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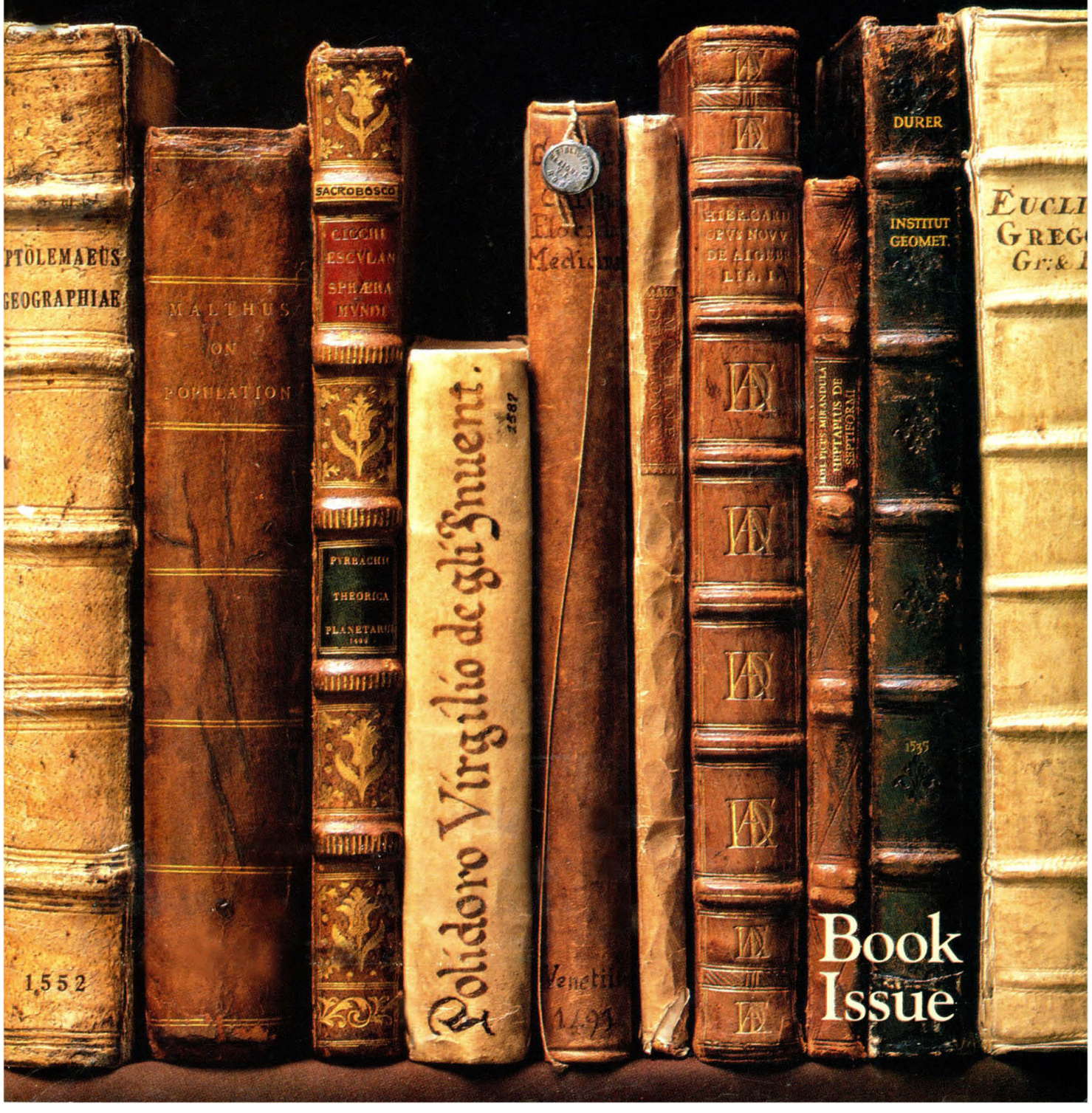
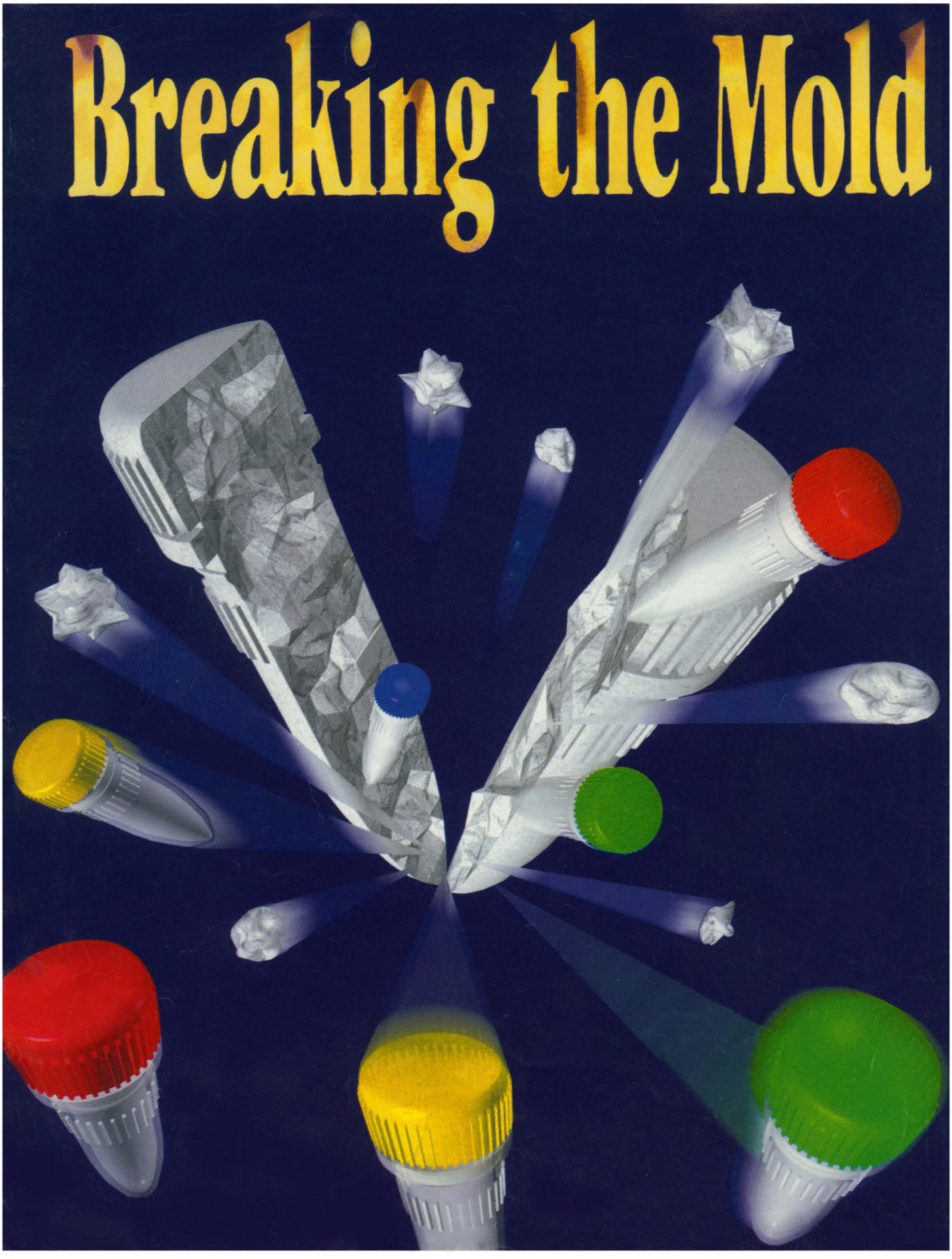


