37
		China	01 256 3159	Netherlands	071 21 71 21	United Kingdom	0800 378994
Worldwide Distribution:		Finland	90 708 0900	India	11 684 6565	Luxembourg (see Netherlands)	
Argentina	1 381 7962	France	1 45 33 67 17	Indonesia	21 739 0320	Malaysia	3 735 1559
Austria	1 80105 324	Germany	06221 502122	Ireland	01 8426644	Mexico	5 525 8579
Belgium (see Netherlands)		Ger. Export	49 6221 502 114	Israel	8 406 530	New Zealand	9 570 3200
Brazil	031 275 12 40	(Hungary, Poland, Czech Rep., Slovakia)		Italy	055 5001871	Norway	035 541999
Canada	800 267 7424	Greece	01 643 6138	Japan	03 3270 0536	Portugal	1 458 1641
Denmark	44 94 88 22	Hong Kong	751 9488	Korea	02 571 0440	Russia	095 135 4206
Egypt	2 245 1785	Iceland (see Sweden)			or 02 588 5961	Singapore	273 0898
						South Africa	11 886 4710
						Spain	93 404 52 14
						Sweden	0346 83050
						Taiwan	02 733 6877
						Thailand	2 284 0950-51
						Turkey	216 385 8321
						Venezuela	2 265 0891

©1994, Promega Corporation. All Rights Reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of Promega Corporation. Prices and specifications subject to change without prior notice. Revised 7/26/94



Promega

In USA Call

800-356-9526

Fax 800-356-1970 or



Fisher Scientific
800-766-7000

Circle No. 53 on Readers' Service Card

SIGMA ANNOUNCES 4 NEW WAYS TO HELP YOU GROW.



INTRODUCING OUR SERUM-FREE, SPECIALTY MEDIA.

At Sigma, anticipating your growing needs is our business. And to prove it, we're introducing four new serum-free and serum-reduced medium kits to the industry's most complete product line:

1. Keratinocyte Medium Kit - Product No. KMK 1
2. Fibroblast Medium Kit - Product No. FMK 1
3. Melanocyte Medium Kit - Product No. MMK 1
4. Endothelial Medium Kit - Product No. EMK 1 (contains 2% serum in complete medium).

Our four new specialty media come with all the appropriate supplements to form your complete growth medium. So throw away your "shopping list" of medium supplements. These kits also offer flexibility - you can add, withhold, or substitute growth supplements as necessary. And they're cell type-specific, practical and convenient. So, if you're looking for additional growth opportunities, look to Sigma's four new serum-free medium kits. You can count on us for the best in cell culture.



Where Science and Service Come Together.


























Call collect: 314-771-5750,
800-325-3010,
or contact your local Sigma office.


AUSTRALIA AUSTRIA BELGIUM BRAZIL CZECH REPUBLIC FRANCE GERMANY HUNGARY INDIA ITALY
JAPAN MEXICO NETHERLANDS SOUTH KOREA SPAIN SWITZERLAND UNITED KINGDOM UNITED STATES

A Sigma-Aldrich Company

Circle No. 18 on Readers' Service Card

Our Competitors' Enzymes Can't Pass The Quality Testing Performed On GIBCO BRL Restriction Endonucleases[†]

Assay Performed	GIBCO BRL	Company A	Company B	Company C
DNA Endonuclease Assay	All Pass	 	All Pass	
DNA Exonuclease Assay	All Pass	All Pass	 	
DNA Ligation/Recut Assay	All Pass	 	 	All Pass
Nicking Assay	All Pass		 	 
Unit Assay	All Pass	   	  	  

 = One Failure

Summary: Seven out of ten restriction endonucleases from each competitor failed one or more of our quality tests.

[†]Enzymes tested in the manufacturers' recommended buffers: *Bam*H I, *Bgl* I, *Cla* I, *Eco*R I, *Hind* III, *Kpn* I, *Not* I, *Pst* I, *Sal* I, and *Sst* I (*Sac* I)

In a recent quality comparison between Life Technologies and three leading manufacturers, seven out of ten restriction endonucleases from each competitor failed one or more of our quality tests.

Life Technologies offers the highest quality restriction endonucleases on the market because of our rigorous and complete quality control. All enzymes are performed at four separate stages: synthesis, purification, and on the final product.

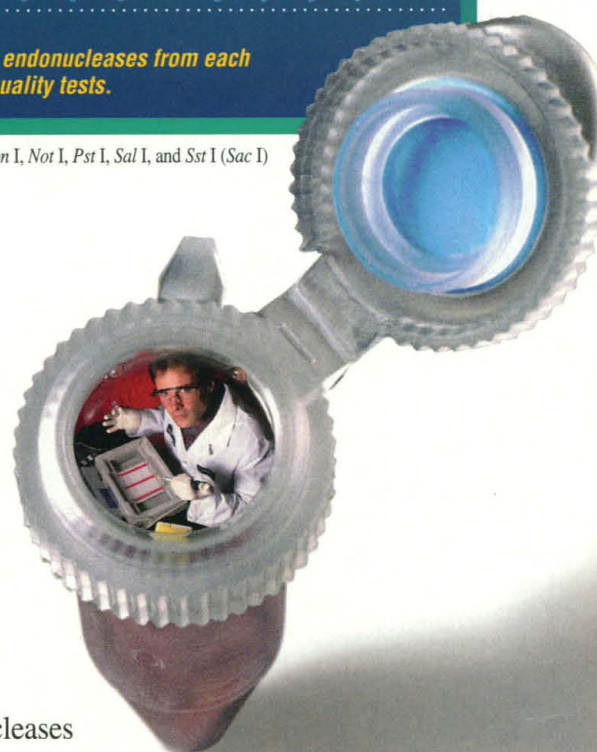
For reliable results, compare our restriction endonucleases to the competition. Request our free restriction endonuclease brochure or visit our website for comparative data.

SPECIAL OFFER!

Buy \$450 worth of GIBCO BRL Restriction Enzymes, get a **FREE** canvas attaché.

Reference Quote Number 941793P

Offer expires 11/15/94



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

LIFE TECHNOLOGIESTM

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
Telex: 64210 BRL GARG UW

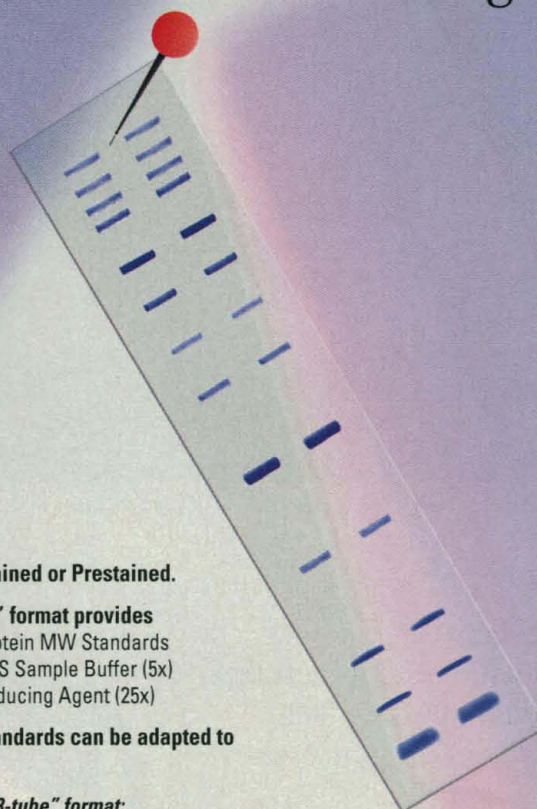
Canada Orders
Burlington, Ontario L7P 1A1 Canada
To Order/TECH-LINE: (416) 335-2255

TECH-LINESM 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.
94-161

Circle No. 46 on Readers' Service Card

Pinpoint accuracy.

Protein Markers from New England Biolabs.



Available Unstained or Prestained.

Unique "3-tube" format provides

- Protein MW Standards
- SDS Sample Buffer (5x)
- Reducing Agent (25x)

Protein MW Standards can be adapted to any gel system.

Advantages of "3-tube" format:

- Supplies enough SDS Sample Buffer and Reducing Agent for analysis of 1,000 protein samples.
- Allows preparation of Reducing SDS Sample Buffer just before use.
- Ensures uniform mobility for protein samples and Protein MW Standards by use of same Reducing SDS Sample Buffer.
- Permits long term stable storage for each component.



Ordering Information

#7701 Protein Marker Broad Range

#7707 Prestained Protein Marker Broad Range

For more information about Protein Markers from New England Biolabs contact us at 1-800-NEB-LABS or via the Internet at info@neb.com

- New England Biolabs Inc. 32 Tozer Road, Beverly, MA 01915 USA 1-800-NEB-LABS Tel. (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 (UK) Ltd., Tel. (0800) 31 84 86 (0462) 420616 Fax (0462) 421057 info@uk.neb.com

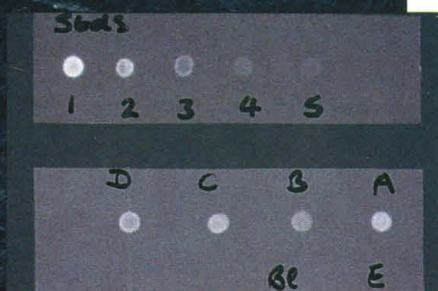
DISTRIBUTORS: Australia (075) 94-0299; Belgium 078 119815; Brazil (011) 66-3565; Denmark (31) 56 20 00; Finland (90) 420-8077; France (1) 34 60 24 24; Greece (01) 5226547; India (542) 311473; Israel (03) 535-1205; Italy (02) 38103171; Japan (03) 3272-0671; Korea (02) 5560311; Mexico (5) 519-3463; Netherlands (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. 27 on Readers' Service Card

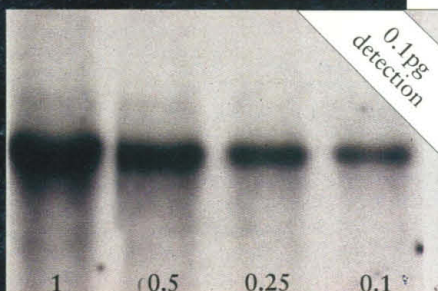




Chemiluminescent Southern Blotting



Novel spray-on detection reagents (main picture), a rapid and simple labelling check (above) and a new liquid blocking reagent are just some of the unique features that enhance convenience with excellent non-radioactive sensitivity.



Human genomic DNA-probed with *N-ras* probe (10ng/ml) labelled and detected with Fluorescein Gene Images. Overnight exposure (15 hours). Loadings in picogrammes.

© Amersham International plc 1994.
All rights reserved.

