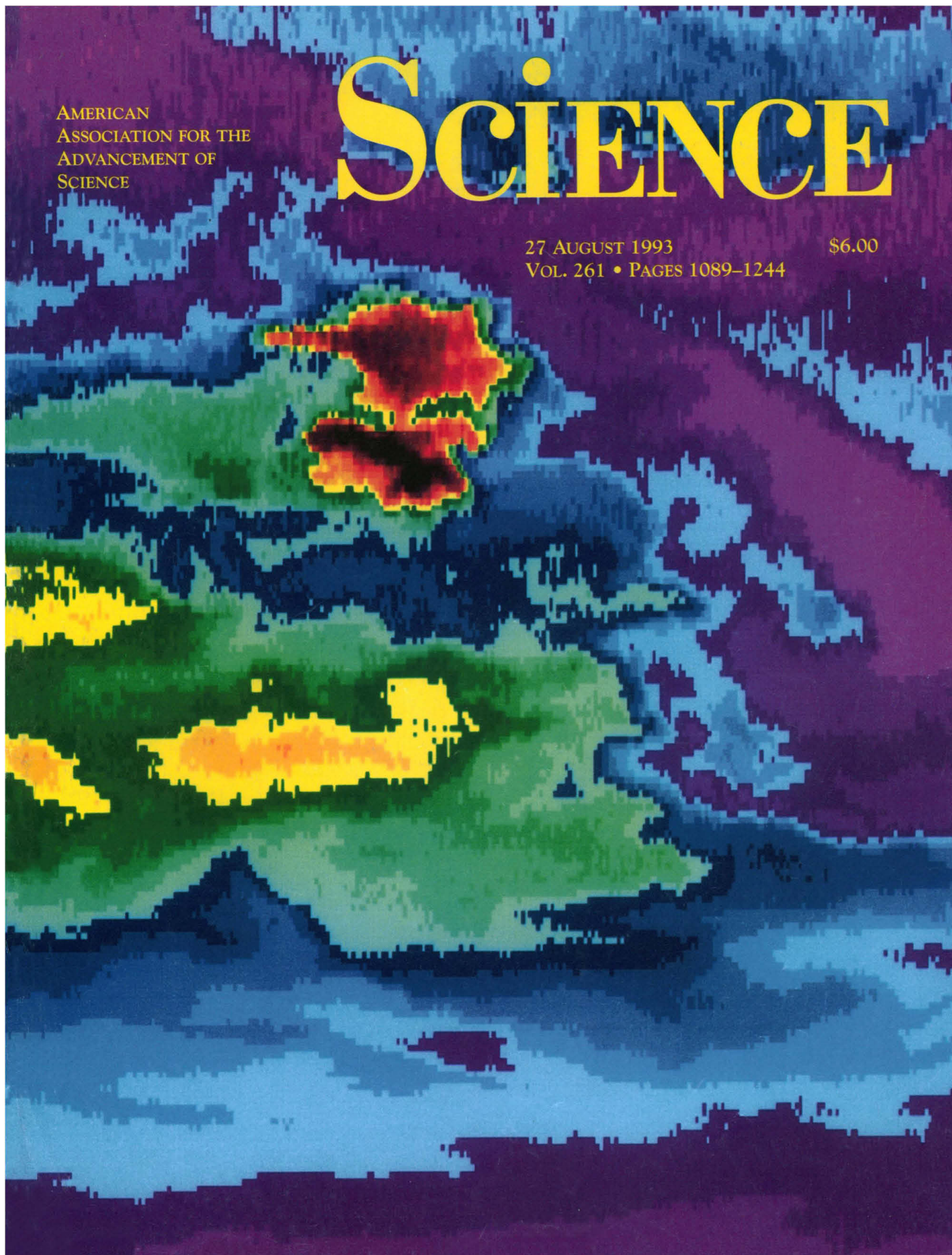


AMERICAN  
ASSOCIATION FOR THE  
ADVANCEMENT OF  
SCIENCE


# SCIENCE

27 AUGUST 1993  
VOL. 261 • PAGES 1089-1244

\$6.00

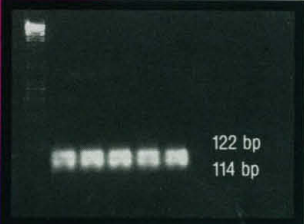






DNA Thermal Cycler 480

# DNA THERMAL CYCLER 480 SYSTEM





DETECTION OF MARINE SPECIES METALLOTHIONEIN MRNAs (114 bp) WITH INTERNAL STANDARDS (122 bp) USING THE GENEAMP® RNA PCR KIT AND THE DNA THERMAL CYCLER 480 WITH THIN-WALLED GENEAMP REACTION TUBES. COURTESY OF DR. JOSEPH F. CRIVELLO, UNIVERSITY OF CONNECTICUT.

## Advancing Gene Expression Research Through RNA PCR.

Innovations in PCR amplification are leading the way with a powerful tool for gene expression research. Today the DNA Thermal Cycler 480 System makes rapid amplification and quantitation of mRNA routine.

By integrating state-of-the-art instrumentation, consumables and RNA PCR reagents, the DNA Thermal Cycler 480 System ensures efficient amplification of all types of mRNA sequences, including complex secondary structures. The exceptional temperature uniformity of the DNA Thermal Cycler 480, coupled with rapid heat transfer facilitated by Thin-Walled GeneAmp™ Reaction Tubes, provides the accuracy and precision required for advanced PCR quantitation.

Above all, the DNA Thermal Cycler 480 System for RNA PCR comes with our PCR Performance Guarantee. A commitment backed by

the comprehensive experience of Perkin-Elmer's worldwide technical support organization.

**Free technical note and bibliography.** To receive free literature on the DNA Thermal Cycler 480 and RNA PCR, contact your local Perkin-Elmer sales representative or call 1-800-762-4000. To order, call 1-800-762-4002. Outside the U.S., contact your Perkin-Elmer sales representative.

