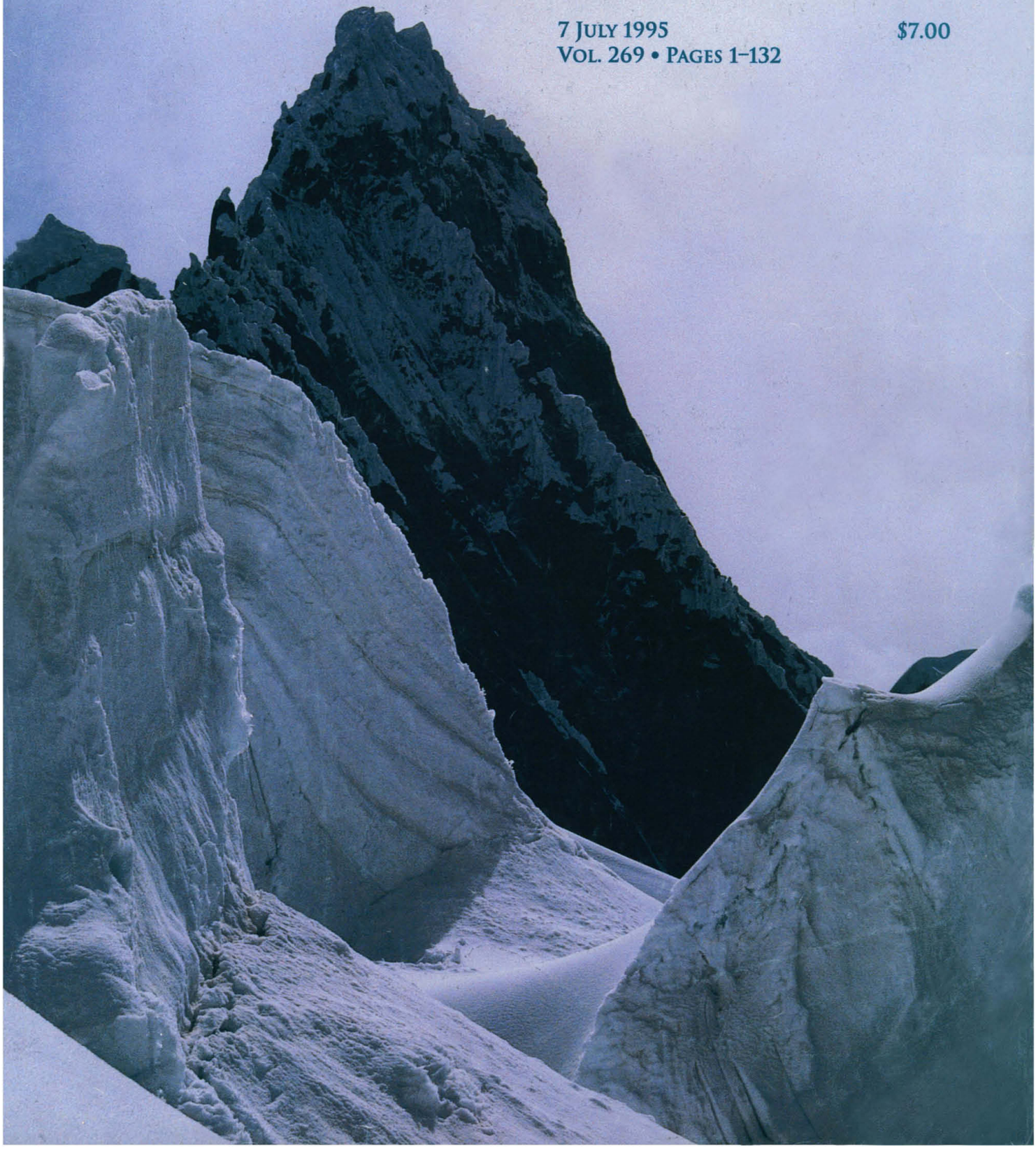
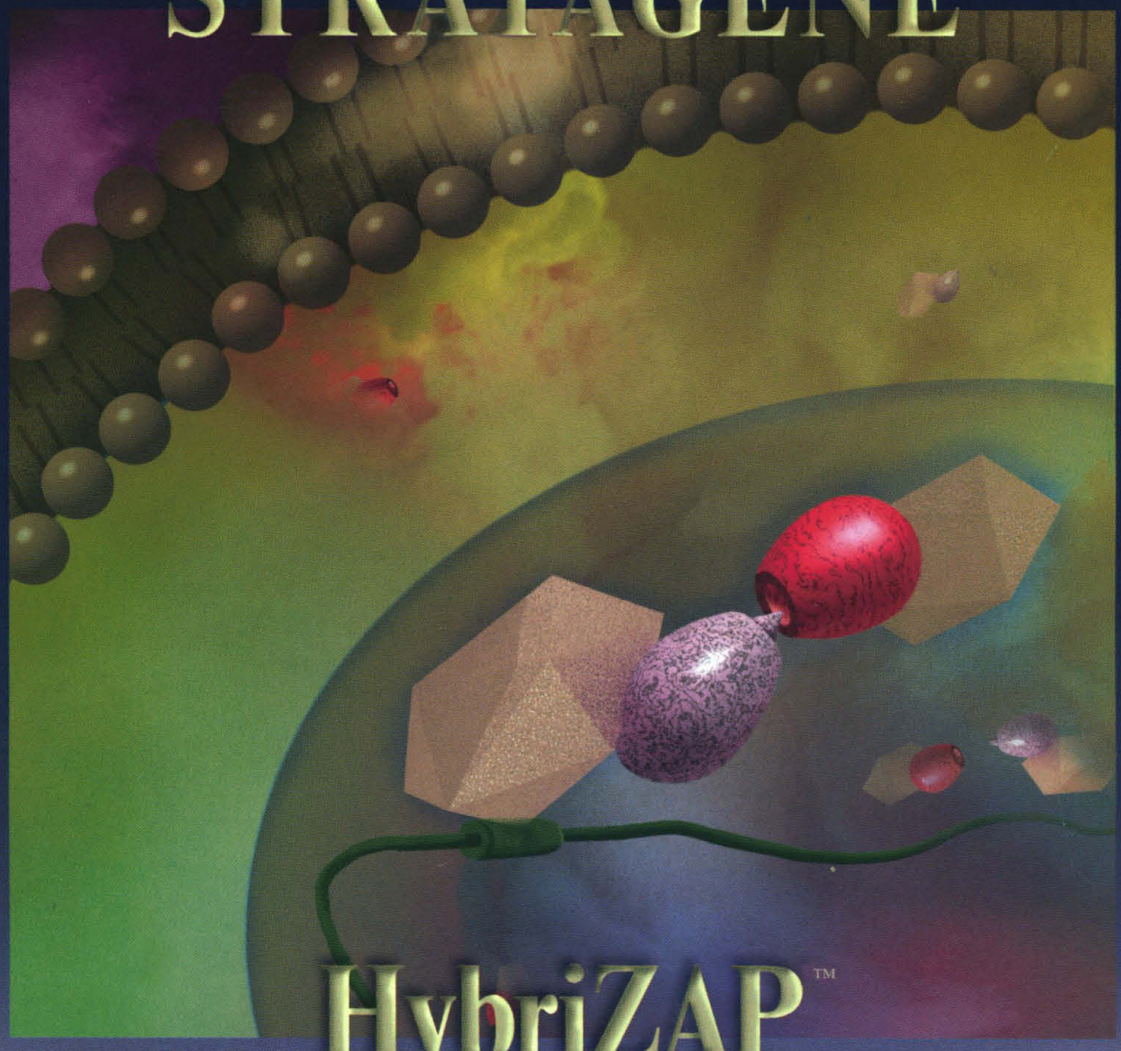
American Association for the Advancement of Science