Breaking the Mold



In Thermostable Enzyme Research

The Commitment to Discovery

Stratagene is committed to thermostable enzyme research. We literally go to the ends of the earth looking for novel microorganisms which may contain useful thermostable enzymes. Our goal is to make recombinant DNA methodologies more efficient and less time-consuming by exploiting these newly discovered enzymes that excel at elevated temperatures.

The Results of Our Search

Stratagene's search has been quite fruitful. We have broken new ground with thermostable enzymes isolated from the hyperthermophilic marine archaeon, *Pyrococcus furiosus* (*Pfu*)[1]. This extremely thermophilic microorganism grows optimally at 100°C and as may be expected, possesses a host of exceptionally thermostable enzymes.

Scientists at Stratagene have recently cloned *Pfu* DNA ligase*[2,3], which remains active following one hour incubation at 95°C and functions superbly in the ligase chain reaction (LCR)[4,5]. Cloned *Pfu* DNA polymerase* exhibits 12-fold higher fidelity than *Taq* polymerase[6,7]. The exonuclease-deficient mutant of *Pfu* DNA polymerase can be used to directly sequence PCR** products with ^{35}S-dATP[8].

This is just the beginning of Stratagene's commitment to explore thermophilic enzymes and their applications. Just the beginning of the already unmatched line of Stratagene enzymes that can take the heat.

Products

Cloned *Pfu* DNA ligase Extremely thermostable. Exhibits higher specificity with substantially less blunt-ended activity than *Tth* DNA ligase, making it ideal for use in LCR. Cat# 600191

Cloned *Tth* DNA ligase Until now, the only commercially available thermostable DNA ligase. The original LCR technique employs this enzyme. Cat# 600193

LCR Kit Includes *Pfu* DNA ligase, reaction buffer, positive and negative control oligonucleotides, control plasmid template and a detailed LCR protocol complete with experimental design and troubleshooting section. Cat# 200520

Cloned *Pfu* DNA Polymerase Extremely thermostable. Exhibits 3' to 5' exonuclease-dependent proofreading activity and the highest fidelity of any thermostable DNA polymerase. Cat#'s 600153, 600154, 600159

Native *Pfu* DNA polymerase The original high-fidelity *Pfu* polymerase isolated from the hyperthermophilic archaebacterium, *Pyrococcus furiosus*. Cat#'s 600135, 600136

Exo-minus *Pfu* DNA polymerase The genetically engineered mutant of *Pfu* polymerase possesses no detectable exonuclease activity. Ideal for cycle sequencing PCR products with ^{35}S nucleotide analogs and for other high-temperature primer extension reactions that do not require high-fidelity DNA synthesis. Cat# 600163

Cyclist™ Exo-minus *Pfu* DNA sequencing kit Contains all the reagents required for cycle sequencing with Exo-minus *Pfu*. Designed for direct sequencing of PCR products or purified plasmid templates, labeled with ^{35}S-dATP. Cat# 200326

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7. Mathur, E., *et al.* (1991) *Nucleic Acids Res.* 19:6952.
8. Hedden, V., *et al. Stratagies* (1992) 5:79-80