### PERKIN ELMER

Europe Vaterstetten, Germany Tel: 49-8106-381-115 Fax: 49-8106-6697  
Canada Montreal, Canada Tel: 514-737-7575 Fax: 514-737-9726  
Far East Melbourne, Australia Tel: 61-3-560-4566 Fax: 61-3-560-3231  
Latin America Mexico City, Mexico Tel: 52-5-651-7077 Fax: 52-5-593-6223

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

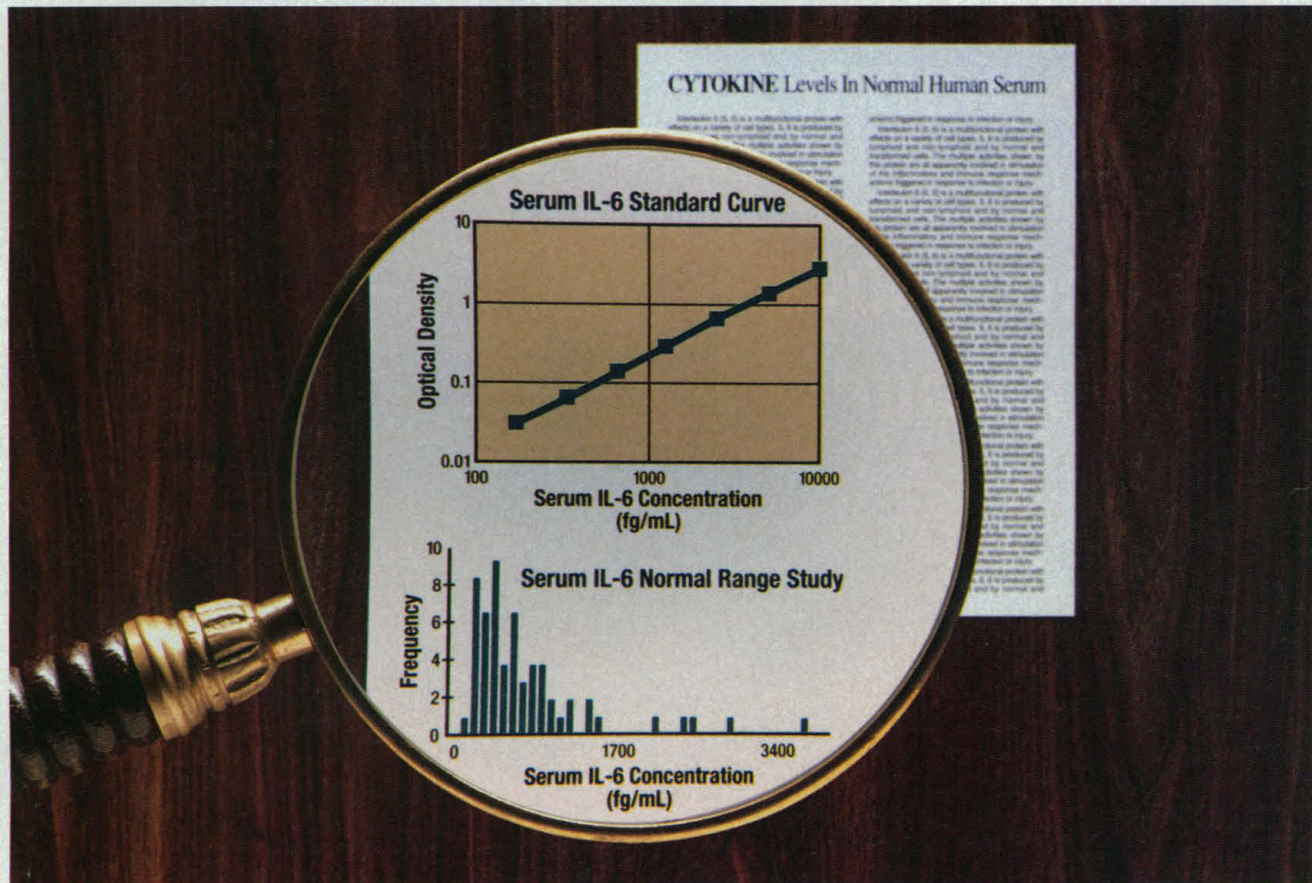


Perkin-Elmer is a registered trademark of The Perkin-Elmer Corporation. GeneAmp is a registered trademark/trademark of Hoffmann-La Roche Inc. and F. Hoffmann-La Roche A.G. The GeneAmp PCR process is covered by U.S. patents owned by Hoffmann-La Roche Inc. and F. Hoffmann-La Roche A.G.

Circle No. 17 on Readers' Service Card



# Focus in on Measuring... FEMTOGRAM Levels of CYTOKINES



## Quantikine™ HS (High Sensitivity) Immunoassays No other assay can measure cytokines at these low levels

Cytokines occur in extremely low levels in biological fluids. Now it is possible, with the Quantikine HS (High Sensitivity) series of immunoassay kits, to easily and precisely quantitate cytokines in a variety of biological fluids.

- Femtogram Sensitivity
- No Interference from other Cytokines
- No Interference from Soluble Receptors
- Performs Normal Range Studies

- Multiple Sample Types:  
Urine  
Plasma  
Serum

- Quantikine HS Immunoassays Available for:  
IL-6  
IL-1 $\beta$   
TNF  $\alpha$   
FGF basic

FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES.

To obtain a catalog, detailed product information or to place an order call 1-800-343-7475

In Europe contact:

**British Bio-technology, Ltd.**  
4-10 The Quadrant, Barton Lane  
Abingdon, Oxon OX14 3YS  
Telephone: +44 (0865) 781045  
Fax: +44 (0235) 533420

In Japan contact:

**Funakoshi Co., Ltd.**  
9-7, Hongo 2-Chome  
Bunkyo-ku, Tokyo 113  
Telephone: +81 (03) 56841622  
Fax: +81 (03) 56841633

**R&D Systems**  
614 McKinley Place N.E.  
Minneapolis, MN 55413  
Telephone: 800-343-7475  
Fax: (612) 379-6580

**1-800-343-7475**

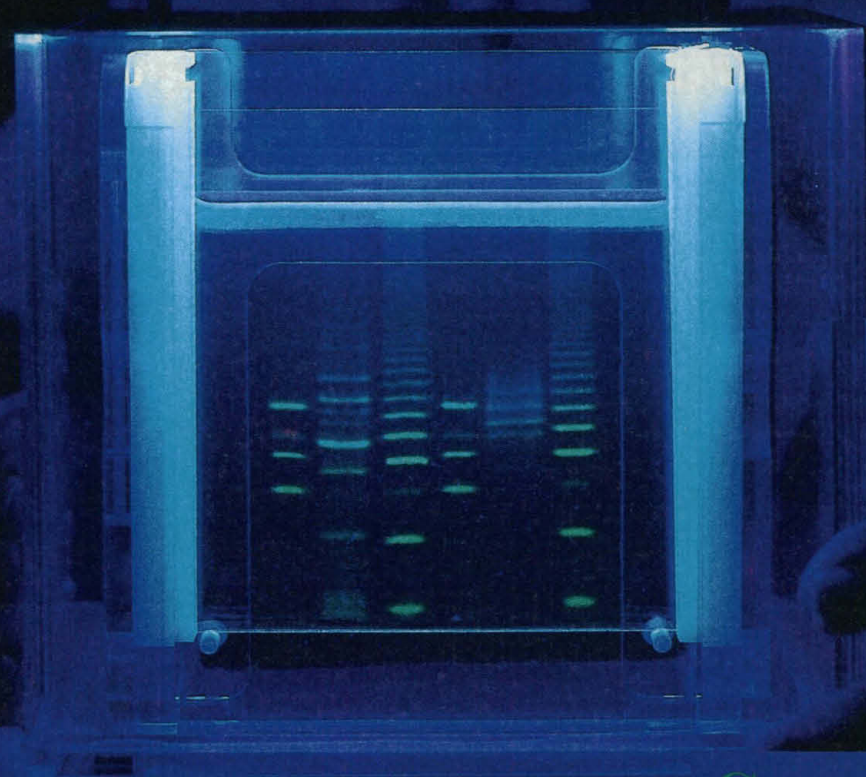
Circle No. 18 on Readers' Service Card

**R&D  
SYSTEMS**



With Glyko  
FACE technology  
you can separate,  
quantify, or  
sequence your  
carbohydrate

In one day.