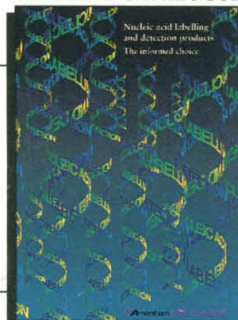
New nonradioactive system for Southern blotting from Amersham Fluorescein Gene Images™

Single-copy detection—0.1 pg can routinely be achieved
Liquid blocking agent—allows strong signal with low background
Spray substrate—for added convenience and even coverage

For your free Gene Detection Product Guide call 800-323-9750. Ask for "Southern".

Gene Images is a trademark of Amersham International plc.

FREE MINI CATALOGUE



Amersham International plc
Little Chalfont England HP7 9NA
Tel: 0494 544000
Fax: 0494 542929

For further information
contact your local office.

Amersham Corporation
2636 South Clearbrook Drive
Arlington Heights
Illinois 60005
Tel: (800) 323-9750
Fax: (708) 437-1640

Amersham Canada Ltd
1166 South Service Road West
Oakville
Ontario L6L5T7
Tel: (905) 847-1166
Fax: (905) 847-7790

* Based on Lumi-Phos 530, a trademark of Lumigen Inc.
Fluorescein Gene Images and Amersham are trademarks of Amersham International plc

FGCB

GRAINCOLLECTION

HUMANS' NATURAL ECOLOGICAL NICHE

SERGIO TREVIÑO

Translated by:
Rebeca San Martín-Feeney

The logically harmonious thesis contained in this work will revolutionize our current way of thinking about human origins and behavior.

Ernst Mayr, Professor of Zoology, Emeritus, at Harvard University, considered by many to be the greatest evolutionist of the century, has written to the author:

"...I am rather inclined to accept your thesis of the role of graincollecting in the history of mankind, persuaded by your arguments and those of others.

Thank you very much for your interesting and closely argued book!"

How did bipedalism, the loss of body hair, and tool use originate? After more than 130 years of scientific research, the origin of these basic human characteristics is still unknown. Bipedalism, the loss of body hair, and tool use originated 14 million years ago, when our very distant ancestors, *Ramapithecus*, turned graincollectors. Erroneously, we still equate biological evolution with "progress", and therefore, believe humans descend from knuckle-walking, hairy, unskilled tool users who resembled the living great apes, when, in fact these apes descend from bipedal, naked, skilled tool users, who resemble modern man.



The large intestine, humans' largest internal organ, is presently used only to absorb water and electrolytes, although its sacculated nature indicates an evolutionary adaptation to digest cellulose. This intestine's movements are so slow that the first radiologist to observe it said it presented a picture of still life. Much of this inactivity can be attributed to mankind's omnivorous diet. Nonetheless, it follows that, when following an **exclusively** granivorous, cellulose-digesting diet, our large intestine proves to be much more useful and efficient, since our ancestors up to 50 thousand years ago **always** used it to digest cellulose fiber. We are presently neglecting a very useful capability that our ancestors adaptively acquired. Humans, as **all** other primates, were meant to be vegetarian cellulose-digesters and have slim bodies. The size of the human mouth is small for almost any type of omnivorous feeding, making this feature, as well as our powerful teeth, characteristic more of seed-eaters than of carnivorous or omnivorous mammals.

It is inconceivable to think that hominids and their protohominid ancestors lived in the savannas for millions of years and never developed the practice of feeding from gramineous seeds until the discovery of agriculture, or until fire was used to cook food. If we take into consideration that early hominids were already **bipeds and tool users**, and **the seeds from grasses would lightly touch their hands as they walked in the long-grass grasslands**, it would be illogical to assume that, in spite of the many vicissitudes they suffered during so many million years of living in the savannas, they never tried to feed from these seeds or that they never thought of removing the seeds with their hands. The author argues that when injuring themselves by removing the seeds, they used a **natural** small stone tool to protect their hands, which achieved an unanticipated advantage: they improved their efficiency in removing and threshing seeds.

We invite you to read this book and explore in it the scientific bases of these arguments, upholding the importance of the role of graincollecting in human evolution and behavior.

293 pp., 6x9 hardcover
ISBN: 0-533-09415-1

Photos and illus.
\$18.00

VANTAGE PRESS, INC.
516 West 34th Street
New York, NY 10001
Telephone (212) 736-1767
Fax (212) 736-2273

MasterCard and Visa members
call toll free in U.S.:
1-800-882-3273

A SYNTHESIS OF NEW IDEAS...

COMPLEXITY

Complexity provides global coverage of the rapidly expanding science of complex adaptive systems in a concise, readable format. The journal is designed to serve as a medium of communication for professionals and students of such systems in all fields of inquiry, including physics, biology, chemistry, economics, anthropology, computer science and linguistics. **Complexity** will interrelate these fields by promoting discussion of common problems and their solutions between disciplines.

Editorial features include:

Survey Articles—synthesis of current research, survey methodology and description of applications of complexity in specific problem areas.

Research Articles—peer-reviewed original research on methodology of complexity.

Technical Communications—short, peer-reviewed announcements of important research results in the science of complexity.

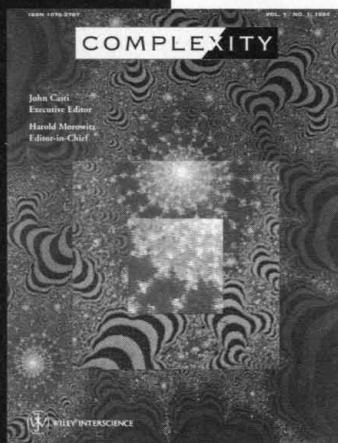
Tutorials—introductions to the basic approaches to the analysis and/or application of complexity.

Commentaries—short articles arguing a particular view of complexity as a system property or addressing any other controversial theme in the field of complex adaptive systems.

Book and Software Reviews

Manuscripts should be submitted to:

John L. Casti, Santa Fe Institute
1399 Hyde Park Road • Santa Fe, NM 87501
e-mail: complexity@santafe.edu
phone: (505) 984-8800 fax: (505) 982-0565



COMPLEXITY

ISSN 1076-2787
Volume 1, 6 issues,
beginning
Spring 1995

Institutional Rates:
\$195 U.S.,
\$225 outside U.S.

Personal Rates:
\$59.95 U.S.
\$89.95 outside U.S.
(Special introductory
offer good through
April 30, 1995.)

Student Rates:
\$36 U.S.,
\$66 outside U.S.
(Student rate is
available to those
who submit
proof of a valid
student I.D.)

Harold Morowitz
Editor-in-Chief
George Mason
University

John L. Casti
Executive Editor
Santa Fe Institute

Associate Editors:
Marcus Feldman
Stanford University

Michele Boldrin
Northwestern
University

Peter Carruthers
University of Arizona

Joseph Traub
Columbia University

Wojciech Zurek
Los Alamos
National Lab

Editorial Board:
Philip W. Anderson
Princeton University

Kenneth J. Arrow
Stanford University

W. Brian Arthur
Stanford University

George Bell
Los Alamos
National Lab

Gregory Chaitin
IBM Research
Division

George Cowan
Los Alamos, NM

Manfred Eigen
Max Planck
Institute Göttingen

Murray Gell-Mann
Santa Fe Institute

Peter Grassberger
University of
Wuppertal

George Gumerman
Santa Fe Institute

Hanoch Gutfreund
The Hebrew
University

W. Daniel Hillis
Thinking Machines
Corp

John Holland
University of
Michigan

C.S. Holling
University of Florida

Atlee Jackson
University of Illinois

Erica Jen
Los Alamos
National Lab

Kunihiko Kaneko
University of Tokyo

Stuart Kauffman
Santa Fe Institute

Edward Knapp
Santa Fe Institute

Richard Palmer
Duke University

Alan Perelson
Los Alamos
National Lab

David Pines
University of Illinois

Ronald Z. Sagdeev
University of
Maryland

Peter Schuster
University of
Vienna

L.M. Simmons, Jr.
Santa Fe Institute

Miguel Virasoro
University of Rome
"La Sapienza"

Gérard Weisbuch
Ecole Normale
Supérieure

Michael Woodford
University of
Chicago

Ordering Information

Subscription orders
and requests for
sample copies can
be sent to:

Beth Schacht, Marketing Dept.,
John Wiley & Sons, Inc.,
605 Third Avenue,
New York, NY 10158-0012,
Fax #212-850-6021,
e-mail: subinfo@jwiley.com.

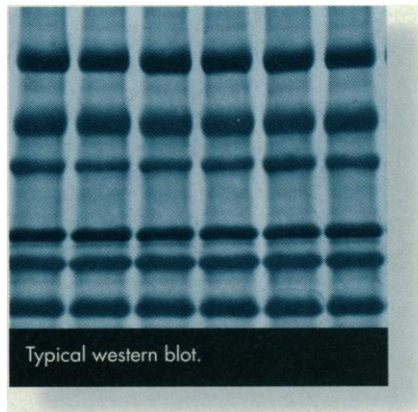
Outside North America, order from
John Wiley & Sons Limited,
Tel: +44 243 779777 Fax: +44 243 775878
Subscription Department, Baffins Lane,
Chichester, Sussex PO19 1UD, England.

Circle No. 40 on Readers' Service Card

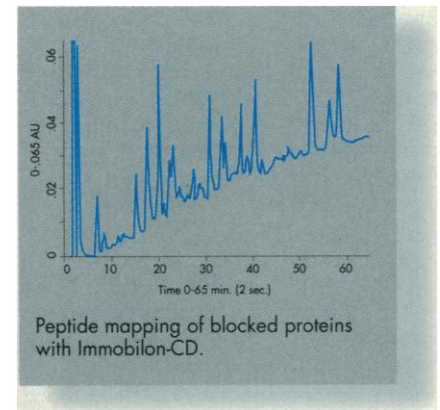
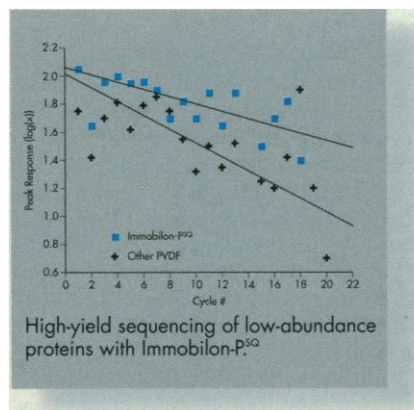
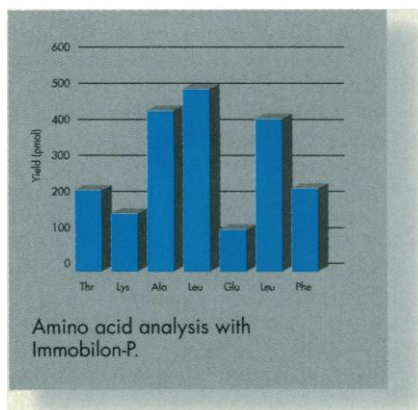


WILEY INTERSCIENCE

Call For A
Free Sample.