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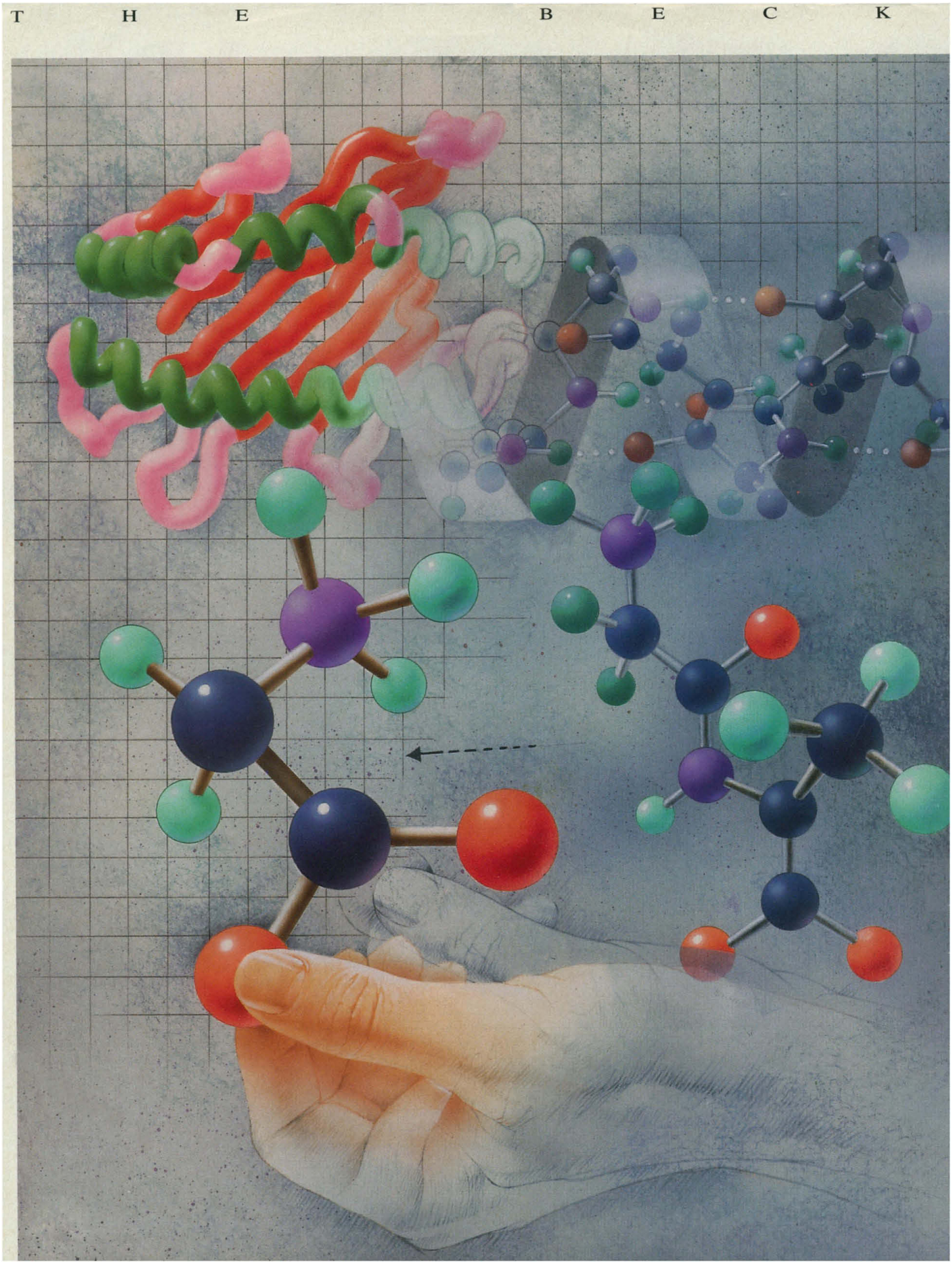
T H E B E C K

PROTEINS

How innovative technologies solve today's problems.

Today's protein research environment is more exciting and demanding than ever before. With each breakthrough, researchers discover new challenges as they strive to do more in less time with smaller amounts of material. In many cases, they are solving these problems with the application of alternate technologies.

PROTEIN QUARTERNARY STRUCTURE: WHERE DO TRADITIONAL TECHNIQUES FALL SHORT?

Quantification of stoichiometry and binding affinities is critical, both in quality control of recombinant proteins and in anti-viral drug development. Yet direct measurement of these thermodynamic properties has been hampered by empirical methods that rely on molecular weight standards and unjustified assumptions or methods that interfere with equilibrium between associated and non-associated protein moieties. To avoid such problems, Beckman Instruments now offers a modern analytical ultracentrifuge described by Dr. Preston Hensley of SmithKline Beecham:

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Beckman has integrated HPLC and CE with its Gold software, producing the only LCCE system available today. With the Porton LF 3000 Protein Sequencer, Beckman provides a complete protein workstation for the determination of primary structures.