GLYKO



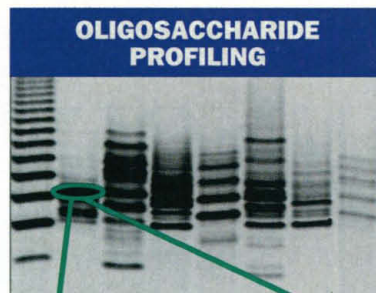
## If you're working with DNA or protein, you're ready to work with carbohydrates

Glyko's FACE® (*Fluorophore Assisted Carbohydrate Electrophoresis*) technology, makes it possible for you to work with and analyze complex carbohydrates using the same technique you already use every day in your laboratory: polyacrylamide gel electrophoresis.

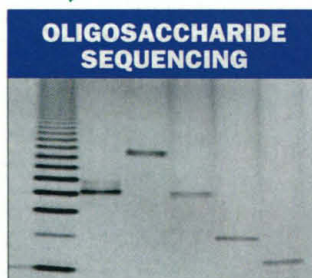
Now, in less than one day—without complicated or expensive instruments—you can perform profiling, composition, or sequencing experiments such as the ones shown here, using FACE chemistry kits.

## Color-coded FACE kits make carbohydrate analysis easy and reliable

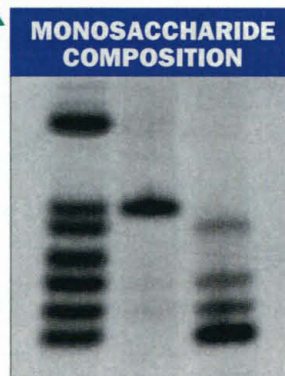
FACE kits are color-coded and are designed to provide a complete approach to carbohydrate analysis...starting with the enzymatic or chemical release from the glycoconjugate to the separation, isolation, or sequencing of oligosaccharides.



FACE gel profile of N-linked oligosaccharides released from a number of different glycoproteins



FACE gel showing the monosaccharide compositional analysis of a tri-sialylated, triantennary oligosaccharide



FACE gel illustrating the enzyme-based sequencing of a tri-sialylated, triantennary oligosaccharide

Everything you need is included: enzymes or release chemicals, fluorescent-labeling reagents, electrophoresis standards, controls, running buffers, and complete protocols.

Precast polyacrylamide gels specifically formulated for the separation of monosaccharides or oligosaccharides assure consistent results from experiment to experiment.

Glyko FACE kits available for glycoconjugate analysis include:

- **N-LINKED OLIGOSACCHARIDE PROFILING KIT**
- **O-LINKED OLIGOSACCHARIDE PROFILING KIT**
- **MONOSACCHARIDE COMPOSITION KIT**
- **N-LINKED OLIGOSACCHARIDE SEQUENCING KIT**
- **O-LINKED OLIGOSACCHARIDE SEQUENCING KIT**

## We want to be your carbohydrate research partner

When your research requires a unique application of FACE technology, Glyko scientists will work with you to develop a custom FACE kit to your exact specifications.

Color-coded and accompanied with complete protocols, your custom FACE kit will contain the necessary reagents and materials you need to achieve your research objectives.

## Sequence your oligosaccharides with Glyko recombinant glycosidases

Glyko also offers the most complete line of recombinant glycosidases available, each cloned to be free of other glycosidases and protease activity:

- **PNGase F**, releases Asn-linked oligosaccharides
- **NANase I**, releases  $\alpha$ 2-3 N-acetylneuraminic acid
- **NANase II**, releases  $\alpha$ 2-3,6 N-acetylneuraminic acid
- **NANase III**, releases  $\alpha$ 2-3,6,8 N-acetylneuraminic acid
- **Neuraminic Acid Linkage Analysis Kit** contains NANase I, II, and III
- **HEXase I**, releases  $\beta$ 1-2,4,6 N-acetylglucosamine
- **MANase I**, releases  $\alpha$ 1-2,3,6 mannose
- **FUCase I**, releases  $\alpha$ 1-6 fucose



## Your place or ours?

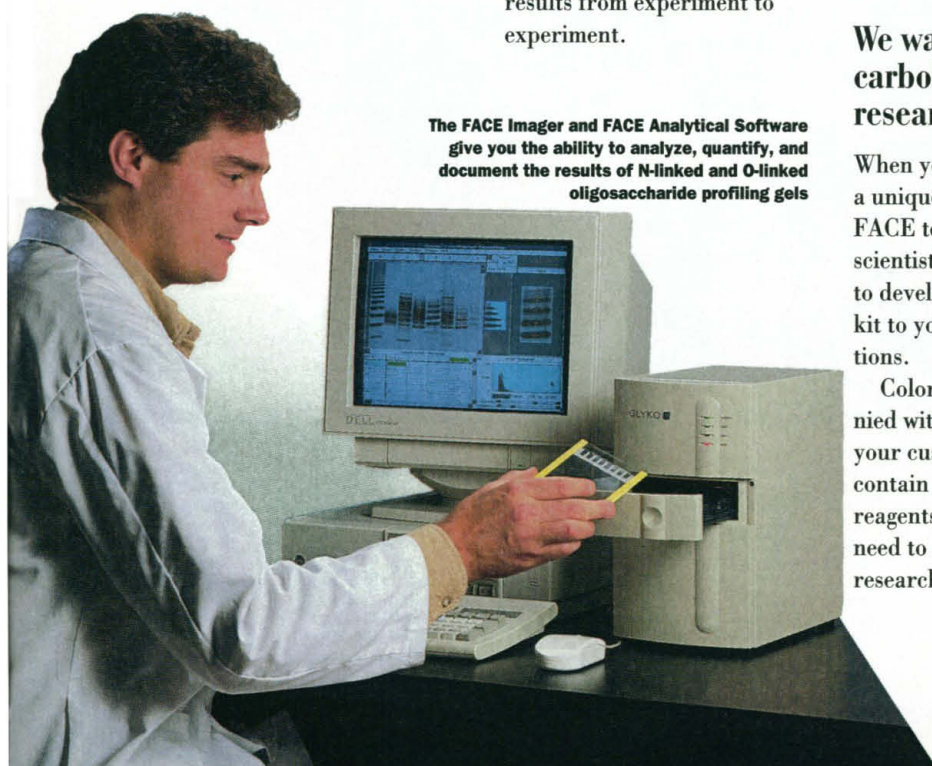
If you have only an occasional need for carbohydrate analysis, or lack the personnel to perform the analyses you require, our staff of scientists can do it for you.