SCIENCE

7 JULY 1995
VOL. 269 • PAGES 1–132
$7.00



STRATAGENE

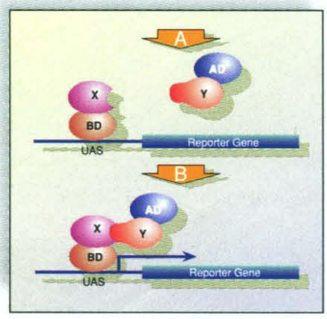


HybriZAP™ TWO-HYBRID SYSTEM

THE BEST WAY YET TO PICK UP CELLULAR MESSAGES

STRATAGENE'S NEW HYBRIZAP™ two-hybrid vector kit. It's the best yeast two-hybrid system* yet. It puts the power of Lambda ZAP® technology into your study of protein-protein interactions and your search for novel proteins. It's sensitive, fast and easy to use. And it integrates everything you need into one powerful package for detecting cellular messages.

* U.S. Patent No. 5,283,173



Detection of Interacting Proteins by Transcription of the Reporter Gene

THE SYSTEM WITH EVERYTHING

- Easy construction of representative libraries
- GAL4-based yeast two-hybrid system
- YRG-2 yeast cells with dual reporters to minimize false positives
- More sensitive than co-immunoprecipitation
- Detects weak or transient interactions
- Premade and custom libraries

Call Stratagene at 1-800-424-5444 for a closer look at the entire HybriZAP two-hybrid vector system.

STRATAGENE®

Internet Mail
techservices@stratagene.com

USA
Corporate Headquarters
(800) 424-5444
(619) 535-5400
Fax: (619) 535-0045

GERMANY
Stratagene GmbH
Telephone: (06221) 400634
Telefax: (06221) 400639

UNITED KINGDOM
Stratagene Ltd.
Telephone: (01223) 420955
Telefax: (01223) 420234

SWITZERLAND
Stratagene GmbH
Telephone: (01) 3641106
Telefax: (01) 3657707

Circle No. 20 on Readers' Service Card

New MultiPROBE® VersaTip™ technology automatically adapts pipetting tips to your assay procedures. Disposable tips, fixed washable tips, or both? Microliter or milliliter volumes? Liquid level sensing of ionic or nonionic solutions? Different disposable tip sizes and types? With MultiPROBE, you get it all in one system.

The new VersaTip automatically changes from fixed, washable tips to a variety of disposable tip sizes or types — within the same protocol and without any user-intervention. Now you can minimize consumable costs by using washable tips whenever possible, and at the same time optimize performance by automatically switching from small volume to larger volume disposable tips. In other words, MultiPROBE with VersaTip adapts to your application, instead of your having to adapt the application to it.

Drug Discovery Work

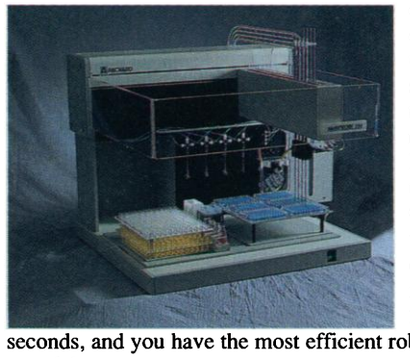
For drug discovery work, VersaTip will sense small sample volumes in microplates, and handle both ionic and nonionic solutions such as DMSO. With four- and eight-tip MultiPROBE systems, you can stop wasting precious compounds for all solubilization, distribution, and screening applications.

Molecular Biology

For molecular biology applications, VersaTip can automatically pick up micro tips to handle very small volumes, switch to larger tips when required, or use washable fixed tips whenever possible. Ultra-sensitive liquid level sensing tips further eliminate any risk for DNA cross-contamination.

Clinical Testing

For clinical testing, VersaTip will automatically adapt to the carry-over requirements of your assays. Four-tip systems with Varispan



can switch from disposable to washable tips, and transfer samples from any size test tube or vial, to microplates or other labware — all without user intervention. Combine this versatility with a large deck capacity and a bar code reader that can read 256 tubes in 90 seconds, and you have the most efficient robotic liquid handler your lab can own.

Now, there's no need to compromise. Demand the MultiPROBE with VersaTip — the first robotic liquid handler that adapts to your assays.

PACKARD
A Canberra Company

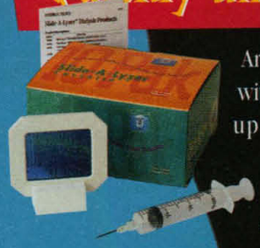
Packard Instrument Company, 800 Research Parkway, Meriden, CT 06450 U.S.A.
Tel: 203-238-2351 Toll Free: 1-800-323-1891 FAX: 203-639-2172

Packard Instrument Co. SYSTEM CERTIFIED ISO 9001

Packard International Offices:
Australia, Mt Waverley 61-3-543-4266; **Austria**, Vienna 43-1-2702504; **Belgium**, Brussels 32-2-4668210; **Canada**, Ontario 1-800-387-9559; **Central Europe**, Vienna 43-2230-3263; **Denmark**, Greve 45-42909023; **France**, Rungis (33) 1 46.86.27.75; **Germany**, Dreieich 49 6103 385-0; **Italy**, Milano 39-2-33910796/7/8; **Japan**, Tokyo 81-3-3866-5850; **Netherlands**, Groningen 31-50-413360; Tilburg (013) 423900; **Russia**, Moscow, 7-095-238-7335; **Switzerland**, Zurich (01) 481 69 44; **United Kingdom**, Pangbourne, Berks (44) 0734 844981.