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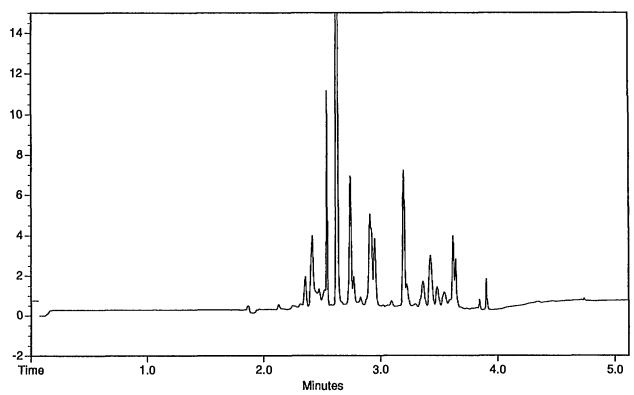

Tryptic digest of ß-lactoglobulin analyzed with CE. (700 attomoles injected.)

For more information about applications of the techniques discussed in this article, the Beckman Plus, or for information and dates on Beckman's worldwide Protein Discovery Tour, write to Beckman Instruments, Inc., Bioanalytical Systems Group, 2500 Harbor Boulevard, Fullerton, California 92634-3100. Or call, toll-free in the U.S.A. 1-800-742-2345.

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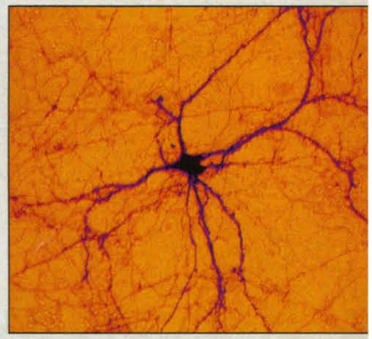
COVER

Works from the Dibner Library, Smithsonian Institution. Works of current vintage reviewed in this Book Issue include considerations of the origins of life on Earth, fossil horses and living insects, and inventions from photography to forks; views of Mars, Andromeda, and solid-state physics; and studies of the human life course with implications for gender and generation gaps. For a complete list, see page 1151. [Photo: Ed Castle, in Michael Olmert, *The Smithsonian Book of Books* (Smithsonian Institution Press, 1992)]

SPECIAL BOOK SECTION

A neurotrophic factor for midbrain dopaminergic neurons

1072 & 1130



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edited by PHIL SZUROMI

Different fates for volcanic gases

Volcanic eruptions eject much chlorine and sulfur gases into the atmosphere. Much of the sulfur dioxide emitted apparently reaches the stratosphere where it is oxidized to the sulfate aerosols that may impact on the formation and destruction of ozone. However, the chlorine gases, which could potentially lead to ozone destruction, seem to be scavenged during the eruption. Tabazadeh and Turco (p. 1082), using a physical and chemical model of volcanic plumes, investigate the fate of this chlorine. The results imply that much of the hydrogen chloride that is formed is removed by condensed supercooled water as the plume ascends.

■

Learning how to relax slowly

After an applied magnetic field is removed, the magnetization of many materials will first decay rapidly, then more slowly to a steady value. The mechanism of this slow relaxation has not been well understood and has generally been attributed to magnetic domain switching or motion of domain walls. Chamberlin and Scheinfein (p. 1098) show that low-energy, internal degrees of freedom must be considered. They studied the remnant magnetization of single-crystal iron whiskers for time periods spanning nine orders of magnitude. A model in which the magnetic response is caused by relaxation of quantized magnetic excitations (magnons) appears to accurately describe the results. The magnon behavior is virtually identical to that of excitations in glass-forming liquids. The iron system can be described as a ferromagnetic liquid.

Solar shock wave sighted

Optical spectra of nearby stars include absorption lines produced by gas contained in clouds, a few parsecs across, that populate interstellar space. By careful measurement of the Doppler shifts of lines in several stellar spectra, Lallement *et al.* (p. 1095) are able to show that the solar system is moving at 26 kilometers per second through the cloud in which it is embedded. They also show that hydrogen of interstellar origin is drifting through the solar system at only 20 kilometers per second, having been braked at the shocked interface between the interstellar medium and the solar wind. These results indicate that the interface is somewhat more than twice as far from the sun as Pluto—which means that Voyager I could reach it in the first decade of the next century.