Carbohydrate or glycoconjugate analysis, custom kit production, and staff training are just a few of the ways we can help.

For more information, a color brochure, and complete product specifications, please call Glyko, Inc. toll free at 1 800 33 GLYKO (334 5956) or fax us at 1 415 382 7889.



Circle No. 10 on Readers' Service Card



The FACE Imager and FACE Analytical Software give you the ability to analyze, quantify, and document the results of N-linked and O-linked oligosaccharide profiling gels





**1117**

A leap for pharmacology

## NEWS

- Misconduct: Views From the Trenches 1108
- Cornell Leads Battle of the B Factories 1111
- Innovative Techniques on Display at Boston Meeting 1112
- Putting Antibodies to Work Inside Cells 1114
- Predators, Prey, and Natural Disasters Attract Ecologists 1115
- Frog Venom Cocktail Yields a One-Handed Painkiller 1117

## SPECIAL NEWS REPORT



- Is NIH's Crown Jewel Losing Luster? 1120
- How Much Is Enough? NIH's Best-Funded Labs 1123
- 'Power to the People'—Research Style 1125

## PERSPECTIVE

- Probing Stratospheric Ozone 1128  
J. M. Rodriguez

## REPORTS

### ARCTIC OZONE: AASE II OBSERVATIONS

- Chlorine Chemistry on Polar Stratospheric Cloud Particles in the Arctic Winter 1130  
C. R. Webster, R. D. May, D. W. Toohey, L. M. Avallone, J. G. Anderson, P. Newman, L. Lait, M. R. Schoeberl, J. W. Elkins, K. R. Chan
- The Seasonal Evolution of Reactive Chlorine in the Northern Hemisphere Stratosphere 1134  
D. W. Toohey, L. M. Avallone, L. R. Lait, P. A. Newman, M. R. Schoeberl, D. W. Fahey, E. L. Woodbridge, J. G. Anderson
- Heterogeneous Reaction Probabilities, Solubilities, and the Physical State of Cold Volcanic Aerosols 1136  
O. Toon, E. Browell, B. Gary, L. Lait, J. Livingston, P. Newman, R. Pueschel, P. Russell, M. Schoeberl, G. Toon, W. Traub, F. P. J. Valero, H. Selkirk, J. Jordan

## DEPARTMENTS

- |  |             |  |             |
|--|-------------|--|-------------|
| <b>THIS WEEK IN SCIENCE</b>  | <b>1097</b> | <b>RANDOM SAMPLES</b>  | <b>1118</b> |
| <b>EDITORIAL</b>   | <b>1099</b> | <b>BOOK REVIEWS</b>  | <b>1186</b> |
| Three Good Choices   |             | AI, reviewed by W. S. Bainbridge • <i>Darwinism and Social Darwinism in Imperial Germany</i> , F. B. Churchill • <i>Weather Cycles</i> , R. A. Anthes • <i>Synthetic Fluorine Chemistry</i> , W. R. Dolbier Jr. • Vignettes • Books Received |             |
| <b>LETTERS</b>   | <b>1101</b> | <b>PRODUCTS &amp; MATERIALS</b>  | <b>1193</b> |
| Ozone Depletion Theory: S. F. Singer; F. S. Rowland • "Critical Fat": R. E. Frisch |             |  |             |
| <b>SCIENCESCOPE</b>  | <b>1107</b> |  |             |

## Board of Reviewing Editors

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

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

Harry A. Fozzard  
K. Friedrich  
Theodore H. Geballe  
Margaret J. Geller  
John C. Gerhart  
Roger I. M. Glass  
Stephen P. Goff  
Peter N. Goodfellow  
Corey S. Goodman  
Stephen J. Gould  
Ira Herskowitz

Eric F. Johnson  
Stephen M. Kosslyn  
Michael LaBarbera  
Charles S. Levings III  
Alexander Levitzki  
Harvey F. Lodish  
Richard Losick  
Diane Mathis  
Anthony R. Means  
Shigetada Nakanishi  
Roger A. Nicoll

William H. Orme-Johnson III  
Stuart L. Pimm  
Yeshayau Pocker  
Dennis A. Powers  
Ralph S. Quatrano  
V. Ramanathan  
Douglas C. Rees  
T. M. Rice  
Erkki Ruoslahti  
David C. Rubie

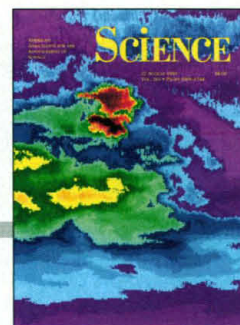
Gottfried Schatz  
Jozef Schell  
Ronald H. Schwartz  
Terrence J. Sejnowski  
Ellen Solomon  
Thomas A. Steitz  
Michael P. Stryker  
Richard F. Thompson  
Robert T. N. Tjian  
Emil R. Unanue  
Geerat J. Vermeij

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



Stratospheric aerosol scattering (red, high; violet, low) from 11 to 25 kilometers across the Arctic vortex edge, measured on 16 January 1992 by AASE II. Aerosols from the Mount Pinatubo eruption were blocked from moving deep into the vortex. Isolation of air in the vortex

resulted in a 23 percent ozone loss at 18 kilometers between January and March 1992. See page 1155 and related Reports beginning on page 1130; see also the Perspective on page 1128. [Image: E. V. Browell, NASA Langley Research Center]



**In Situ Observations of Aerosol and Chlorine Monoxide After the 1991 Eruption of Mount Pinatubo: Effect of Reactions on Sulfate Aerosol**

1140

J. C. Wilson, H. H. Jonsson, C. A. Brock, D. W. Toohey, L. M. Avallone, D. Baumgardner, J. E. Dye, L. R. Poole, D. C. Woods, R. J. DeCoursey, M. Osborn, M. C. Pitts, K. K. Kelly, K. R. Chan, G. V. Ferry, M. Loewenstein, J. R. Podolske, A. Weaver

**Stratospheric Meteorological Conditions in the Arctic Polar Vortex, 1991 to 1992**

1143

P. Newman, L. R. Lait, M. Schoeberl, E. R. Nash, K. Kelly, D. W. Fahey, R. Nagatani, D. Toohey, L. Avallone, J. Anderson

**Chemical Loss of Ozone in the Arctic Polar Vortex in the Winter of 1991-1992**

1146

R. J. Salawitch, S. C. Wofsy, E. W. Gottlieb, L. R. Lait, P. A. Newman, M. R. Schoeberl, M. Loewenstein, J. R. Podolske, S. E. Strahan, M. H. Proffitt, C. R. Webster, R. D. May, D. W. Fahey, D. Baumgardner, J. E. Dye, J. C. Wilson, K. K. Kelly, J. W. Elkins, K. R. Chan, J. G. Anderson