How the Wise Dialyze...

Quickly and easily with Pierce Slide-A-Lyzer™ Dialysis Cassettes!



Are you still wasting your research time wrestling with the hassles and mess of dialysis tubing? Wise up. With Slide-A-Lyzer™ Cassettes, you can perform dialysis faster and easier than ever—with total sample control and superior recovery.

Speed and convenience. You can load your sample for dialysis into a ready-to-use, disposable Slide-A-Lyzer™ Cassette using a syringe, in less than 1 minute—without boiling, soaking, tying or clamping. The exclusive Cassette format produces an increased sample-to-volume ratio, significantly increasing the rate of dialysis. Convenient accessory Buoys float Cassettes during dialysis, and serve as bench-top Cassette stands during loading and recovery.

Total sample control, superior recovery.
A hermetically sealed sample chamber with syringe guide ports provides complete sample control during loading and removal, and ensures consistently reliable recovery.

Slide-A-Lyzer™ Dialysis Cassettes have a 10,000 molecular weight cutoff and are available in several capacities to meet your sample volume requirements.

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**
E-mail: PierceChem@mcimail.com

PIERCE
A Perstorp Biotec Company

ISO 9001 QUALITY SYSTEM CERTIFIED

European Distributors:

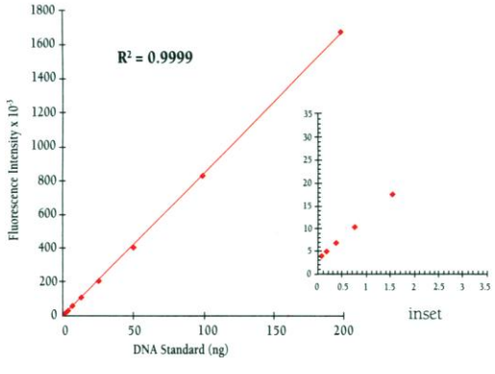
Austria	018891819	Denmark	44948822	Germany	0224196850	Italy	025097220	Sweden	087460035
Belgium	036465511	Finland	08777013	Holland	0206113133 or 076795795	Norway	22722100	Switzerland	0217287772
		France	70038855			Spain	017290333	United Kingdom	02441382525

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

Circle No. 12 on Readers' Service Card

SINK YOUR TEETH

Into Double-Stranded DNA Quantitation!



Standard Curve of Double-Stranded DNA using the Beacon™ DNA Quantitation Kit

Specific for double-stranded DNA, the **Beacon™ DNA Quantitation Kit** provides fast and accurate quantitation, with minimal detection of single-stranded nucleic acids. Simple to use, this kit generates a standard curve of high linearity and precisely measures as little as 100 picograms of double-stranded DNA. Using a standard fluorometer, its "Mix-and-Read" format produces data in just seconds.

A separate fluorescence polarization-based assay provides sequence-specific quantitation of amplified DNA.

Sink Your Teeth Into It! *Call PanVera today for more information and to receive your FREE copy of the 140-page Beacon™ Applications Guide.*

PANVERA

800-791-1400

608-233-5050
Fax: 608-233-3007
E-mail: info@panvera.com
Homepage: http://www.panvera.com/

PanVera Corporation
565 Science Drive
Madison, WI 53711 USA

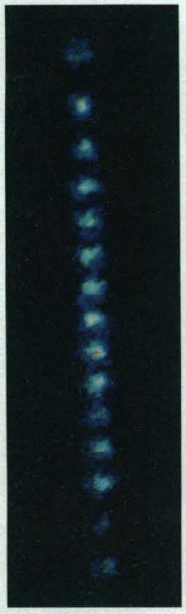
In Japan contact: **TaKaRa Shuzo Co., Ltd.** Otsu, Shiga, Japan Phone: +81 775-43-7247 Fax: +81 775-43-9254

Circle No. 24 on Readers' Service Card

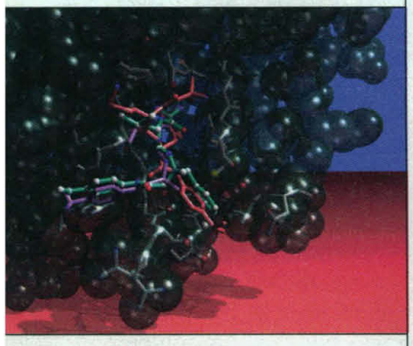
ISSN 0036-8075
7 JULY 1995
VOLUME 269
NUMBER 5220

SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



28
Computing with atoms



66
Peptidomimetic inhibitors

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVES

ARTICLE

RESEARCH ARTICLE

REPORTS

DEPARTMENTS

COVER

Pinnacles of ice and rock on Nevado Taulliraju (5830 meters above sea level) guarding extensive ice fields in the Cordillera Blanca, Peru. Two ice cores from an ice field on the col of Huascarán provide a perspective of climate and the environment in the tropics back to glacial times. These frozen archives are disappearing rapidly under the present climate conditions. See page 46 and the News story on page 32. [Photo: Lonnie G. Thompson]

TECHNICAL COMMENTS

86
Sperm-egg recognition

Indicates accompanying feature

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.

Domestic individual membership and subscription (51 issues): $97 ($50 allocated to subscription). Domestic institutional subscription (51 issues): $228. Foreign postage extra: Mexico, Caribbean (surface mail) $53; other countries (air assist delivery) $93. 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.**

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:** $7.00 per issue prepaid includes surface postage; bulk rates on request.

edited by PHIL SZUROMI

Assembly hanger

The ferritin protein contains a large cavity that can contain several thousand iron atoms. Douglas *et al.* (p. 54) have adapted this iron storage system to control the formation of iron sulfide nanoparticles. Particles with 500 or 3000 iron atom clusters could be made; the former exhibit an unusual oxidation state.

Unscrambling ions

Hydrocarbons can be quite unreactive, but protonation by acid catalysts can create highly reactive carbonium ions. The simplest example, CH_5^+, appears to have no stable equilibrium structure; the hydrogen atoms scramble continuously, so much so that vibrational spectroscopy reveals little about this process. Boo *et al.* (p. 57) found that solvating this ion with neutral H_2 molecules in the gas phase stabilizes the CH_5^+ core. The vibrational spectra obtained were interpreted in light of molecular dynamics simulations.