Information.



Information Superhighway.

To elucidate the properties of your protein, let one of the Immobilon™ transfer membranes pull out the maximum information possible.

Millipore has developed unique Immobilon matrices—each optimized for different biomolecule studies.

Immobilon-P is the ideal PVDF matrix for general western blotting and immunodetection, delivering stronger bands and better signal-to-noise than traditional nitrocellulose. The broad compatibility of PVDF makes it particularly well suited for amino acid analysis.

Immobilon-P^{SQ} is a specialized PVDF membrane that binds three-to-five times more protein than conventional PVDF. The capture of peptides or low-abundance proteins

with nearly 100% efficiency makes this the membrane of choice for high-yield sequencing.

For peptide mapping of N-terminally blocked proteins, there's no better choice than Immobilon-CD. Its cationically-charged PVDF surface permits reversible sample immobilization, allowing protein bands to be eluted from the membrane after transfer for sequencing.

Don't let vital information slip through your fingers. Take the high road—and find out what you've been missing. For a free sample of the Immobilon membrane of your choice and key references, in the US and Canada call 1-800-MILLIPORE ext. 8202. Japan, fax to (03) 3474-9141. Europe (fax to our Paris headquarters), +33.1.30.12.71.83.



Thermal Cycler of the Hour

Portable MiniCycler™ Does Its Duty

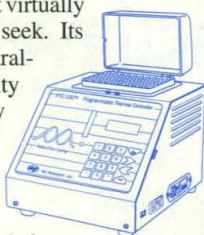
Not many thermal cyclers can be slipped into a suitcase and shuttled off to distant lands, but the 3 kilogram MiniCycler™ instrument has often seen such service. From the frigid glaciers of Antarctica to a confined hotel room in Tokyo, this rugged instrument can be counted on to get the job done with speed, precision and accuracy. Its Peltier heat pump delivers an extended temperature range from -9° to 105°C, with a ramping rate as fast as 2.4°C/sec. Its switching power supply allows operation on a variety of currents—from the 100V of Japan to the 240V of England. Says Scott Baker, "This machine is a real gem. It is lightning fast and spot on with its temperature plateaus. It functioned beautifully in Japan and in my lab in New Zealand ever since." He adds, "I couldn't have done the job without it."



PTC-100-96V WITH HOT BONNET™ LID

Oil-Free & Accepts Plates or Tubes

There are many models of thermal cycler on the market, but only the MJ RESEARCH PTC-100-96V combines in one instrument virtually every feature investigators seek. Its advantages include: unparalleled temperature uniformity across the block, the ability to accept a microassay plate or 0.2ml tubes, a heated-lid accessory for oil-free operation, a new Slide Griddle™ accessory that holds four glass slides, 0°-100°C temperature range, speedy operation, intuitive software, elephantine memory, and a two-year warranty. Furthermore, all of this fits into a compact design that doesn't require messy water connections or an accessory chiller.



It is the Peltier effect—combined with MJR engineering—that makes this possible. MJR has more experience than any other firm in building and controlling Peltier-effect heat pumps for cycling, and this difficult-to-master technology can lead to extraordinary speed and accuracy of operation.

FOR MORE INFO, PLEASE CALL OR E-MAIL: SALES@MJR.COM



MJ RESEARCH, INC.

Manufacturer of Peltier-effect Thermal Cyclers

149 Grove St. • Watertown, MA 02172 U.S.A.
(800) 729-2165 • Fax (617) 923-8080

HUMPBAC WHALE STILL HUNTED, mtDNA SHOWS

EARTHTRUST TEAM GOES UNDERCOVER

PCR* in Hotel Rooms

HONOLULU — A team working with the environmental group Earthtrust has adapted the tools of molecular biology to document the illegal sale of whale meat. The poaching of endangered species of whales had long been suspected, but due to a technicality of international law, actual data were always difficult to collect. Although whale meat is commonly sold in several nations, scientists are restricted from taking tissue samples across national borders—even if only to conduct DNA analysis.

Enter Earthtrust, the Hawaii-based group that first exposed the slaughter of dolphins by deep-sea driftnetters. In 1993, their scientific team of Scott Baker of the University of Auckland & Steve Palumbi of the University of Hawaii developed a protocol for extracting and copying DNA that works well in the field. Baker then flew to Japan to test samples of whale meat obtained in advance by a collection team consisting of an off-duty wildlife officer and a linguist. This team had scouted fish markets and department stores to obtain samples and videotape



of whale meat for sale. They relayed the samples to Baker, who set up his lab gear in a hotel room.

Under the rules of the International Whaling Commission, Japanese whalers are permitted to harvest a small number of Southern Hemisphere minke whales—a less threatened species—for population analysis, then sell the meat to finance their efforts. It had long been suspected that through this legal loophole, much illicit trade in endangered species was occurring. But data were lacking, and the CITES treaty—an international agreement designed to protect threatened animals worldwide—prohibits the transportation of products from endangered species across national borders. So Baker extracted DNA from the processed whale meat samples, then amplified mtDNA using a portable MiniCycler thermal cycler donated by MJ RESEARCH. In order to adhere to the CITES regulations, Baker separated the synthetic, copied DNA from true whale DNA by using biotinylated primers and streptavidin-coated magnetic beads. He then returned to Hawaii with only copied DNA, which he and Palumbi sequenced and analyzed.

Baker & Palumbi's data show that among 16 samples identified, 7 were from Southern minke whale, one from North Atlantic minke, one from humpback, 4 from fin whale, 2 from dolphin, and one was likely a beaked whale. These data were presented to the IWC in May and published in a recent issue of *Science*. Many groups hope that this new method of portable DNA analysis will help authorities enforce existing law, as well as obviate any future need for lethal "research whaling".

New MicroSeal™ 'A' Film

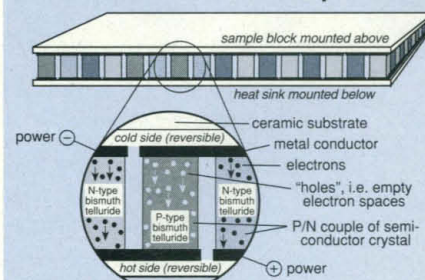
Allows Oil-Free Cycling in 96-well Plates

MJ RESEARCH has just announced a new technology for reliably sealing 96-well plates during thermal cycling. Much better than tapes that sometimes leak or rubber covers that must be reused, this "MicroSeal A" film is a novel and economical sealing device for use with heated lids. It can also be used to replace caps on racks of 0.2ml tubes.

The film is a laminate of Mylar™ substrate and a pliable silicone gel that conforms to wells as pressure is applied. The film is laid upon the plate or rack of tubes, and a heated lid with a pressure plate—such as a 96V Hot Bonnet™—creates a seal that contains water vapor. The film can easily be removed and replaced, and its use greatly facilitates the hot start technique. Microseal film is especially useful for thermal cycle sequencing or other procedures where throughput is high, and it works well in several brands of thermal cycler.

* The polymerase chain reaction (PCR) is a process covered by patents owned by Hoffmann-La Roche. Users should obtain proper license—or use licensed reagents—to perform the reaction.

How A Peltier Heat Pump Works

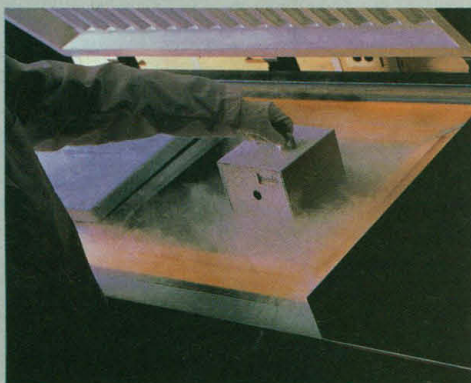


As current passes through the P/N semiconductor couples, charge carriers (electrons or "holes") absorb energy at one of the metal/semiconductor interfaces and deposit energy at the other, generating a thermal gradient of up to 70°C across the crystals. The rate of heat pumping is proportional to current, and the direction is reversible by switching polarity.

READY FOR DISTRIBUTION

Second Edition of "Protocol: In-Situ Amplification*" by Omar Bagasra et al

Please call for a free copy of this 64-page booklet describing Dr. Bagasra's latest techniques.



- 152°C ultra-low temperature freezers
- 135°C/-86°C ultra-low temperature freezers
- 40°C/-35°C/-30°C medical freezers

Blood bank refrigerators
Pharmaceutical refrigerators
Cooling rooms

Freezers/refrigerators with totally reliable internal temperatures.

Multi-gas incubators
CO₂ incubators
Cooled incubators
Heated incubators
Plant growth chambers
Incubators for advanced research and testing.

-152°C



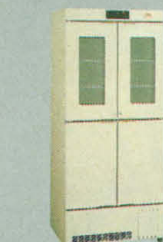
MDF1155
An ultra-low -152°C temperature freezer with special refrigerant and refrigerating oil for safe, low temperature operation.



MCO-17A
Microprocessor-controlled air-jacketed CO₂ incubator with accurate temperature control and alarm functions. Easy to install and maintain.



MLR-350
Versatile plant growth chamber with programmable temperature and lighting functions and large capacity plus a slim, space saving design.



MPR-411F
Exclusively tailored refrigeration/freezing systems provide a stable preservation environment for reagents and pharmaceuticals.

**100% CFC-Free
Refrigerants
and Insulation
Non-Flammable
Non-Toxic**

SANYO



Automatic tablet counting and packing machines
Based on microcomputer advances, these compact units enable accurate tablet dispensing.

Automated Hospital Pharmacy System

Washing System

Laboratory ware jet washers
Sanyo's new washing technology for scientific use is based on jet water action and microcomputer control.

**Electric ovens
Dry heat sterilizers
Autoclaves**
Equipped with electronic control systems, these models limit temperature fluctuations.

**Bio-clean rooms
Bio-clean benches
Clean benches
HEPA-filter units**
Sanyo's know-how extends to bio and industrial clean rooms.

A wide range of advanced Sanyo technology in support of medicine and research.

Using state-of-the-art electronics technology and control systems, Sanyo makes it possible to perform a wide variety of environmental and medical experiments that are vital for biotechnology research. Our advanced technology used in compressors and ultra-low temperature freezers enables

long-term preservation of cells, bacteria, bone marrow, and other materials essential to the advancement of science. Thanks to the use of CFC-free technology, Sanyo offers an array of outstanding products that are safe for the environment.