**Ozone Loss Inside the Northern Polar Vortex During the 1991-1992 Winter**

1150

M. H. Proffitt, K. Aikin, J. J. Margitan, M. Loewenstein, J. R. Podolske, A. Weaver, K. R. Chan, H. Fast, J. W. Elkins

**Ozone and Aerosol Changes During the 1991-1992 Airborne Arctic Stratospheric Expedition**

1155

E. V. Browell, C. F. Butler, M. A. Fenn, W. B. Grant, S. Ismail, M. R. Schoeberl, O. B. Toon, M. Loewenstein, J. R. Podolske

**Seismic Determination of Elastic Anisotropy and Mantle Flow**

1159

J. Park and Y. Yu

**Life History Variables Preserved in Dental Cementum Microstructure**

1162

D. E. Lieberman

**Repair of DNA Methylphosphotriesters Through a Metalloactivated Cysteine Nucleophile**

1164

L. C. Myers, M. P. Terranova, A. E. Ferentz, G. Wagner, G. L. Verdine

**Deletion of the Paired  $\alpha 5(IV)$  and  $\alpha 6(IV)$  Collagen Genes in Inherited Smooth Muscle Tumors**

1167

J. Zhou, T. Mochizuki, H. Smeets, C. Antignac, P. Laurila, A. de Paepe, K. Tryggvason, S. T. Reeders

**Identification of a Structural Glycoprotein of an RNA Virus as a Ribonuclease**

1169

R. Schneider, G. Unger, R. Stark, E. Schneider-Scherzer, H.-J. Thiel

**Lack of N Regions in Antigen Receptor Variable Region Genes of TdT-Deficient Lymphocytes**

1171

T. Komori, A. Okada, V. Stewart, F. W. Alt

**Mice Lacking TdT: Mature Animals with an Immature Lymphocyte Repertoire**

1175

S. Gilfillan, A. Dierich, M. Lemeur, C. Benoist, D. Mathis

**Genotypic and Phenotypic Characterization of HIV-1 in Patients with Primary Infection**

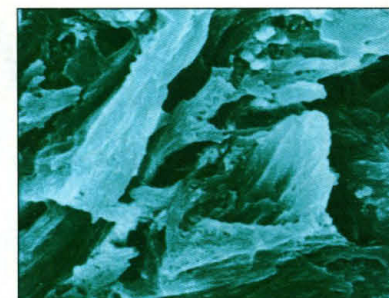
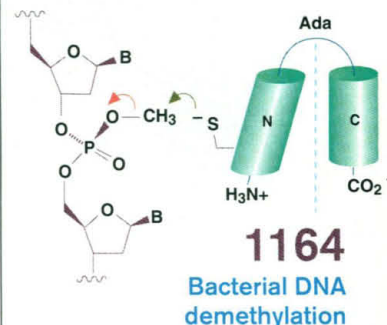
1179

T. Zhu, H. Mo, N. Wang, D. S. Nam, Y. Cao, R. A. Koup, D. D. Ho

**A Receptor for the Malarial Parasite *Plasmodium vivax*: The Erythrocyte Chemokine receptor**

1182

R. Horuk, C. E. Chitnis, W. C. Darbonne, T. J. Colby, A. Rybicki, T. J. Hadley, L. H. Miller



**1162**  
A dental record of diet

**AAAS Board of Directors**

F. Sherwood Rowland  
Retiring President,  
Chairman  
Eloise E. Clark  
President  
Francisco J. Ayala  
President-elect

Robert A. Froesch  
Florence P. Haseltine  
William A. Lester, Jr.

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 © 1993 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): \$87 (\$47 allocated to subscription). Domestic institutional subscription (51 issues): \$205. 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 #125488122. 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.



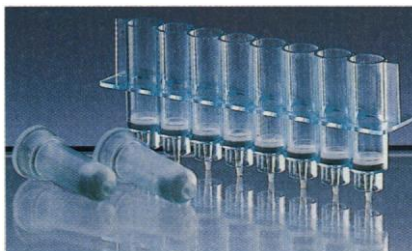


# Quick as a Flash – Minipreps in Minutes!

The new QIAprep system from QIAGEN provides:

- 20 µg DNA per prep,
- 48 preps in 60 minutes,
- DNA elution in TE, and
- safe, non-toxic procedures.

The QIAprep system is based on a unique silica membrane that selectively binds plasmid DNA in the presence of high salt. 20 µg of pure plasmid is eluted in 100 µl of TE, ready-to-go. Two convenient formats are available: microspin columns for a few preps or 8-well microtitration strips for high throughput.



Use the QIAprep Plasmid Kits to prepare plasmid DNA for applications such as radioactive sequencing, ligation, transformation, and restriction enzyme analysis.

Say goodbye to ethanol, boiling water, and toxic compounds forever. QIAprep Plasmid Kits make purifying DNA faster than ever ... quick as a flash!

To receive additional information about the QIAprep-spin Plasmid Kit or the QIAprep-8 Plasmid Kit, or to have a product specialist contact you, please contact DIAGEN or your local distributor.

**DIAGEN GmbH** Max-Valmer-Straße 4, 4010 Hilden, Germany, Orders (0)2103-892-230, Fax (0)2103-892-222, Technical Service (0)2103-892-240  
**QIAGEN Inc.** 2559 Eton Avenue, Chatsworth, CA 91311 USA, Orders 800-426-8157, Fax 818-718-2056, Technical Service 800-DNA-PREP (800-362-7737)  
**DISTRIBUTORS:** **AUSTRALIA:** PHOENIX Scientific Pty. Ltd. (03) 868 6888 **AUSTRIA:** BIO-TRADE (0222) 889 18 19 **BENELUX:** Westburg B.V. NL: (033) 95 00 94, B: (07811) 9815 (toll free) **DENMARK:** KEBO Lab A/S (44) 88 72 00 **FINLAND:** KEBO OY (90) 804 4900 **FRANCE:** Cogter (1) 45 32 35 17  
**GREECE:** Bio+Analytica (01) 64 62 748 **HONG KONG/CHINA:** Diagnostics Co., Ltd. (892) 542 0566 **INDIA:** Genetix: (11)-550 6463 **ISRAEL:** BIO-LAB Laboratories Ltd. (02) 524 447 **ITALY:** Genenco (M-Medical srl) (055) 5001871 **JAPAN:** Funakoshi Co., Ltd. (3) 5684-1622 **KOREA:** LRS Laboratories, Inc. 924 8697 **NORWAY:** KEBO Lab AS (02) 30 17 18 **PORTUGAL:** Izasa Portugal (01) 758 07 40 **RSA:** Whitehead Scientific Supplies (021) 981-1560 **SINGAPORE:** TIBS TRADING PTE LTD (Biotech Branch) 292 9783 **SPAIN:** Izasa S. A. (3) 401 01 01 **SWEDEN:** KEBO Lab AB (08) 621 34 00 **SWITZERLAND:** KONTRON Instruments AG (01) 733-5733 **TAIWAN:** Formo Industrial Co., Ltd. (02) 736 7125 **UK:** Hybaid Ltd. (081) 977 3266