Designer peptides

In addition to the ribosomal peptide synthesis, microorganisms can generate a variety of small peptides by using large, multi-domain peptide synthetases. These enzymes link amino acids that may have been modified previously by acylation or glycosylation into linear, branched, or cyclic peptide structures. Stachelhaus *et al.* (p. 69) re-engineered a synthetase from the bacterium *Bacillus subtilis*, which makes the lipopetide surfactin, by substituting genes encoding domains from similar synthetases in *Bacillus brevis* and the fungus *Penicillium chrysogenum*.

Ice records in the tropics

Climate records from the tropics covering warming from the late glacial stage (LGS, more than 15,000 years ago) have been sparse. Most ice caps are small compared to the polar ice sheets and ice cores had extended only back a few thousand years. Thompson *et al.* (p. 46; see cover and news story by Mlot, p. 32) obtained two ice cores from Huascarán, Peru, that extend back to the LGS. The stable isotope variations in the ice imply that the tropical Atlantic was 5 to 6 Celsius degrees cooler during the LGS than today.

Signals in the water

Sudden slip on faults generating earthquakes may often be facilitated by a build up of fluid pressures in the fault zone; in turn, precursory cracking of the crust can affect local hydrology. Tsunogai and Wakita (p. 61) and Igarashi *et al.* (p. 60; see the Perspective by King *et al.*, p. 38) report that a variety of chemical and physical signals, including increases in chloride, sulfate, and radon concentrations in ground water, preceded the destructive Kobe earthquake of 17 January 1995.

A start for STATs

Many growth factors and cytokines regulate transcription by activating transcription factors known as STATs. The STATs are activated by phosphorylation on tyrosine by protein kinases called Jaks. Activation of STATs is seen in cells transformed by expression of an oncoprotein or by infection with a virus. Yu *et al.* (p. 81) found that transforming cells with the Src tyrosine kinase oncoprotein activated Stat3. Cells infected with human T cell leukemia virus I (HTLV-I) for some time no longer require interleukin-2 for growth. Migone *et al.* (p. 79) report that the Jak-STAT pathway is constitutively activated in such cells. Activation of this growth-promoting signal in the absence of cytokines appears to be part of the mechanism by which T cells are transformed by HTLV-I.

Changing pumps

Bacteriorhodopsin (bR) actively pumps protons outward across the cell membrane when stimulated with light. Halorhodopsin, a member of the same family of proteins, responds to light by pumping chloride ions (Cl^-) inward. Sasaki *et al.* (p. 73) replaced a single aspartate residue (at position 85) with threonine in bR and converted it into a light-driven Cl^- transporter. The spectral shifts of the retinal chromophore suggest that the mutant bR and the wild-type halorhodopsin use similar mechanisms for Cl^- transport, and that the interaction of the chromophore and residue 85 controls substrate specificity.

Active partners

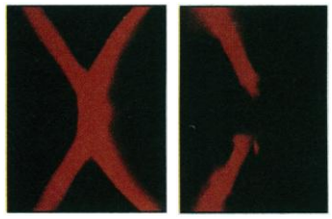
The TATA binding protein (TBP) is essential for transcription by all three RNA polymerases (Pols). Stargell and Struhl (p. 75) isolated a mutant TBP that is normal in vivo for transcription by Pol I and Pol III but appears defective in supporting Pol II transcription mediated by the acidic class of activator proteins. This mutant TBP fails to interact properly with a general transcription factor TFIIA, suggesting that the interaction between TFIIA and TBP is necessary for transcriptional activation by acidic activators in vivo.

Cell-to-cell service

Can proteins move from the membrane of one cell to that of another? Kooyman *et al.* (p. 89) present evidence that this occurs, at least for proteins anchored to the cell membrane through covalently attached glycosyl phosphatidylinositol (GPI). The GPI-anchored proteins expressed in transgenic mice only on blood cells were transferred in functional form to endothelial cells. Whether such transfer serves a physiological function remains unknown, but it could provide a way to transfer therapeutic proteins to the vascular endothelium.

Knowing where to grow

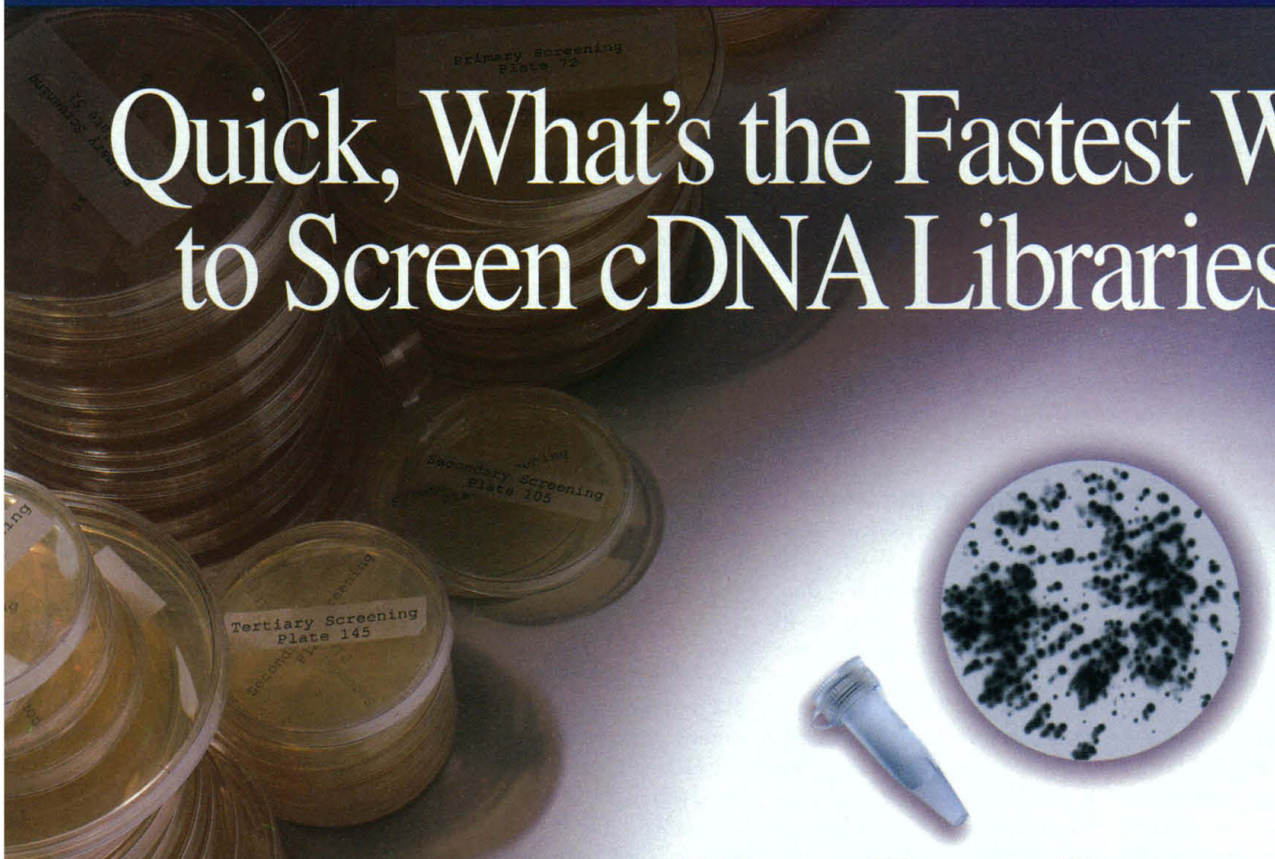
Developing neuronal axons find their way to distant targets, but the cues that guide their growth are not always clear. Mammalian retinal axons from the eyes