CFC-FREE

■ SANYO Electric Co., Ltd.

■ SANYO Electric Trading Co., Ltd.

5-15, Hiyoshi-cho 2-chome, Moriguchi-City, Osaka, 570 Japan Tel: (06)-992-1521
Fax: (06)-992-1565 or (06)-992-2874 Telex: SANYO J63363, J63353

■ SANYO Sales & Supply (USA) Corporation

900 N. Arlington Heights Rd. - Suite 300 Itasca, IL 60143, U.S.A. Tel: 708-775-0404 Fax: 708-775-0044

TOLL FREE - 1-800-858-8442

Circle No. 10 on Readers' Service Card

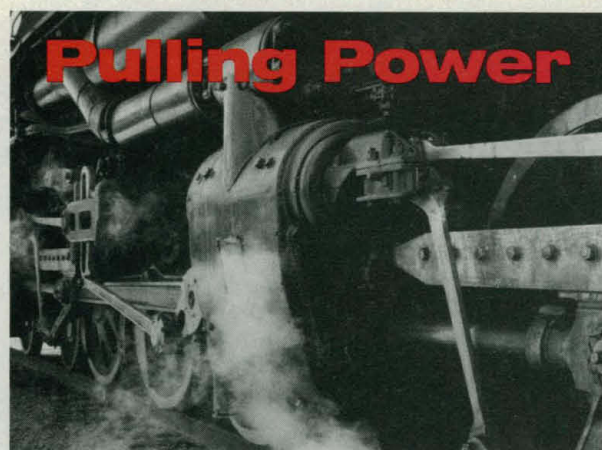
NEW! NEW! NEW!

- **Folimycin (concanamycin A), H^+ -ATPase Inhibitor**
Very potent and specific inhibitor of vacuolar type H^+ -ATPase.
- **ET-18-OCH₃, Protein Kinase C Inhibitor**
New class of membrane-active cytotoxic agent that inhibits PKC, Na^+ , K^+ -ATPase, and PI-PLC. Induces apoptosis in leukemic cells.
- **NC-1300-B, H^+ , K^+ -ATPase Inhibitor**
Long-acting H^+ , K^+ -ATPase inhibitor that is potent in neutral pH environments.
- **Anti-Thymine Dimer mAb (for DNA probe detection)**
New probe detection method used with DNA probes thymine-dimerized by UV light. Available unlabeled or HRP-labeled.

For Research Use Only

KAMIYA BIOMEDICAL COMPANY
P.O. Box 6067, Thousand Oaks, CA 91359
TEL: (805) 374-1380 FAX: (805) 374-1385

Circle No. 51 on Readers' Service Card



**...with this
much control**



Model P-97

Sutter micropipette pullers are the finest available.

Built-in versatility and repeatability are based on 20 years of continuous research and development.

Call or write for a free catalog.



Sutter
Instrument Company
40 Leveroni Court
Novato CA 94949

phone 415-883-0128 fax 415-883-0572

Circle No. 24 on Readers' Service Card

PepSets™ *The flexible*



Rapidly screen hundreds of peptides at the lowest possible price.

PepSets based on the Multipin Peptide Synthesis technology offer unmatched simplicity and flexibility when screening for biological activity, analog studies, structure activity relationships etc.

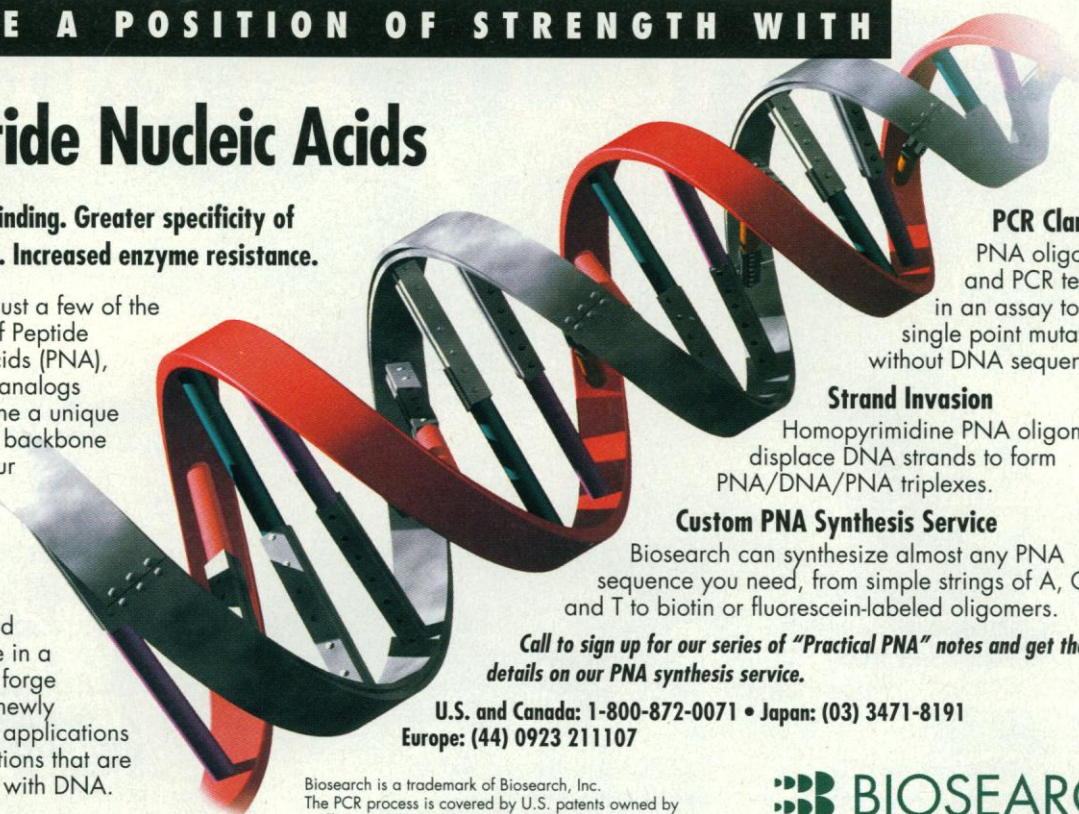
- From a low \$32 per peptide
- Sets of 94 peptides plus 2 controls
- Controls analyzed by HPLC and AAA
- 1 μ mol, 5 μ mol quantities or more
- Cleaved or non-cleaved
- Various N and C terminal options

TAKE A POSITION OF STRENGTH WITH

Peptide Nucleic Acids

Stronger binding. Greater specificity of interaction. Increased enzyme resistance.

These are just a few of the strengths of Peptide Nucleic Acids (PNA), new DNA analogs that combine a unique polyamide backbone with the four purine and pyrimidine bases. With the power of PNA behind you, you're in a position to forge ahead on newly developed applications — applications that are impossible with DNA.



PCR Clamping

PNA oligomers and PCR team up in an assay to detect single point mutations — without DNA sequencing.

Strand Invasion

Homopyrimidine PNA oligomers displace DNA strands to form PNA/DNA/PNA triplexes.

Custom PNA Synthesis Service

Biosearch can synthesize almost any PNA sequence you need, from simple strings of A, C, G, and T to biotin or fluorescein-labeled oligomers.

Call to sign up for our series of "Practical PNA" notes and get the details on our PNA synthesis service.

U.S. and Canada: 1-800-872-0071 • Japan: (03) 3471-8191
Europe: (44) 0923 211107

Biosearch is a trademark of Biosearch, Inc.
The PCR process is covered by U.S. patents owned by Hoffmann-La Roche, Inc. and F. Hoffmann-La Roche Ltd.
Copyright © 1994 Biosearch, Inc., Bedford, MA

BIOSEARCH
Subsidiary of Millipore

Circle No. 69 on Readers' Service Card

way to use peptides.



Call us today and discuss how CMPS can offer an unequalled range of peptide products and services with worldwide support for research, drug discovery and development.

**North American
Sales and Service**
3550 General Atomics Court
San Diego CA 92121 USA
Tel: 800 338 4965
Fax: 800 654 5592

**International
Sales and Service**
11 Duerdin Street
Clayton, Victoria 3186
AUSTRALIA
Tel: +61 3 565 1111
Fax: +61 3 565 1199

**European
Sales and Service**
36 Quai Fulchiron
69005 Lyon FRANCE
Tel: +33 72 41 7039
Fax: +33 78 37 4062



CHIRON
MIMOTOPES
PEPTIDE SYSTEMS

The leaders in Peptide Technology Innovation

Project CM 0860.6.94 (Right)

Circle No. 21 on Readers' Service Card

Maximum Security

The World's Only Microprocessor Controlled Cryogenic Storage Unit.

CryoMed, the ultimate name in cryopreservation, combines liquid nitrogen reliability with microcomputer technology in the CryoPlus series. Sample security is maximized with a microcomputer control/alarm that continuously monitors LN₂ level using pressure differentiation instead of thermocouple sensors. Easily programmed with a touch-pad, the control can be locked, preventing unauthorized entry.



Double fill valves assure positive LN₂ transfer and virtually eliminate problems associated with single valve systems. Reversible-mount control panel lets unit accommodate any lab setup. Coupled with an inventory racking system, CryoPlus provides convenient, economical and secure cryostorage.

The CryoPlus also features:

- Scale selection - liquid or vapor phase
- 24 LED bar graph which continuously displays high/low level limits, alarm setpoints, actual LN₂ level and fill indicator
- Continuous monitoring of system functions
- Audible and visual display of system status
- RS232 data port
- Remote alarm monitoring
- Optional digital display of temperature under the lid

Maximum storage capacities based on 2.0ml vials:
CPII/10,000 CPIII/25,000 CPIV/40,300

Compatible with all CryoPlus units, an optional thermal data printer produces a permanent record of operational functions and alarm sequences.