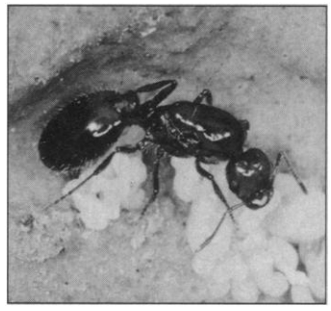
Southern Hemisphere temperature record

Few long-term continental climatic records from the Southern Hemisphere are available for comparison with the many climate chronologies available from North America and Europe. Lara and Villalba (p. 1104) help fill in this gap by presenting a tree-ring record of temperatures in southern Chile obtained from alerce trees. The record, which spans 3620 years, does not indicate a dramatic warming trend during the last several decades. The record also shows that the alerce tree may be the second longest living tree after the bristlecone pine.

■

Reproductive success

For social insects, the factors that determine whether an adult will be sterile or reproductive are poorly understood. Keller and Ross (p. 1107) find that the genotype of successful fire ant queens depends on the social structure within the ant colony. Queens homozygous for the *Pgm-3* locus are killed by workers in colonies with multiple queens, but are successful reproductives in single queen colonies. Ironically, queens homozygous for *Pgm-3* are more fertile than the heterozygotes at



this locus that serve as the queens for the multiple queen colonies.

■

Taking its time

Interleukin-1β is made up entirely of β-sheet structures. Kinetics studies by Varley *et al.* (p. 1110) show that formation of the stable native structure is a slow process compared to that seen for mixed α helix–β sheet proteins. Circular dichroism and fluorescence measurements indicate that 90 percent of the β structure is formed within 25 milliseconds. However, rearrangement into the native fold occurs over a much longer time period. Nuclear magnetic resonance measurements indicate that the tertiary fold only begins to form after 1 second and then proceeds through at least two intermediate states. The final fold stabilizes on a time scale greater than 25 seconds, as opposed to time scales of less than 10 to 20 milliseconds that have been measured for mixed α helix–β sheet proteins.