must cross over one another in the optic chiasm to project to the opposite side of the brain. Sretavan *et al.* (p. 98) used immunological methods to specifically ablate embryonic neurons in mouse embryos in the future site of the optic chiasm. This procedure stopped the retinal axons from crossing the brain midline, indicating that these early-generated neurons are necessary for proper development.

GIBCO BRL Products for Rapid Gene Screening

Quick, What's the Fastest Way to Screen cDNA Libraries?



The GENETRAPPER™ cDNA Positive Selection System

1 Tube, 1 Plate, and 3 Days!

Introducing the new GIBCO BRL GENETRAPPER cDNA Positive Selection System (patent pending)—the fastest, most powerful method of screening cDNA. Go from a cDNA library to a full plate of gene-specific clones in just 3 days, versus weeks or months with conventional methods. The GENETRAPPER System can screen >10^9 clones in a single pass, ensuring the capture of even the rarest cDNA, without the hassles and expense of conventional screening.

This system uses a two-stage selection process that results in a highly enriched population of your clone of interest: hybridization of a biotinylated oligonucleotide, specific for your gene, to plasmid DNA (from a total cDNA library) and selection with paramagnetic streptavidin beads, followed by conversion of the captured clones from ss to dsDNA, ready for transformation.

The GENETRAPPER System is:

- ***Fast***—captures your cDNA in days, versus weeks or months with conventional screening methods.
- ***Powerful***—select hundreds to thousands of clones in a single experiment, for more full-length clones.
- ***Flexible***—works well with our new premade SUPERSCRIPT™ cDNA Libraries, mass-excised λZAP® or λZIPLOX® libraries, and other phagemid-based libraries.
- ***Safe***—procedure can be performed without radioactivity.

Call for a free brochure. **To Order/TECH-LINE℠: (800) 828-6686**

LIFE TECHNOLOGIES™

Producer of GIBCO BRL Products

U.S.A. Orders
To Order/TECH-LINE: (800) 828-6686
Fax: (800) 331-2286

Latin America Orders
To Order/TECH-LINE: (301) 840-4027
Fax: (301) 258-8238

Canada Orders
To Order: (800) 263-6236
TECH-LINE: (800) 757-8257
Fax: (800) 387-1007