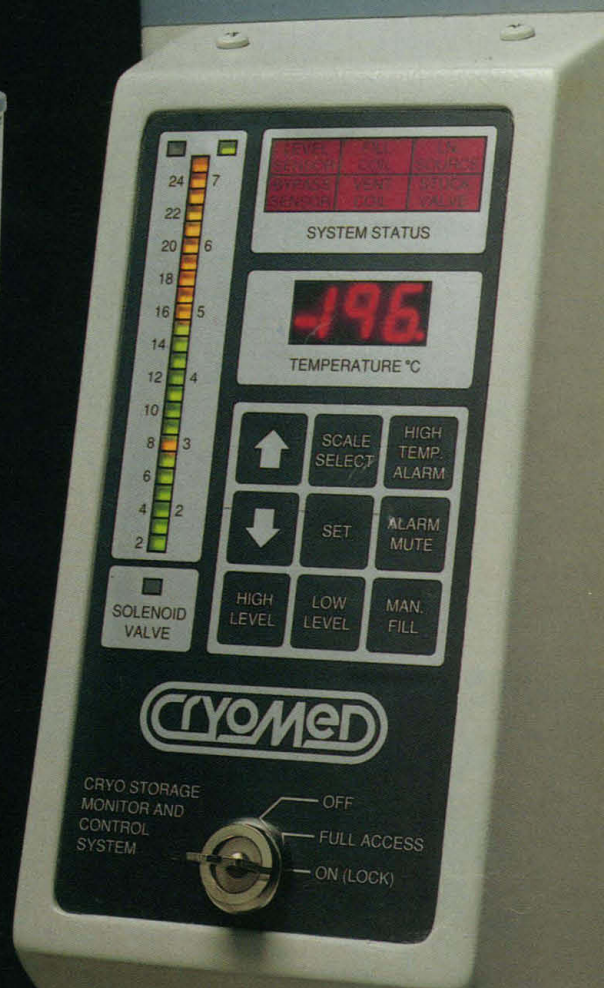


Controlled Rate Freezers

For maximum cell viability, choose CryoMed's programmable and pre-programmed controlled rate freezers, available for use with chambers in three standard sizes.



Direct sales representation in the USA.
International sales and service through authorized distributors in over 70 countries.



Forma Scientific, Inc.

CryoMed

Box 649, Marietta, OH 45750 1-614-373-4763
Telefax: 1-614-373-6770 Telex: 29-8205

Toll-Free 1-800-848-3080

Circle No. 45 on Readers' Service Card

Olympus Fluorescence. Building on the Brilliance.

Olympus now builds on the brilliance of fluorescence by making it an integral part of the most responsive microscope you'll find today.

Presenting the B-Max 60 Research Microscope System.

For transmitted and incident light, a built-in on-axis vertical illuminator now handles any combination of reflected light modes—including incident fluorescence with low UV wavelength techniques. So you get an all-in-one look at your most dynamic applications. And your microscope is ready when you are.

Prepared for the best.

The B-Max 60's Universal Rotary Turret Vertical Illuminator accepts up to four modular fluorescence excitation cubes—from a choice of 18 standard cubes—or lets you select from a wide range of custom cubes for multiple staining techniques. Making everything easily, instantly accessible.

Superior, super-wide F.N. 26.5 Infinity-corrected U.I.S. Plan Fluorite or Plan Apochromat objectives bring you



resolution, contrast and light transmission that enhance your most ambitious procedures and photomicrography. In all microscopy modes. With no magnification factor.

Circle No. 32 on Readers' Service Card

Your Universal Lamp Housing gives you the choice of 12V/100W halogen, 100W mercury or 75W xenon illumination. And a flip of a switch lets you change from reflected to transmitted halogen light and back again.

Which means you never lose sight of your work.

Raising your comfort level.

You experience the B-Max 60 in a totally relaxed, natural position. Your forearms, wrists and hands rest comfortably on the tabletop, yet you have total access to coaxial coarse and 1-micron fine focusing knobs. The electronic controls are visible from the eyepieces. And a massive, stable stand allows simultaneous video and photo mounting for effortless, publication quality photomicrography.

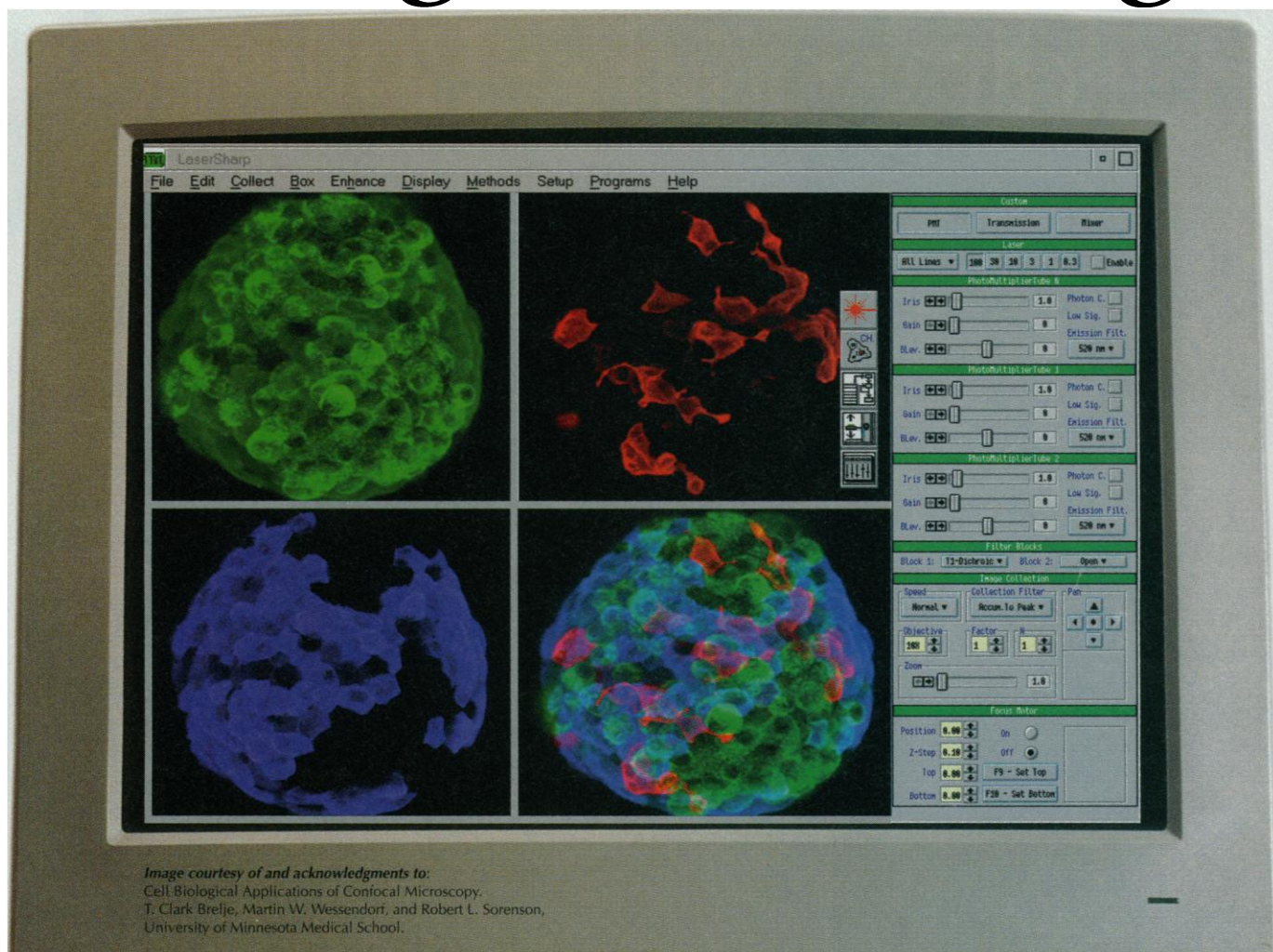
It's a new kind of ease. And like everything about the B-Max 60 Series Research Microscope System, it builds more efficiency into everything you do.

For your demonstration, call
1-800-446-5967.

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



Seeing is believing!



The *Best* Software and the *Finest* Confocal Performance Combined.
The MRC-1024 from Bio-Rad with LaserSharp Software.

- True 24-bit imaging system
- 1280 x 1024 image resolution
- User defined instrument control
- Multi-tasking environment
- Built-in Advanced 3-D visualization software



Call us and see the difference...

BIO-RAD

Microscopy
Division

U.K. (0442)232552 • AUSTRALIA (02) 805 5000 • AUSTRIA 877 89 01 • BELGIUM (09) 385 55 11 • CANADA 1-905-712-2771 • CHINA (Beijing Office) 1-2051850 ext 3401 or 3406
 CHINA (Shanghai Office) (8621) 5459151 • DENMARK 39179947 • FRANCE 00-33-1-49-60 68 34 • GERMANY 0891 31884-0 • ITALY (02) 216091 • FRANCE 01-4960 6834
 MALAYSIA 603-7195072 • NETHERLANDS 08385-40666 • NEW ZEALAND (09) 443 3099 • PACIFIC (852) 789 300 • PACIFIC 011-4610103 • PACIFIC (Korea Liaison Office) 822) 578-8167
 USA (510) 741-1000 • SINGAPORE 65-4432529 • SPAIN Phone: 91-661 7085 • SWEDEN 08-735 8300 • SWITZERLAND 01-810 16 77

For Countries not listed. Please Contact U.K. Office. • Phone: 0442 232552 • Fax: 0442 234434

Circle No. 49 on Readers' Service Card

If these are your questions:

■ Is my protein glycosylated?

■ Are the carbohydrates N-linked or O-linked?

■ What types of monosaccharides are present on my glycoprotein?

■ How consistent is the glycosylation between my production lots?

■ How do various culture conditions affect my protein glycosylation?

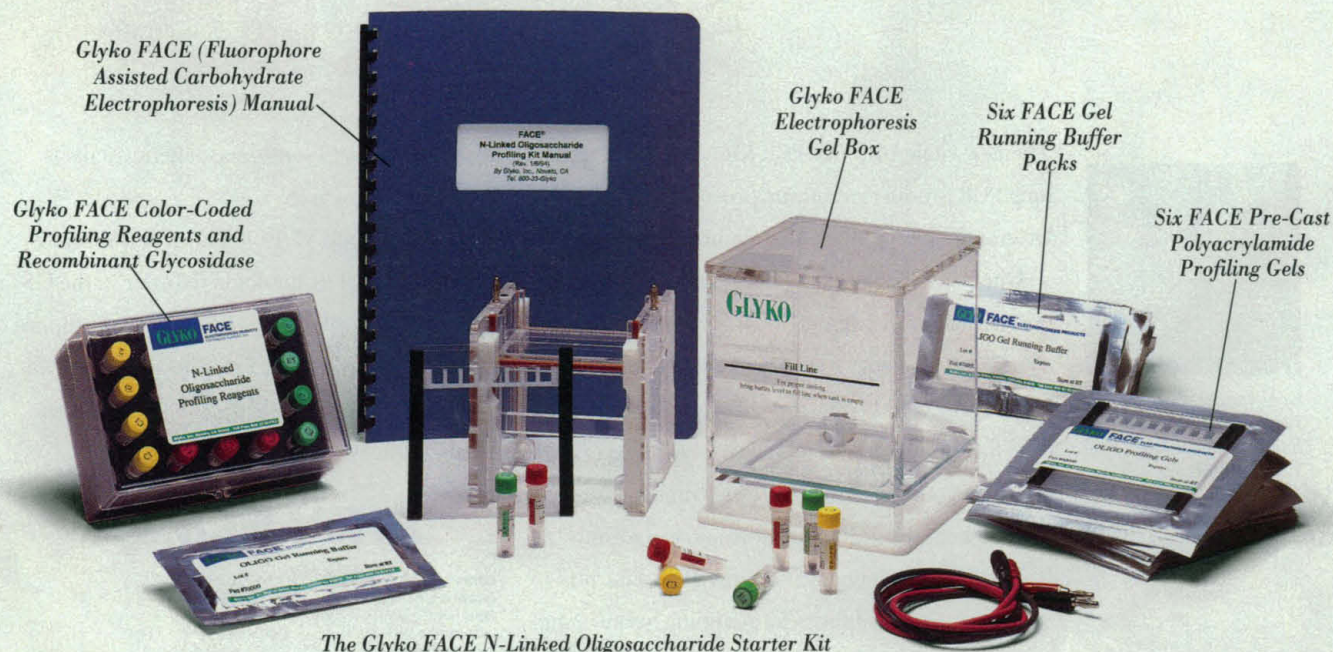
This is your **\$795** answer:

INTRODUCING THREE GLYKO FACE® CARBOHYDRATE ANALYSIS STARTER KITS

■ N-Linked Oligosaccharide Profiling ■ O-Linked Oligosaccharide Profiling ■ Monosaccharide Analysis

Now you can choose one of these easy-to-use Starter Kits for only \$795. Each is guaranteed, and everything you'll need to start getting answers to your carbohydrate questions is included.*

Additional supplies are as close as your telephone. Just ask for details.



To order your Starter Kit for \$795, phone 1 415 382-6653 or fax 1 415 382 7889. In U.S. only, phone 1 800 33 GLYKO (334 5956). Sorry, one kit per customer only at this special price.

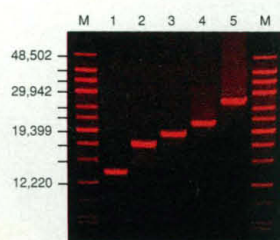
*Power supply, recirculating chiller, and long-wave UV light box not included. ©1994 Glyko, Inc. FACE is a registered trademark of Glyko, Inc. 81 Digital Drive, Novato, CA 94949

Circle No. 48 on Readers' Service Card

GLYKO

15 kb
30 kb
40 kb

Announcing a PCR breakthrough of major proportions.



GeneAmp XL PCR.
Lanes 1-3: β -globin cluster,
human genomic DNA, 13.5,
17.7, 19.6 kb; Lanes 4 & 5:
 λ DNA 20.8, 26.4 kb;
M: High molecular weight
marker.

The new GeneAmp® XL PCR Kit makes generating long PCR products a routine procedure. In fact, we QC test the kit for 20 kb using lambda DNA.

Our new *rTth* DNA Polymerase, XL, in combination with a novel reaction buffer, creates optimal conditions for generating long PCR products with high reproducibility and specificity.

What's more, the GeneAmp XL PCR Kit is optimized on GeneAmp® PCR Instrument Systems, and backed by our PCR performance guarantee.

It's just as convenient as our other PCR kits, and opens up new possibilities for mapping, sequencing and genome analysis.

The integrated resources of our Applied Biosystems Division offer you the most comprehensive range of systems, technologies and support in

PCR, nucleic acid synthesis, genetic analysis and protein research.

The GeneAmp XL PCR Kit—a major breakthrough in PCR technology. To order in the U.S., call 1-800-327-3002. For PCR technical support, call 1-800-762-4001. For more information, call 1-800-345-5224. Outside the U.S., contact your local Perkin-Elmer 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.



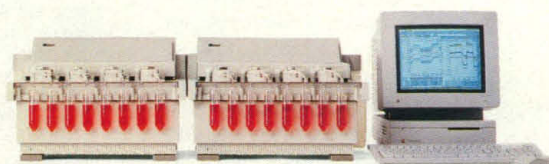
Perkin-Elmer is a registered trademark of The Perkin-Elmer Corporation. GeneAmp is a registered trademark of Roche Molecular Systems, Inc. The GeneAmp PCR process is covered by the U.S. patents owned by Hoffmann-La Roche, Inc. and F. Hoffmann-La Roche Ltd.

CYTOSENSOR™
MICROPHYSIOMETER

The Only Comprehensive Assay System for Receptor Signaling.

.....

**THE CYTOSENSOR SYSTEM:
FUNCTIONAL RESPONSES IN MINUTES**



The **Cytosensor Microphysiometer System** is the latest tool used for drug discovery and signal transduction research! Using a patented biosensor, the system can monitor the receptor-mediated responses from living cells in minutes, producing functional dose responses in just a few hours. Because of the unique biosensor, receptor activation can be studied even without previous knowledge of the signal transduction pathway. Thus, a single assay system can be used to evaluate a variety of receptor families. Previously time-consuming experiments can be performed quickly and easily, making it possible to obtain EC_{50} and IC_{50} values in just 4-7 hours², without radioactivity. And novel receptor responses, not seen with other methods, have been observed.

1. Science 257, 1906-1912, (1992) 2. J. NIH Research 5, 69, (1993)

Call us for an evaluation of your cells and effector agents or for a detailed list of scientific references.



G PROTEIN-LINKED RECEPTORS



TYROSINE KINASE RECEPTORS



LIGAND-GATED ION CHANNELS



HEMATOPOIETIC RECEPTORS

Circle No. 43 on Readers' Service Card

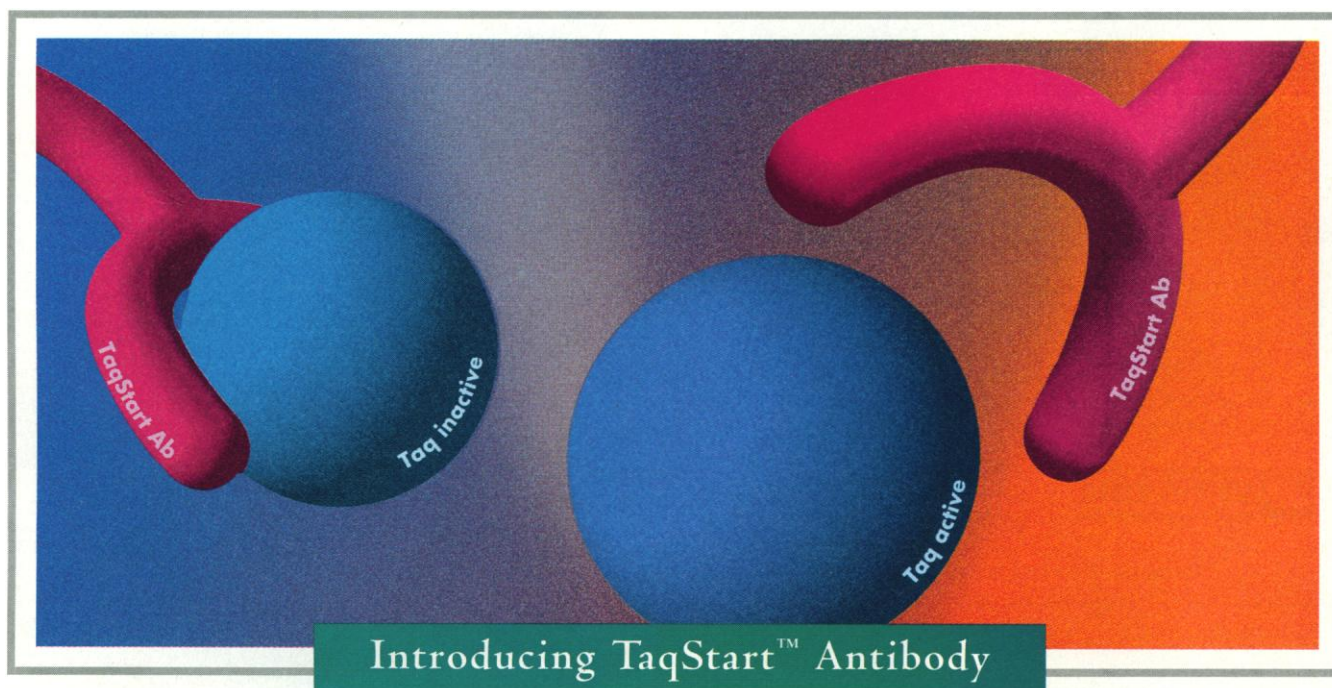
**Molecular
Devices**

U.S.A. 1-800-400-9060 (FAX: 415-326-5134)

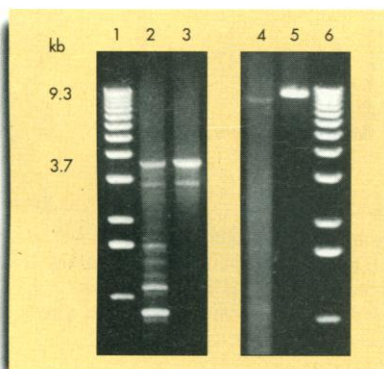
Germany: 49-898-54-5050 (FAX: 49-898-54-2238)

United Kingdom: 44-293-619579 (FAX: 44-293-619586)

TAQSTART™ PCR – THE MOST CONVENIENT APPROACH TO HOT START PCR



TaqStart Antibody gives you all the benefits of Hot Start PCR...without the hassle. With TaqStart, you get enhanced specificity, improved sensitivity, and higher yields in PCR amplifications, with greater convenience than with any other Hot Start method. This unique monoclonal antibody blocks Taq DNA polymerase activity during set-up of your PCR reactions. When thermal cycling



Results of the use of TaqStart Antibody to enhance specificity in long-distance PCR amplifications. Lanes 2 & 3: human p53 fragment (3.7 kb) without and with TaqStart, respectively. Lanes 4 & 5: human IFN- α receptor fragment (9.3 kb) without and with TaqStart, respectively. Lanes 1 & 6: ϕ X174/HaeIII digest.

begins, TaqStart dissociates from Taq; thus, Taq becomes fully active and amplification proceeds optimally. That's all. No messy waxes. No contamination from open tubes. No hassle. TaqStart Antibody. The simple, one-step, no-wax approach to Hot Start PCR. Only from CLONTECH. Call 1-800-662-CLON or contact your local distributor.

DON'T EXPERIMENT WITH ANYTHING ELSE.

CLONTECH

4030 Fabian Way, Palo Alto, California 94303 USA • Fax: 800/424-1350 415/424-1064 • Phone: 800/662-2566 415/424-8222
e-mail: CLONTECH.com • ©1994 CLONTECH Laboratories, Inc. Patent pending.