Circle No. 13 on Readers' Service Card



## Mantle anisotropy

Deformation in the shallow mantle associated with the flow from ridges to trenches should induce an anisotropic fabric in its constituent minerals. Older fabrics would be preserved after a change in plate motions. Anisotropic fabrics should produce a variation in the propagation of seismic waves in different directions, but obtaining sufficient resolution has been difficult. Park and Yu (p. 1159) show that evidence can be obtained using long-period seismic waves (quasi-Love waves). Data for selected paths in the shallow mantle beneath the Pacific Ocean suggest that the anisotropy is horizontal and that fabrics rotate by 90° in a region east of the Tonga-Kermadec trench.

## Dental records

Cementum bands in teeth, which are commonly preserved as fossils, have been used to infer age, but their origin has been obscure. Liebermann (p. 1162) demonstrates in a series of experiments that the bands can be produced by variations in collagen orientation or collagen mineralization. The teeth of goats that were fed either hard or soft diets were examined by scanning electron microscopy, which revealed that orientation reflects the magnitude and frequency or forces involved in chewing. Bands were also produced when growth of teeth slowed in response to a diet low in protein and minerals. Thus, the bands can be used to infer life history as well as age.

## Zinc to the rescue

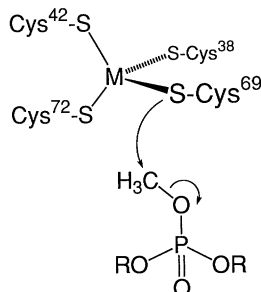
In *Escherichia coli*, the Ada enzyme repairs certain types of DNA damage caused by inad-

## Chemistry and dynamics of Arctic ozone

The second Arctic Airborne Stratospheric Experiment (AASE II) involved a series of aircraft flights into the Arctic vortex from fall 1991 to spring 1992 to study the dynamics and chemistry of ozone destruction in situ. The timing of the mission was particularly interesting because the effect of sulfate aerosols from the Mount Pinatubo volcanic eruption could be studied. The major results of AASE II are reported in a series of eight papers (pp. 1130 to 1158). One highlight is that the in situ measurements allow the history of reactions in air packets to be reconstructed as air descended in the Arctic vortex and ice particles formed and melted. Rodriguez, in a Perspective (p. 1128), summarizes the results in light of other recent missions to both the Arctic and larger Antarctic ozone holes and discusses the implications for our understanding of ozone chemistry at midlatitudes.

vertent methylation, including methylation of phosphates. Myers *et al.* (p. 1164) studied a cadmium variant by nuclear magnetic resonance spectroscopy and show that zinc activates nucleophilic attack by the

benign smooth muscle tumors. Zhou *et al.* (p. 1167) found that patients affected with both disorders carry deletions that straddle the  $\alpha 5$  type IV collagen gene and a second, previously unidentified, type IV collagen gene located nearby. This finding suggests that collagen may help regulate the differentiation of smooth muscle cells.



Cys<sup>69</sup> residue of Ada. This reaction irreversibly transfers the phosphate methyl group to Ada; a His<sup>69</sup> variant was inactive. The zinc atom may also participate in the subsequent conformation change that converts Ada into a DNA binding protein.

## Collagen genes and tumorigenesis

About half of the patients with X-linked Alport syndrome, a disorder marked by defects in basement membrane components, carry deletions in the  $\alpha 5$  type IV collagen gene. A subset of these patients also inherit

## RNA virus ribonuclease

Viral genomes not only encode structural coat proteins but also encode enzymes, such as proteases, which can serve as targets for drug therapies. Surprisingly, a viral coat glycoprotein has been found that also acts as an enzyme. Schneider *et al.* (p. 1169) studied the protein products of an RNA virus from the *Pestivirus* genus, classical swine fever virus, and showed that the secreted form of one of the three structural glycoproteins, E0, is a ribonuclease (RNase). The primary sequence of E0 is similar to that of certain fungal and plant RNases, and its RNase activity is highly specific for uridine and could be inhibited by zinc ions. The apparent role of E0 is not to

act on its own RNA; instead, the target of this secreted RNase is probably cells of the host immune system.

## Promoting diversity

Assembly of variable region genes in V(D)J recombination is frequently accompanied in adults by the addition of N regions, nucleotides that are added at segment junctions. In prenatal and newborn animals, N regions are rarely seen. Reports by Komori *et al.* (p. 1171) and by Gilfillan *et al.* (p. 1175) show that adult mice whose stem cells lack the gene for terminal deoxynucleotidyl transferase (TdT) have few N regions in their T cell receptors or immunoglobulin molecules. However, extensive homology-directed recombination occurs, suggesting that TdT also inhibits this process.

## Selective HIV transmission

Although an individual infected with the human immunodeficiency virus-type 1 (HIV-1) may harbor several viral phenotypes, a selection mechanism apparently operates during viral transmission. Zhu *et al.* (p. 1179) found that viral phenotypes of five seroconverted individuals were of the type that replicated in macrophages rather than in T cells and that did not induce syncytium formation. For two patients for which the phenotypes of their sexual partners could be identified, the gp120 sequences matched best with minor variants found in the transmitters. These results may refocus vaccine development strategies, which mainly focus on syncytium-inducing and T cell-trophic HIV-1 strains.



# How Much Quality Testing Goes into *Your* Restriction Endonucleases?

## We Test GIBCO BRL Restriction Endonucleases with up to 17 Assays.

For superior results, count on GIBCO BRL Restriction Endonucleases. Our scientists have developed an unparalleled system of rigorous and complete testing to ensure the production of the highest quality, functionally pure restriction endonucleases. State-of-the-art video imaging instrumentation is utilized for precise quantitative analysis of our stringent quality assays. Up to eight different assays are performed at four separate critical stages of production: during the purification process, on the bulk product in storage buffer, on the diluted product, and on the final product you receive.

### Assays include:

- ☐ **3 Separate DNA Exonuclease Assays** using three different substrates. This unique assay design uses customized end-labeled substrates to maximize sensitivity and specificity, and to detect *all* major exonuclease contaminants.
- ☐ **3 Separate DNA Endonuclease Assays:** endonuclease assay with linear ds DNA, nicking assay with supercoiled ds DNA, and a special endonuclease assay to detect *all* major DNA endonuclease contaminants.
- ☐ **1 DNA Ligation/Recut Assay**, which is our functional quality control, provides a very sensitive method for detecting exonuclease contamination, as well as phosphatase and endonuclease contamination.