Internet
info@lifetech.com
http://www.lifetech.com

Circle No. 16 on Readers' Service Card

STATISTICA®

NEW release 5.0

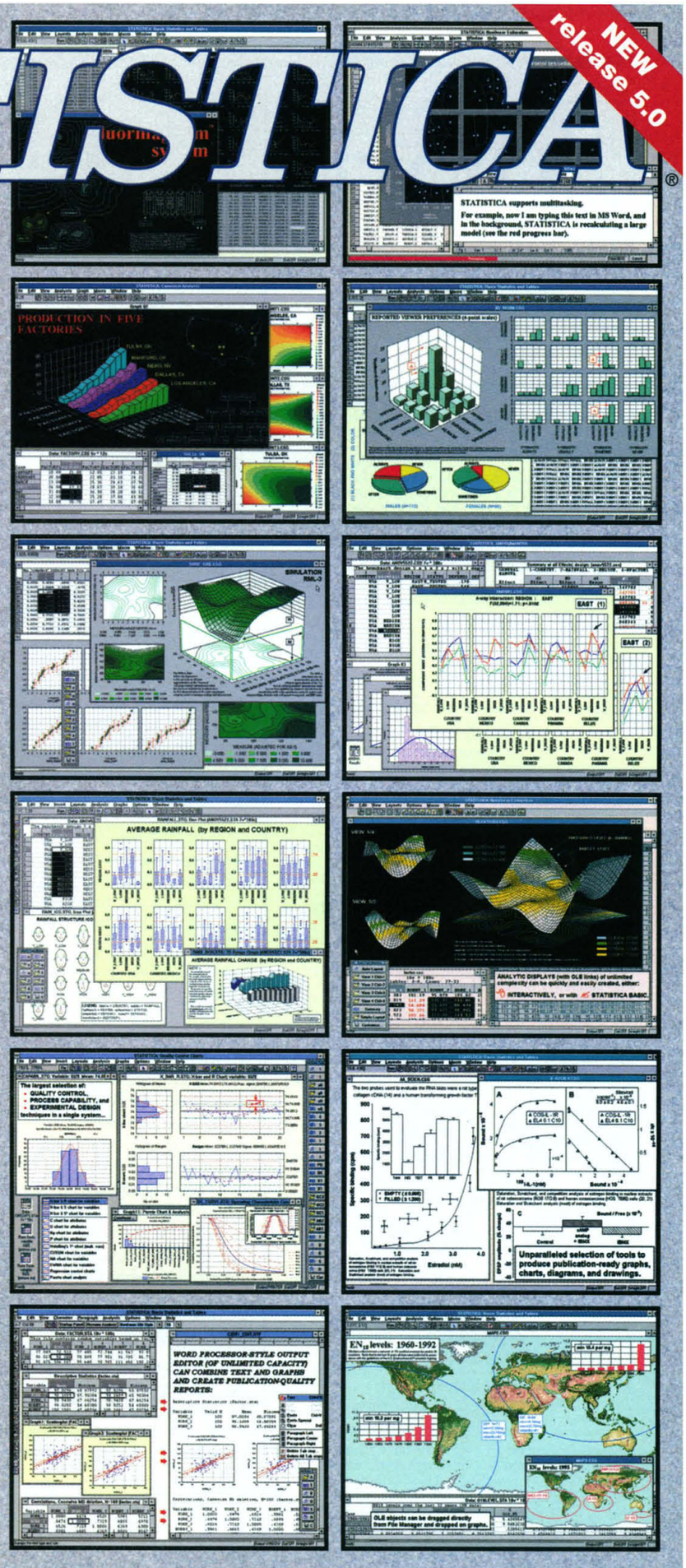
STATISTICA® (for Windows) ▪ A complete data analysis system with thousands of on-screen customizable, presentation-quality graphs fully integrated with all procedures ▪ Comprehensive *Windows*™ support, OLE (client and server), DDE, customizable *Auto Task* toolbars, pop-up menus ▪ Multiple data-, results-, and graph-windows with *data-graph* links ▪ The largest selection of statistics and graphs in a single system; comprehensive implementations of: Exploratory techniques with advanced brushing; multi-way tables with banners (presentation-quality reports); nonparametrics; distribution fitting; multiple regression; general nonlinear estimation; stepwise logit/probit; general ANCOVA/MANCOVA; stepwise discriminant analysis; log-linear analysis; confirmatory/exploratory factor analysis; cluster analysis; multidimensional scaling; canonical correlation; item analysis/reliability; survival analysis; a large selection of time series modeling/forecasting techniques; structural equation modeling with *Monte Carlo* simulations; and much more ▪ On-line *Electronic Manual* with comprehensive introductions to each procedure and examples ▪ Hypertext-based Stats Advisor expert system ▪ Workbooks with multiple *AutoOpen* documents (e.g., graphs, reports) ▪ Extensive data management facilities (fast spreadsheet of unlimited capacity with long formulas, *Drag-and-Drop, AutoFill, Auto-Recalculate,* split-screen/variable-speed scrolling, advanced Clipboard support, DDE links, hot links to graphs, relational merge, data verification/cleaning) ▪ Powerful *STATISTICA BASIC* language with matrix operations, full graphics support, and interface to external programs (*DLLs*) ▪ Batch command language and editable macros, flexible "turn-key" and automation options, custom-designed procedures can be added to floating *Auto Task* toolbars ▪ All output displayed in Scrollsheets™ (dynamic, customizable, presentation-quality tables with instant 2D, 3D, and multiple graphs) or word processor-style report editor (of unlimited capacity) that combines text and graphs ▪ Extremely large analysis designs (e.g., correlation matrices up to 32,000x32,000, unlimited ANOVA designs) ▪ Megafile Manager with up to 32,000 variables (8 Mb) per record ▪ Unlimited size of files; extended ("quadruple") precision; unmatched speed ▪ Exchanges data and graphs with other applications via DDE, OLE, or an extensive selection of file import/export facilities (incl. *ODBC* access to virtually all data bases and mainframe files) ▪ Hundreds of types of graphs, incl. categorized multiple 2D and 3D graphs, ternary 2D/3D graphs, matrix plots, icons, and unique multivariate (e.g., 4D) graphs ▪ Facilities to custom-design new graph types and add them permanently to menus or toolbars ▪ On-screen graph customization with advanced drawing tools (e.g., scrolling and editing of complex objects in 32x real zoom mode), compound (nested) OLE documents, *Multiple-Graph AutoLayout Wizard,* templates, special effects, icons, page layout control for slides and printouts; unmatched speed of graph redraw ▪ Interactive rotation, perspective and cross-sections of 3D displays ▪ Large selection of tools for graphical exploration of data: extensive brushing tools with animation, fitting, smoothing, overlaying, spectral planes, projections, layered compressions, marked subsets ▪ Price **$995.**

Quick STATISTICA (for Windows) ▪ A subset of *STATISTICA*; comprehensive selection of basic statistics and the full analytic and presentation-quality graphics capabilities of *STATISTICA* ▪ Price **$495.**

STATISTICA/QC - ***Industrial statistics add-on package*** (requires *STATISTICA* or Quick *STATISTICA* for Windows) ▪ The largest selection of industrial statistics in a single package; quality control charts (compatible with real-time data acquisition systems), process capability analysis, R&R, sampling plans, and an extremely comprehensive selection of experimental design (DOE) methods ▪ Flexible tools to customize and automate all analyses and reports (incl. "turn-key" system options, and tools to add custom procedures) ▪ Price **$495.**

STATISTICA/Mac (for Macintosh) ▪ Price **$695** (Quick - **$395**).

Domestic sh/h $12 per product; 30-day money back guarantee.