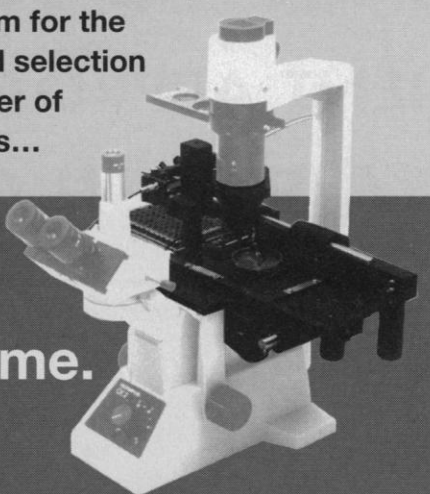
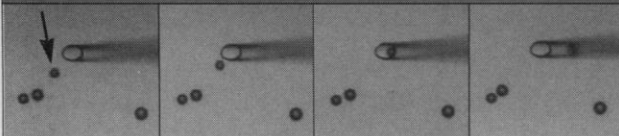
PCR is covered by patents owned by Hoffmann-La Roche, Inc.

Circle No. 57 on Readers' Service Card

NEW TECHNOLOGY

Quixell—a revolutionary new system for the automated selection and transfer of single cells...

one cell at a time.

Selected cell being drawn into Quixell's glass micropipette. All other cells remain undisturbed.

STOELTING

Stoelting Co. 620 Wheat Lane
Wood Dale, IL 60191 USA
(708) 860-9700

Circle No. 3 on Readers' Service Card

Get to the Point

FAST!

Data Desk is fast, visual data analysis software that takes you straight to the heart of your data. Its dynamically linked graphics show you key patterns and relationships—even the first time you use the program. The fastest calculations of *any* Macintosh statistics package let you spend less time computing—even for the largest datasets.

Start Fast "The program teams ease of use with advanced features, making it a good choice for novices as well as experienced statisticians." —MACUSER, 9/93 **★★★★½**

Compute Fast "The fastest statistics package for the Macintosh, and it is also the easiest statistics program to use on any platform." —WALTER T. LINDE-ZWIRBLE, CLINICAL OUTCOMES, SUMMER 93

Analyze Fast "Its user interface and recalculation speed actively encourage users to examine data sets using many different tools." —MACWEEK, 7/5/93 **◆◆◆◆**

Get to the Point Fast "For getting to the heart of the matter, which is finding patterns in data, Data Desk 4.0 has no peer." —MACWORLD, 5/93 **★★★★**

Data Desk

The Fast, Visual Tool for Data Analysis

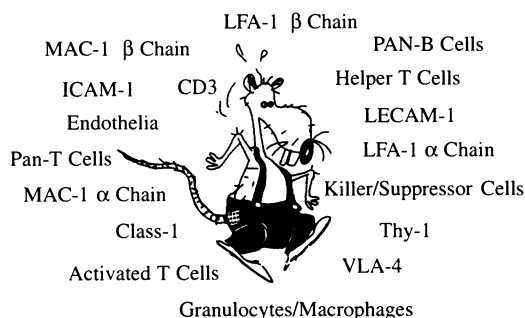
DATA DESCRIPTION, INC., P.O. Box 4555, ITHACA, NY 14852

CALL FOR A FREE MAC DEMO! 800-573-5121



Circle No. 28 on Readers' Service Card

Monoclonal Antibodies to Rat Cell Adhesion



For research use only. Not for drug or other uses.

The purest biochemicals for research in
 ☒ Carbohydrate Chemistry ☒ Molecular Biology
 ☒ Immunology ☒ Cell Biology




SEIKAGAKU AMERICA, INC.
 30 West Gude Drive, Suite 260
 Rockville, MD 20850-1161
 Tel. 301-424-0546, 1-800-237-4512
 Fax. 301-424-6961
A subsidiary of SEIKAGAKU CORPORATION Tokyo, Japan

SEIKAGAKU CORPORATION
 1-5, Nihonbashi-honcho 2-chome, Chuo-ku
 Tokyo 103, Japan
 Tel. 81-3-3245-1951
 Fax. 81-3-3242-5335

"SEIKAGAKU" means "biochemistry"

Circle No. 55 on Readers' Service Card



Celebrate 150 years of Scientific Advancement

In 1998, the American Association for the Advancement of Science (AAAS) will celebrate the 150th anniversary of its founding. A commemorative postage stamp would be a fitting tribute to the Association's historic efforts to promote the progress of science and engineering in the service of humankind.

BUT YOUR HELP IS ESSENTIAL.

We need letters expressing support for a AAAS commemorative stamp as well as ideas for the stamp's theme and design.

Please write promptly to:

The AAAS Commemorative Postage Stamp Committee
 Office of Communications, Room 801
 1333 H Street, NW, Washington, DC 20005
 or call: 202-326-6440

Remember Our 1989 Original Ad?

Well, We Still Are The Same Original...

**Even Though Our Products
Have Been Copied!**



These are typical
calls to us from
unhappy scientists
using the non-designer
original RNAzol -

***"The cheaper copy ruined
my limited, critical cells
and severely impacted my
credibility and in fact,
it nearly ruined the total
program and almost cost
me my job."***

"The yield was non-existent."

***"It simply did not work and
when I returned the product,
the replacement bottle was
unusable also."***

***"Their product is
inexpensive and it should
be, as it did not work."***

TWO ORIGINAL CLASSICS

1917 Ford Model T
The 2.9 liter, 22 h.p. Tin Lizzie featured such convenient innovations as a detachable cylinder head and a chassis resting on transverse springs for superb steering. It even made its own electricity from a magneto built into the flywheel! The nearly unbreakable chrome-vanadium steel machine proved durable, reliable, and affordable. In 1917, our deluxe model shown cost all of \$450.

1954 Mercedes-Benz 300SL
This low-built coupe is an exquisite piece of aerodynamic design. Victorious at the prestigious Le Mans, the International Prix de Bernes, and the Carrera Pan America races, the 300SL reached speeds of 120 mph as quickly and easily as its contemporaries reached 50 mph. In 1954, the 300SL carried about a \$14,000 price tag.

TWO MORE CLASSICS . . .

RNAzol™
Ready to use reagent for isolating RNA from small and large amounts of tissues and cells.
Procedure requires sample homogenization, liquid phase separation, precipitation and wash.
Complete in 3.0 hours.
Like the Model T shown: RNAzol is innovative, reliable, and inexpensive.

RNAzol™ B (Blue)
Ready to use reagent; same application as RNAzol with more rapid results.
The liquid phase is smoothly defined from the organic phase by the visual blue indicator.
Complete in 1.5 hours.
Like the Mercedes above: RNAzol is state of the art and fast.

TEL-TEST, INC.
P.O. Box 1421 • 1511 County Road 129 • Friendswood, Texas 77546
(713) 482-2672 • Customer Service: (800) 631-0600 (Outside Texas) • Telex (ITT) 4896324 ITDI U
FAX: (713) 482-1070

**None Better Than The
Original RNAzol Products!**

TEL-TEST INC.

P.O. Box 1421 • Friendswood, Texas 77546

(713) 482-2672 • Customer Service: (800) 631-0600 • FAX (713) 482-1070

Circle No. 62 on Readers' Service Card

**We Offer
Direct Deposit.**

When we say we offer "direct deposit," we mean just that. With Sterivex™ Filter Units, you can sterilize or clarify up to 1 liter of media, buffers, serum, or media additives and dispense them directly into the desired container. There's no need to first filter into a storage reservoir and then dispense via pipette. This not only minimizes the risk of recontamination and the amount of plastic ware you use, but it also saves time.

Biocompatible Durapore® Membrane. Sterivex units have the 0.22 µm or 0.45 µm low-protein-binding, low-extractable Durapore membrane. It provides up to 99% total protein recovery, won't cause alterations in protein structure and function, and is designed to be biocompatible with cell cultures.

A Reliable Performer.

Sterivex units have a .02 µm vent membrane to prevent air locking, and their pressure-driven design minimizes foaming and the resulting protein denaturation. This design is backed by consistent manufacturing standards and rigorous Q.C. testing.

Call For Our New Brochure.

Dial **1-800-MILLIPORE** (1-800-645-5476) for a copy of our new Small-Volume Filtration Guide.

MILLIPORE

Copyright © 1994 Millipore Corporation

Circle No. 35 on Readers' Service Card

How do you do survival analysis?

Are you analyzing survival data the hard way? Try our way.

Start with StatView...

StatView® is the only Macintosh stats package that combines data management, data analysis, graphing, drawing, and presentation into a single easy-to-use solution. From data entry to finished reports, StatView saves you time and effort.

...now add Survival Tools!

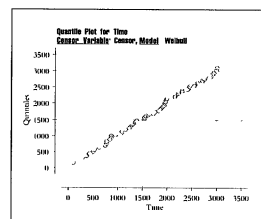
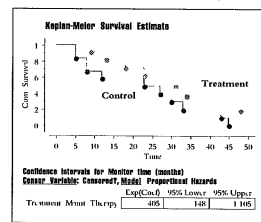
Survival Tools is the latest in a series of drop-in extensions to StatView. Survival Tools incorporates a complete suite of survival analyses into StatView — seamlessly. Survival Tools becomes part of StatView, so you'll enjoy all the benefits of StatView's award-winning interface, full presentation tools, and templates.

It's our way or the hard way

You can analyze the hard way, or the StatView way — the choice is up to you. For more information on StatView, Survival Tools, and other add-on products, call us at **1-800-666-STAT**.

© 1994 Abacus Concepts, Inc., 1918 Bonita Avenue, Berkeley, CA 94704-1014, tel. 510-540-1949; fax 510-540-0260. StatView is a registered trademark of Abacus Concepts, Inc. All other brands are property of their respective holders.

**100%
Power-Mac
Compatible!**



ABACUS
CONCEPTS
THE SIGNIFICANT DIFFERENCE™

Circle No. 58 on Readers' Service Card

FLUORESCENCE POLARIZATION AT LOW COST

FPM-1™ FPM-1™ SYSTEM FLUOROLITE FPM-2™

- SENSITIVE ■ FAST
- PRECISE ■ EASY

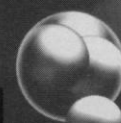
INSTRUMENTATION FOR PERFORMING

- DNA PROBES
- DNA/PROTEIN BINDING
- CELL RECEPTOR/LIGAND BINDING
- THERAPEUTIC DRUG ANALYSIS
- ENZYME/SUBSTRATE INTERACTIONS
- PROTEASE ASSAYS
- ANTIBODY/ANTIGEN INTERACTIONS
- DRUG/RECEPTOR INTERACTIONS
- HIGH VOLUME THROUGH-PUT SCREENING (FLUOROLITE FPM-2 ONLY)
 - 96 WELL FORMAT
 - >15,000 SAMPLES PER DAY

FOR FURTHER DETAILS CALL, FAX OR WRITE TO

JOLLEY CONSULTING AND RESEARCH, INC.