- ☐ **1 Unit Assay**, performed at four different stages, to confirm concentration and full activity. Stringent criteria for accurate unit determination includes Adenovirus 2 as a substrate more than twice as often as other manufacturers.

Assay	Purification Process	Bulk	Diluted Product	Vial Product
3' ds DNA Exonuclease				
5' ds DNA Exonuclease				
3' ss DNA Exonuclease				
Standard Endonuclease				*
Special Endonuclease				*
Nicking				*
Ligation/Recut				
Unit				

\*Depending on enzyme, most sensitive of the three assays is performed

Quality results demand quality restriction endonucleases. So for reliable, reproducible performance in your lab, count on GIBCO BRL Restriction Endonucleases — quality tested to guarantee the highest level of purity. Call now for our new *Restriction Endonuclease Brochure*.

To order/TECH-LINE<sup>SM</sup>: (800) 828-6686

LIFE  TECHNOLOGIES<sup>TM</sup>

**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

**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

For research use only. Not intended for any human or animal diagnostic or therapeutic use. TECH-LINE<sup>SM</sup> and the Satisfaction Guarantee logo are marks of Life Technologies, Inc.

93-096

Circle No. 24 on Readers' Service Card







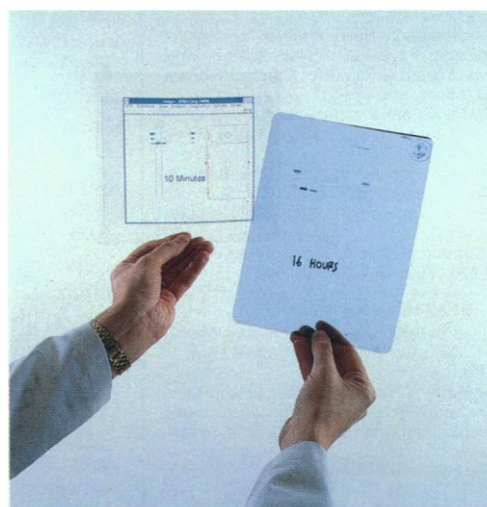
# Enter the New Era of Instant Autoradiography

Packard's new InstantImager™ directly images and quantitates radioactivity from gels, blots, membranes, TLC plates and tissue slices. There are no X-ray films or phosphor screens to expose and process. Just load your sample, point and click with the mouse, and you will get instant results.

In just seconds, you'll know if your experiment has succeeded; in minutes, you'll get quantitative data. The InstantImager is 100 times faster than X-ray film and ten times faster than phosphor screens.

Its revolutionary Microchannel Array Detector (MICAD) images  $^{14}\text{C}$ ,  $^{35}\text{S}$ ,  $^{32}\text{P}$ ,  $^{33}\text{P}$  and  $^{125}\text{I}$  activity, and other beta and gamma emitting radioisotopes, in real time, with spatial resolutions unmatched by any other direct detection system. It counts your labels with true nuclear counting statistics and delivers reliable quantitative results from activity levels that would require days of film or phosphor screen exposure.

Hard to imagine? Just look at the following example of a Southern blot from Prof. E. Southern's laboratory, University of Oxford, UK. On the right is a conventional X-ray film after a 16 hour exposure.



On the left is the same sample imaged and quantitated with the InstantImager, in just ten minutes.

So why wait? Experience similar productivity gains in your lab. Call Packard today and ask for the InstantImager!



Packard Instrument Company, 800 Research Parkway, Meriden, CT 06450 U.S.A.  
Tel: 203-238-2351 Toll Free: 1-800-323-1891 TX: 643251 FAX: 203-235-1347



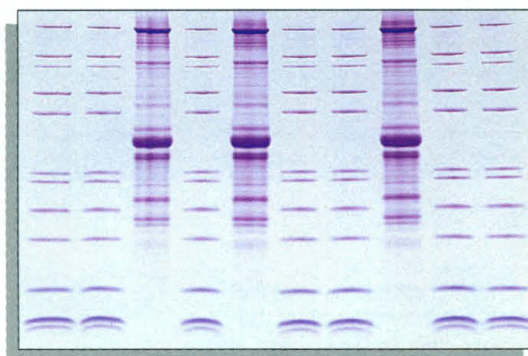
#### Packard International Offices:

**Australia**, Mt Waverley 61-3-543-4266; **Austria**, Vienna 43-1-302504-0; **Belgium**, Brussels 32-2-4668210; **Canada**, Ontario 1-800-387-9559; **Denmark**, Greve 45-42909023; **France**, Rungis (33) 1 46.86.27.75; **Germany**, Frankfurt (49-69) 663010; **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.

Circle No. 12 on Readers' Service Card



# It's Easy. It Works.



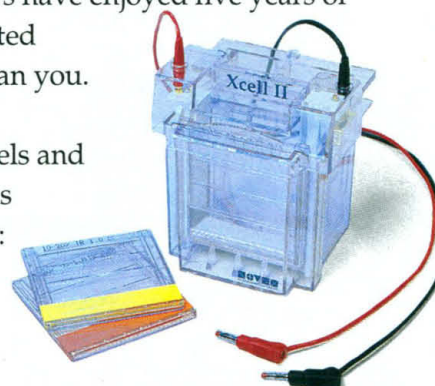
## NOVEX Pre-Cast Gels.

Many of your colleagues trust them. That's why their labs are now using NOVEX Pre-Cast Gels for electrophoresis. Just slip a NOVEX gel into our leak-free Xcell II™ Mini-Cell and you're ready to run in 30 seconds.

NOVEX has perfected the science of producing Pre-Cast Gels that give reproducible results every time. And we have over 100 gel types available for nearly any kind of experiment you're running.

Best of all, we can put them in your hands right away. Our customers have enjoyed five years of prompt, uninterrupted deliveries. And so can you.