Circle No. 4 on Readers' Service Card

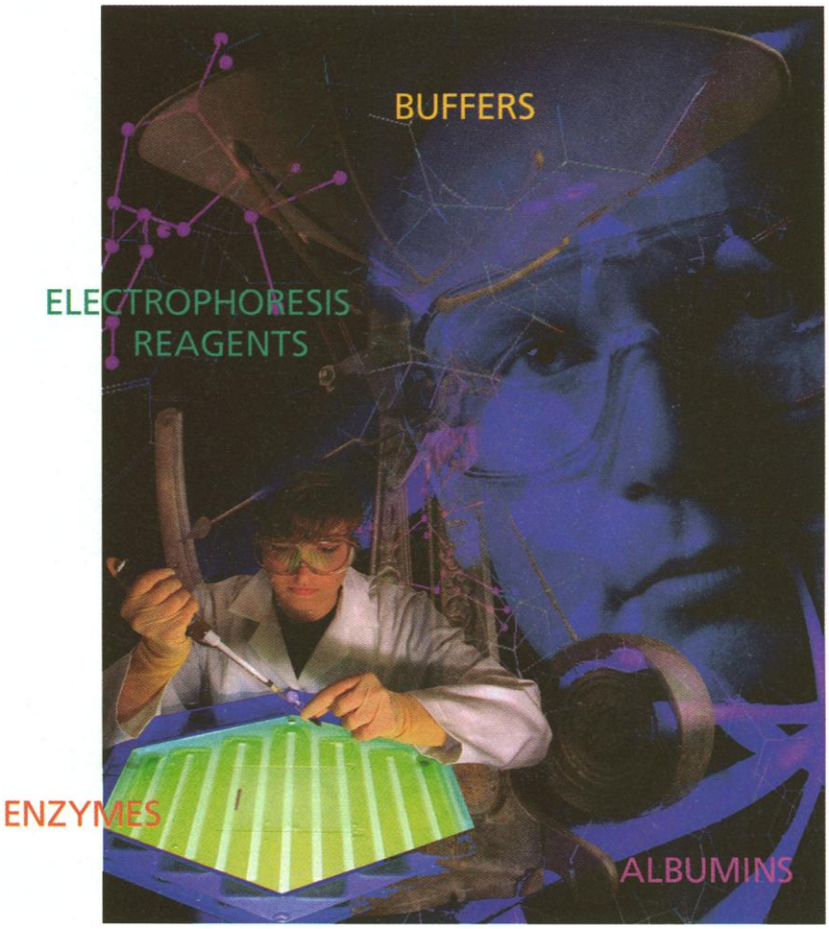
StatSoft®

2325 E. 13th St. • Tulsa, OK 74104 • (918) 583-4149
Fax: (918) 583-4376

Overseas Offices: StatSoft of Europe (Hamburg, FRG), ph: 040/ 4200347, fax: 040/4911310; **StatSoft UK** (London), ph: 0462/482822, fax: 0462/482855; **StatSoft Pacific** (Melbourne, Australia), ph: (03) 663 6580, fax: (03) 663 6117; **StatSoft France** ph: (1) 45 66 97 00, fax: (1) 45 66 06 51; Available from other Authorized Representatives worldwide: Sweden: AkademiData Scientific ph: 018-210035, fax: 018-210039; Finland: Statcon Oy ph: 24-334678, fax: 24-333867; Belgium: Texma NewTech ph: 10 61 16 28, fax 10 61 69 57; South Africa: Osiris ph: 12-663-4500, fax 12-663-6114; Japan (Macintosh): Three's Company, Inc., ph: 03-3770-7600, fax 03-3770-7784; Japan (Windows): Design Technologies, Inc., ph: 03-3667-1110, fax: 03-3668-3110; Italy: Prompt SRL ph: 49-893-3227, fax: 49-893-2897; Poland: Companion Oprogramowanie ph: 12-369680, fax: 12-360791; Taiwan: Intelligent Integration Corp. ph: 2-759-1791, fax: 2-759-1790.

Sigma.

Supporting the Future of Research With a Tradition of Service.



What distinguishes a chemical company: First and foremost - service; which is Sigma's approach to supporting the future of research. Should technical questions arise, a Sigma specialist is available to assist you with the use or application of our 35,000-plus products. In addition - quality; every one of Sigma's products is thoroughly assayed in state-of-the-art analytical laboratories using the most demanding analytical criteria.

Another distinguishing factor is expertise; as in Sigma's family of experts in life science research. Sigma's chemists are constantly at work on a wide spectrum of specialty chemicals for targeted areas of research, adding over 2,000 new products each year. And they're continually refining and improving the products that established Sigma's reputation over 50 years ago.

Service, quality and expertise distinguish Sigma as the leading choice of laboratories worldwide. Weigh all the advantages and consider Sigma as your single source for research biochemicals and organic compounds.

SIGMA Σ

Where Science and Service Come Together.

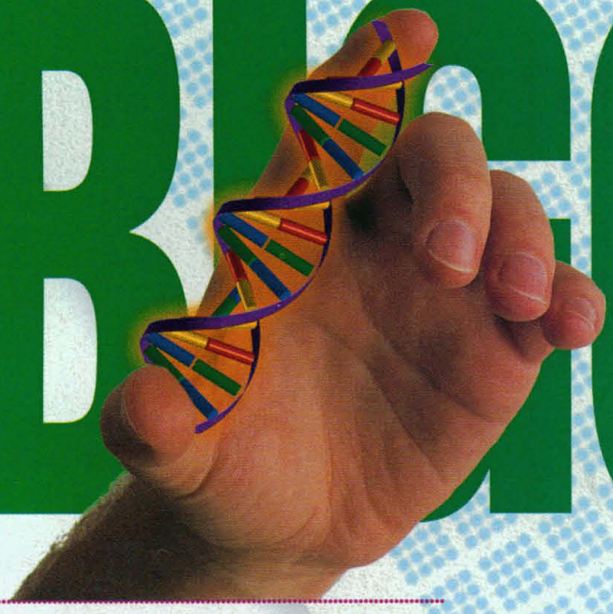
Call collect: 314-771-5750,
800-325-3010,
or contact your local Sigma office.

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

A Sigma-Aldrich Company

Circle No. 8 on Readers' Service Card

Get It BIGGER℠



Screen Over 150,000 P1 or PAC/BAC™ Clones With Our Double Spotted High Density Filters

Our high density filters can be hybridized with your choice of probes. Genome Systems double-spots up to 150,000 colonies on 22 by 22 cm filters, (36,864 spots per filter). Double-spotting makes it easy to identify true positive colonies over the background noise generated by hybidization probes. In addition, the clone address can be easily determined by the position of the two hybridization signals created by double spotting.

From a single copy gene, a multi-gene family, or an entire YAC clone, you can identify the cognate clones. Or let Genome Systems convert even the largest YAC into overlapping sets of P1 or PAC/BAC™ clones in a matter of days.

Our services also include; P1 (85kb) genomic library screening service (human, ES mouse for knockouts, rat and drosophila).

- New! *Human PAC/BAC™ (120kb+ insert) genomic library screening service.*
- New! *Fluorescent in-situ hybridization (FISH).*
- New! *YAC library screening service (human, mouse).*
- New! *Go Germline℠ ES and MEFcells for making mouse knockouts.*
- New! *Custom robotic colony picking and spotting services.*
- New! *"Down To The Well"™ PCR[1]able DNA pools.*

Other P1 or PAC/BAC™ services include:

- *DNA Preparation*
- *DNA Insert End Sequencing*
- *DNA Insert Orientation*
- *DNA Subcloning*

GenomeSystemsInc™

8620 Pennell Drive
St. Louis, Missouri 63114, USA

800 - 430 - 0030 or, 314 - 692 - 0033
Facsimile: 314 - 692 - 0044

France: Appel gratuit, 0590 - 2104

Germany: Rufen sie uns an zum ortstarif, 0130 - 81 - 9081

UK: Call us free on, 0800 - 89 - 3733

email address: Genome@MO.net

1. The PCR process is covered by patents owned by Hoffman-La Roche.

—illustration by Pat Babcock

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

19-22 September 1995 • Fairbanks, Alaska

Landscapes

The 46th AAAS Arctic Division Science Conference

President and Conference Chair: Robert G. White, Director, Institute of Arctic Biology