34469 N. CIRCLE DR., ROUND LAKE, IL 60073 USA
708-548-2330 ■ USA & CANADA 1-800-685-0401
■ FAX 708-548-2984



Circle No. 29 on Readers' Service Card

SAVE YOUR COPIES OF Science



CASES

BINDER

These custom-made, imprinted cases and binders are ideal for protecting your valuable *Science* copies from damage. Each binder or case holds one volume of *Science*, or 13 weekly issues—order four binders or cases to hold a complete year of issues. Constructed from reinforced board and covered with durable, leather-like red material and stamped in gold, the cases are V-notched for easy access; binders have a special spring mechanism to hold individual rods which easily snap in.

Quantity	Cases	Binders
One	\$ 7.95	\$ 9.95
Two	\$14.95	\$18.95
Four	\$27.95	\$35.95

SCIENCE
Jesse Jones Industries, Dept. SCE
499 East Erie Avenue
Philadelphia, PA 19134

Enclosed is \$_____ for _____
Cases; _____ Binders. Add \$1 per case/
binder for postage & handling. Outside
USA \$2.50 per case/binder (US funds
only). PA residents add 7% sales tax.

Print
Name _____

Address _____

City _____ No P.O. Box Numbers Please

State/Zip _____

CHARGE ORDERS (Minimum \$15): Am
Ex, Visa, MC, DC accepted. Send card
name, #, Exp. date.

CALL TOLL FREE 7 days, 24 hours
1-800-825-6690
Outside the US call 215-425-6600

— SATISFACTION GUARANTEED —

1995 McKNIGHT NEUROSCIENCE SCHOLARS AWARDS

The McKnight Endowment Fund for Neuroscience is soliciting applications in preparation for awarding McKnight Scholars Awards which commence July 1, 1995.

The McKnight Scholars Awards were initiated in 1976 to stimulate research in neuroscience especially as it pertains to memory and, ultimately, to a clearer understanding of diseases affecting memory. Over the years this mandate has been interpreted broadly to permit support of work in many relevant areas of neuroscience. The McKnight Endowment Fund for Neuroscience administers its awards programs through a Board of Directors comprised of eminent scientists and representatives from the Board of Directors of The McKnight Foundation which is the source of the Endowment Fund.

Up to six 1995 McKnight Scholars will be selected from applicants who hold the M.D. and/or Ph.D. degree and have completed formal postdoctoral training. Candidates should have demonstrated meritorious research in areas pertinent to the interests of The McKnight Endowment Fund for Neuroscience and should be in the early stages of establishing their own independent laboratory and research career. Candidates must be citizens or lawful permanent residents of the United States. Award payments will be made directly to a sponsoring institution which must be located within the U.S.

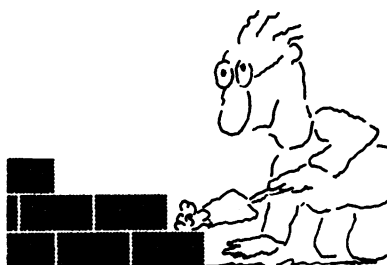
Each McKnight Scholars Award provides \$40,000 annually in 1995, 1996 and 1997. Funds may be used in any way that will facilitate development of the Scholar's research program. Funds may not be used for indirect costs.

Applications will be evaluated by a review committee which will recommend to the Board of Directors of the Endowment Fund candidates for appointment. Award announcements will be made on or before May 15, 1995.

Potential applicants should write or call the office of The McKnight Endowment Fund for Neuroscience to request application forms and guidelines. Completed applications must be postmarked no later than January 3, 1995.

THE MCKNIGHT ENDOWMENT FUND
FOR NEUROSCIENCE
600 TCF TOWER • 121 SOUTH EIGHTH STREET
MINNEAPOLIS, MINNESOTA 55402
612-333-4220

We'll Help You Build A New Lab



Let the free Science product information service put you in touch with the vendors whose products you will need.

Simply write us a letter stating the specifics about your proposed lab and the instruments and supplies you need. We will do the rest. Write to:

SCIENCE Magazine
New Lab Service Department
1333 H Street, N.W., Rm 830
Washington, DC 20005

The Global Weekly of Research
SCIENCE

NEW

5' DIRECT FLUORESCENT GUARANTEED OLIGOS

From GENSET

For MAPPING LINKAGE GENE EXPRESSION

• 6-FAM • HEX • TET

(ABI Dyes)

Also available for DNA SEQUENCING oligos 5'-labelled with

• JOE, ROX, FAM, TAMRA

(ABI Dyes)

• FLUORESCCEIN

ORDERS & INFORMATION

USA - GENSET Corp.

FAX : (1) - 800 551 5291

EUROPE - GENSET SA

FAX : (33) - 1 43 56 68 18

JAPAN - GENSET KK

FAX : (81) - 3 3585 5351



GUARANTEED OLIGOS™

Circle No. 47 on Readers' Service Card

Announcing a major new monthly journal!

RNA

The Official Publication of The RNA Society

First Issue: March 1995

RNA, the official publication of the new RNA society, will provide rapid publication of significant original research in all areas of RNA structure and function in eukaryotic, prokaryotic and viral systems.

Editor

Timothy W. Nilsen,
Case Western Reserve University

Associate Editors

Thomas R. Cech, *Univ. of Colorado*
Chris L. Greer, *Univ. of California, Irvine*
Christine Guthrie, *Univ. of California, San Francisco*
Robert M. Krug, *Rutgers Univ.*
Reinhard Lührmann, *Philips Univ., Marburg*
Dino Moras, *CNRS, Strasbourg*
James Ofengand, *Roche Inst. of Molecular Biology*
Nancy Standart, *Univ. of Cambridge*
Joan A. Steitz, *Yale Univ.*
Marvin Wickens, *Univ. of Wisconsin*

Editorial Board

John N. Abelson, <i>CalTech</i>	François Michel, <i>CNRS, Gif-sur-Yvette</i>
Sidney Altman, <i>Yale Univ.</i>	Peter B. Moore, <i>Yale Univ.</i>
Brenda L. Bass, <i>Univ. of Utah</i>	Andrew Newman, <i>MRC Lab. of Mol. Biol.</i>
Jean D. Beggs, <i>Univ. of Edinburgh</i>	Harry F. Noller, <i>Univ. of California, Santa Cruz</i>
Marlene Belfort, <i>New York State Dept. of Health</i>	Norman R. Pace, <i>Indiana Univ.</i>
Donald M. Crothers, <i>Yale Univ.</i>	Arthur Pardi, <i>Univ. of Colorado</i>
James E. Dahlberg, <i>Univ. of Wisconsin</i>	Hugh D. Robertson, <i>Cornell Univ.</i>
Fritz Eckstein, <i>Max-Planck Inst.</i>	Michael Rosbash, <i>Brandeis Univ.</i>
Michael R. Green, <i>Univ. of Massachusetts</i>	Phillip A. Sharp, <i>Massachusetts Inst. of Technology</i>
Richard B. Hallick, <i>Univ. of Arizona</i>	Aaron J. Shatkin, <i>Rutgers Univ.</i>
Daniel Herschlag, <i>Stanford Univ.</i>	Yoshiro Shimura, <i>Kyoto Univ.</i>
Anita K. Hopper, <i>Penn State Univ.</i>	Robert H. Symons, <i>Univ. of Adelaide</i>
Alain Jacquier, <i>Inst. Pasteur, Paris</i>	Jack W. Szostak, <i>Harvard Univ.</i>
Walter Keller, <i>Univ. of Basel</i>	Ignacio Tinoco, Jr., <i>Univ. of California, Berkeley</i>
Karla Kirkegaard, <i>Univ. of Colorado</i>	Glauco P. Tocchini-Valentini, <i>CNR, Rome</i>
Adrian R. Krainer, <i>Cold Spring Harbor Lab.</i>	Olke Uhlenbeck, <i>Univ. of Colorado</i>
Angus I. Lamond, <i>EMBL, Heidelberg</i>	Jonathan Warner, <i>Albert Einstein Col. of Med.</i>
Tom Maniatis, <i>Harvard Univ.</i>	Alan Weiner, <i>Yale Univ.</i>
James Manley, <i>Columbia Univ.</i>	Eric Westhof, <i>CNRS, Strasbourg</i>
Michael B. Mathews, <i>Cold Spring Harbor Lab.</i>	Jo Ann Wise, <i>Case Western Reserve Univ.</i>
Iain W. Mattaj, <i>EMBL, Heidelberg</i>	Michael Yarus, <i>Univ. of Colorado</i>
William H. McClain, <i>Univ. of Wisconsin</i>	

THE RNA SOCIETY

The RNA Society was founded in 1993 to facilitate sharing and dissemination of experimental results and emerging concepts in ribonucleic acid research. This multidisciplinary society encompasses molecular, evolutionary and structural biology, biochemistry, biomedical sciences, chemistry, genetics, and virology as they relate to questions of the structure and function of RNA and of ribonucleoprotein assemblies.

All members of The RNA Society will receive the journal as part of membership. Membership rates: regular members \$115.00; students \$57.50. Optional air delivery of the journal is available outside of the U.S., Canada, and Mexico for an additional \$55.00.

For additional information and membership application, contact:

The RNA Society, 9650 Rockville Pike, Bethesda,
MD 20814-3998, USA
Tel. 301-530-7120 Fax. 301-530-7049

Call for Papers

Manuscripts submitted for publication must be primary reports of original research. All manuscripts will be reviewed by members of the Editorial Board or other qualified reviewers.

Send five copies to:

RNA
Cambridge University Press
40 West 20th Street
New York, NY 10011-4211, USA

For further information contact RNA publication office at the address above or by fax (212) 691-3239.

Subscriptions

RNA will begin publication in March 1995. Ten issues will be published in 1995; twelve issues per year will be published from January 1996. Volume 1, 1995 (10 issues)/ISSN 1355-8382:
Non-member individuals \$149.00 (£139.00 outside N. Amer. via air del.)
Institutions \$299.00 (£239.00 outside N. Amer. via air del.)

In the United States, Canada and Mexico send orders to:

Journals Department, Cambridge University Press, 40 West 20th Street, New York, NY, 10011-4211.

Outside North America, send orders to: Journals Department, Cambridge University Press, The Edinburgh Building, Cambridge CB2 2RU.



CAMBRIDGE
UNIVERSITY PRESS