For a catalog of NOVEX Pre-Cast Gels and other electrophoresis products, call today:  
**1-800-556-6839.**



NOVEX, 4202 Sorrento Valley Blvd., San Diego, CA 92121, (619) 452-6634, FAX (619) 452-6635 • **INTERNATIONAL DISTRIBUTORS:** AUSTRALIA NOVEX Australia PTY LTD, (61) 2 486 3104 • AUSTRIA ict Chemikalien Vertriebsges. m.b.H., (43) 222 877 6941 • CANADA Helixx Technologies, (416) 750 8850 • FRANCE Prolabo, (33) 1 4923 1500 • GERMANY Anamed GmbH i.G., (49) 6251 73024 • HONG KONG Line Analytics Ltd., (852) 578-5839 • HUNGARY, POLAND, CZECHOSLOVAKIA INOVEX Handelsges. m.b.H., (43) 1 94 8509 • ISRAEL Tamar, (972) 2 520279 • KOREA Koma, (02) 578-1886/7 • SCANDINAVIA Kem-En-Tec A/S, (45) 39 27 17 77 • SWITZERLAND ict AG Switzerland, (41) 61 302 0025 • TAIWAN Centec Scientific Inc., (886) 2 700 5548 • UNITED KINGDOM British Biotechnology Limited, (44) 235 529 449

Actual image: 10-20% Tricine Gel, lanes 1,2,4,6,7,9,10: Mark12™ standard (2.5kDa-200kDa), lanes 3,5,8: Turkey Muscle Extract



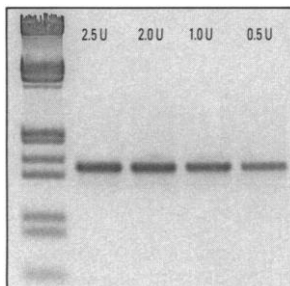


## Specific purpose

The sharply curved bill of the white-tipped sickle-billed hummingbird is specifically adapted to probe the delicate tubular flowers of heliconia plants for the nectar on which the creature survives.

High-performance Boehringer Mannheim *Taq* DNA polymerase is designed and tested with an equally specific goal in mind: to produce absolutely specific amplification products in your polymerase chain reactions.

Each lot of *Taq* polymerase undergoes a unique self-priming assay to assure that the enzyme is essentially free of endogenous DNA fragments. Additional testing makes sure that contaminating exonucleases and endonucleases are also not present.



Specific amplification of a single-copy  $\beta$ -globin gene (1.5 kb) from 100 ng of human genomic DNA using various unit (U) quantities of Boehringer Mannheim *Taq* polymerase.

The highest levels of product purity are provided so that you achieve specific, high-yield amplification with no background and no false priming.

### Licensed to perform

Choose Boehringer Mannheim *Taq* polymerase with confidence because Boehringer Mannheim is now a fully licensed supplier of PCR products, and your purchase conveys to you a license to perform PCR for research purposes.

Now you have the convenience of being able to purchase licensed *Taq* polymerase from the same company that you rely on for a wide range of other molecular biology research products.

### Give us your specifics today

Count on Boehringer Mannheim *Taq* polymerase for high-yield, high-quality PCR results. Contact your Boehringer Mannheim representative or call us to place your order at 1-800-262-1640.

This product is sold under licensing arrangements with Roche Molecular Systems and The Perkin-Elmer Corporation.

©1993 Boehringer Mannheim. All Rights Reserved.

T A Q  
BOEHRINGER  
MANNHEIM  
**PCR**  
H I G H  
PERFORMANCE

*Leaving the  
Limits Behind*

**BOEHRINGER  
MANNHEIM**

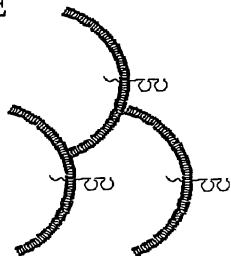




# NEW TITLES FROM ATL

## CARBOHYDRATES AND CARBOHYDRATE POLYMERS

M. Yalpani, Editor



Based on the proceedings of the ACS symposium on Industrial Polysaccharides (Washington, DC, 1992). This book offers a sampling of the latest developments in carbohydrate technology, including biotechnology processes, e.g., bioengineered foods, enzymatic hydrolyses and syntheses of oligosaccharides and polymers. Other topics include: analysis and conformational studies, novel chemical modifications, biomedical uses, such as in biomaterials and wound healing, and as anti-inflammatory, anti-viral (anti-HIV), and anti-tumor agents. Among the newest applications: polyrotaxanes, photo-switching materials, and biodegradable plastics. 29 Chapters by leading international experts in this field.

1993 320 pages Price: US\$ 175.00

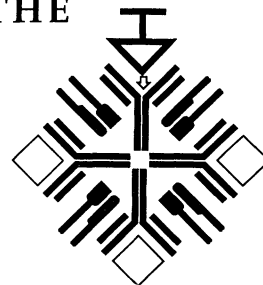
ISBN 1-882360-40-0

Frontiers in Biomedicine and Biotechnology, Vol. 1  
ISSN #1-067-1897

1993 Subscription Price (2 volumes): US\$306.00.

## SCIENCE FOR THE FOOD INDUSTRY OF THE 21ST CENTURY

M. Yalpani, Editor



This book presents 22 chapters on the latest R&D advances in low calorie foods and food ingredients. Coverage includes: markets for healthy food ingredients; high potency sweeteners; fat and sugar substitutes (Litesse, Simplese, Olestra, etc.); plant biotechnology; transgenic fish; artificial receptors; enzymatic peptide synthesis; reduced-alcohol wines and spirits; food processing by supercritical fluids; inactivation of enzymes and microorganisms with supercritical fluids; active packaging; stabilization of colorants; interactions of dietary compounds and colonic microflora; detection of food-borne disease agents; microbiology of reduced fat foods; regulatory aspects of fat and sugar substitutes.

September 1993 420 pages Price: US\$ 187.00

ISBN 1-882360-45-1

To order please contact: ATL PRESS, P. O. Box 697,  
Mt. Prospect, IL 60056, USA; for credit card orders by  
FAX: US only: 1-800-835-7543; other areas: (508)-898-2290.

Circle No. 25 on Readers' Service Card

### AAAS 1993 Mentor Awards Call for Nominations

The American Association for the Advancement of Science (AAAS) invites nominations for the 1993 Mentor Awards. The two categories are *Lifetime Mentor Award* and *Mentor Award*. These annual awards honor individuals who, during their careers, demonstrate extraordinary leadership to increase the participation of women of all racial/ethnic groups; African American, American Indian, and Hispanic men; and/or people with disabilities in science and engineering fields and careers.

A prize of \$5000 and a commemorative plaque for the *Lifetime Mentor Award* will recognize an individual who has mentored and guided significant numbers of students from these underrepresented groups to the completion of doctoral studies and/or who has impacted the climate of a department, college, or institution to significantly increase the ethnic diversity of students pursuing and completing doctoral studies. This individual will have served in such a role for 10 years or longer.

The *Mentor Award*, a prize of \$2,500 and a commemorative plaque, will recognize an individual who has mentored a significant number of students over a period of less than 10 years.

Such commitment and extraordinary effort may be demonstrated by:

- the number and diversity of students mentored.
- assisting students to present and publish their work, to find financial aid, and to provide career guidance.
- providing psychological support, encouragement, and essential strategies for life in the scholarly community.
- continued interest in the individual's professional advancement.

The 1992 AAAS Mentor Award recipient was Dr. Abdulalim A. Shabazz, Professor and Chair of the Mathematical Sciences Department of Clark Atlanta University.

For more information or an application, please contact Yolanda S. George at AAAS, telephone (202) 326-6670.

The Awards will be presented during the Association's Annual Meeting in San Francisco in February 1994.