Preliminary Schedule

Tuesday, 19 September

Plenary Session

Symposium on Landscapes

Human Ecology
Chair: Gerald Shields
Dale Guthrie, Jeff Leer

Landscape Ecology
Chair: John Bryant
Roger Ruess, Marilyn Walker, David Klein

Earth System Science
Chair: Amanda Lynch
Larry Hinzman, Diana Verseghy, Warren Washington

Symposium on Landscapes
Panel Discussion

Wednesday and Thursday, 20-21 September

Technical Sessions
Technical Sessions cover all disciplines, including:

Land-Atmosphere Interactions
Chair: Jeffrey Tilley

Spatial Statistics, Geographic Information Systems and Spatially Explicit Models
Chairs: Terry Bowyer, Sue Hills

SEAscape—Ecosystem Studies of Prince William Sound
Chair: David Eslinger

Subsistence and Wildlife/ Fisheries Resources
Chair: Elizabeth Andrews

Biological Diversity and Landscapes
Chairs: Wendy Nixon, Scott Armbruster, Joe Cook

Anthropogenic and Natural Change in Forest Landscapes of Alaska–Scientific and Policy Aspects
Chair: Glenn P. Juday

Ecosystem-Based Management
Chair: Rosa Meehan

Cold Regions Engineering
Chair: Debendra Das

A Retrospective on Research at the Naval Arctic Research Laboratory (NARL), sponsored by the Arctic Institute of North America (AINA)
Chairs: Carl S. Benson, Jerry Brown

Integrative Teaching—Human and Landscape Ecology
Chair: Mark Oswood

Special Workshop

Friday, 22 September

Preparing for an Uncertain Future: Impacts of Short and Long-term Climate Change on Alaska
Chairs: Juan Roederer
TBA State of Alaska
Plenary Session and Working Group Discussions on:

- Climate scenarios and physical effects
- Biological effects
- Socio-economic effects
- Policy implications

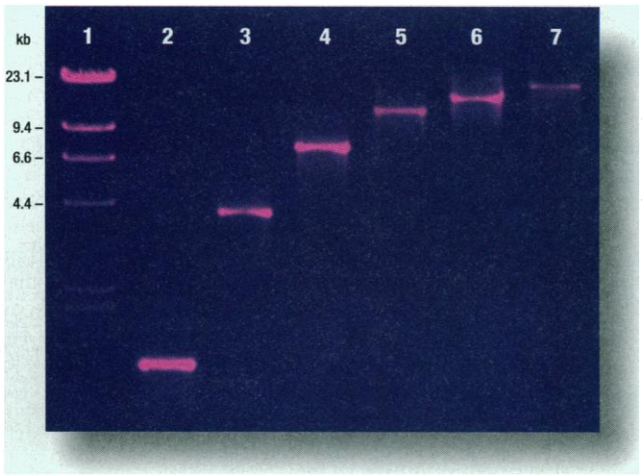
Invited papers only at special workshop.

Abstracts for Arctic Science Conference deadline: 17 July 1995
Early Registration deadline: 1 August 1995

For Information, contact:
Patricia A. Anderson,
Executive Secretary
AAAS Arctic Division
Center for Global Change
PO Box 757740
University of Alaska Fairbanks
Fairbanks, AK 99775-7740
Phone:(907) 474-5698
FAX:(907) 474-6722
Email:patricia@gi.alaska.edu

GIBCO BRL Products for Long PCR

When you have a long way to go,

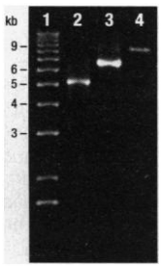


choose the best way to get there.

Human Genomic DNA K562 DNA (100 ng) was amplified with ELONGASE Reagent for 35 cycles in a 50 µl volume. Lane 1 is lambda DNA/Hind III Fragments. Lanes 2-4 are amplifications of 1.3 kb, 4.1 kb and 7.5 kb β-globin targets, respectively. Lane 5 is an amplification of a 12.4 kb serum albumin target. Lanes 6 and 7 are amplifications of 15.1 kb and 20 kb Factor IX targets, respectively. Sample loads range from 4-10 µl.

GIBCO BRL ELONGASE™ Reagents. Your best choice for success with long PCR.

ELONGASE Reagents contain an optimized mixture of recombinant, thermostable polymerases, including a proofreading (3′ → 5′ exonuclease) activity, resulting in efficient amplification of long templates and exceptionally high yields.



RT-PCR cDNA was synthesized from HeLa RNA (500 µg) with the SUPERSCRIPT™ Preamplification System using oligo dT. A portion of the reaction was amplified with ELONGASE Reagent. Lane 1 is the 1 Kb DNA Ladder. Lanes 2-4, respectively, are amplifications of 5.3 kb tuberous sclerosis II, 6.8 kb DNA polymerase ε and 8.9 kb adenomatous polyposis coli full length cDNAs.

Efficient Amplification of Long Templates

- Amplification of λ DNA up to 30 kb and single-copy genomic DNA up to 20 kb.
- Amplification of long cDNA templates in RT-PCR applications.

Exceptionally High Yield

- 10^6 fold amplification of DNA templates < 10 kb in size.

One-step Optimization

- Simple mixing of buffers for accurate Mg^{2+} titration is the only step required.
- Proven effective for simple and complex targets – no need to optimize enzyme concentration or change buffers.

Choose the best for success!

	Cat. No.	Size
ELONGASE Enzyme Mix	10480-010	100 rxn
	10480-028	500 rxn
ELONGASE Amplification System Contains ELONGASE Enzyme Mix, 5X PCR Buffer, dNTP Mix, distilled water, silicone oil and control human genomic DNA with primer sets for 7.5 kb and 20 kb targets	10481-018	100 rxn

LIFE TECHNOLOGIES™

To Order/TECH-LINE℠: (800) 828-6686 Facsimile: (800) 331-2286

Producer of GIBCO BRL Products

U.S.A. Orders
To Order/TECH-LINE℠: (800) 828-6686
Facsimile: (800) 331-2286

Latin America Orders
To Order/TECH-LINE℠: (301) 840-4027
Facsimile: (301) 258-8238

Canada Orders
To Order: (800) 263-6236
TECH-LINE℠: (800) 757-8257
Facsimile: (800) 387-1007

Internet
info@lifetech.com
http://www.lifetech.com

* Purchase of this product is accompanied by a limited license to use it in the Polymerase Chain Reaction (PCR) process for research and development in conjunction with a thermal cycler whose use in the automated performance of the PCR process is covered by the up-front license fee, either by payment to Perkin-Elmer or as purchased, i.e., an authorized thermal cycler.

Circle No. 18 on Readers' Service Card