■

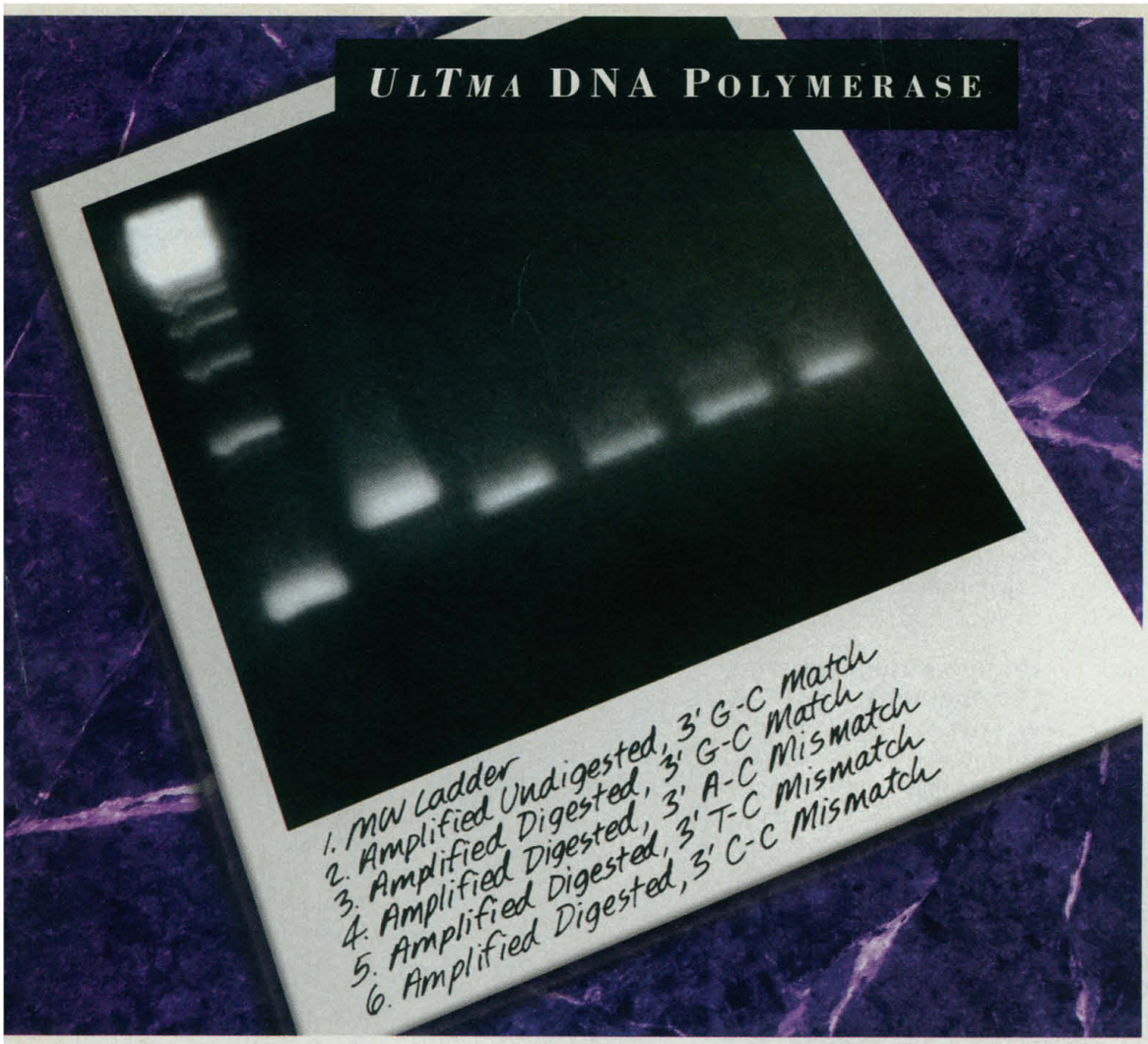
Maintaining neuron life

Specific factors that promote survival of dopaminergic neurons in the midbrain are of clinical interest because these neurons degenerate in Parkinson's disease. Lin *et al.* (p. 1130) purified and cloned such a survival factor. Glial cell line–derived neurotrophic factor (GDNF) is a glycosylated homodimeric protein that is related to the transforming growth factor–β superfamily. In culture, this factor specifically enhances survival and morphological differentiation of dopaminergic neurons and increases their dopamine uptake. It does not increase the number of neurons or astrocytes and does not affect the uptake of neurotransmitters by other types of neurons.

■

Oscillatory firing of calcium channels

In one pattern of neuronal activity, the cells fire bursts that are separated by intervals of silence. This pattern can occur normally, during slow wave sleep for instance, or it can be manifest in neuronal dysfunction, such as convulsions. Soong *et al.* (p. 1133) have cloned and expressed a subunit of one member of the family of low voltage-activated calcium channels that are thought to underlie this pattern of neuronal firing. This family differs from other known classes of calcium channels in kinetic and pharmacological properties; however, this subunit does share sequence similarity with the corresponding subunits of other calcium channels.



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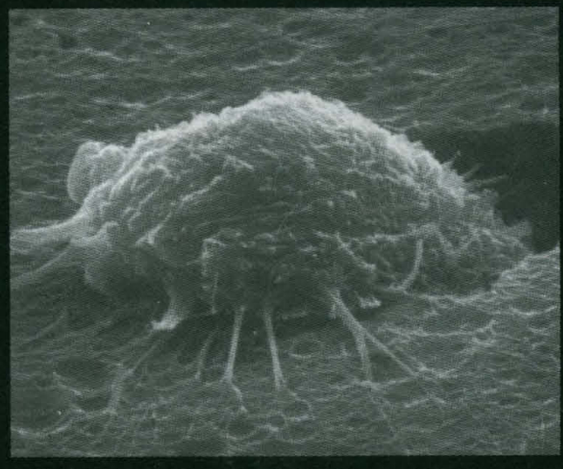

(Left) Scanning electron micrograph of two human fibrosarcoma cells (HT-1080 cells), having digested the MATRIGEL Matrix occluding the membrane pore, migrating through an 8 micron pore in the chamber membrane.
(Inset) Micrograph of cell with numerous processes on the underside of the filter following its invasion of the matrix.

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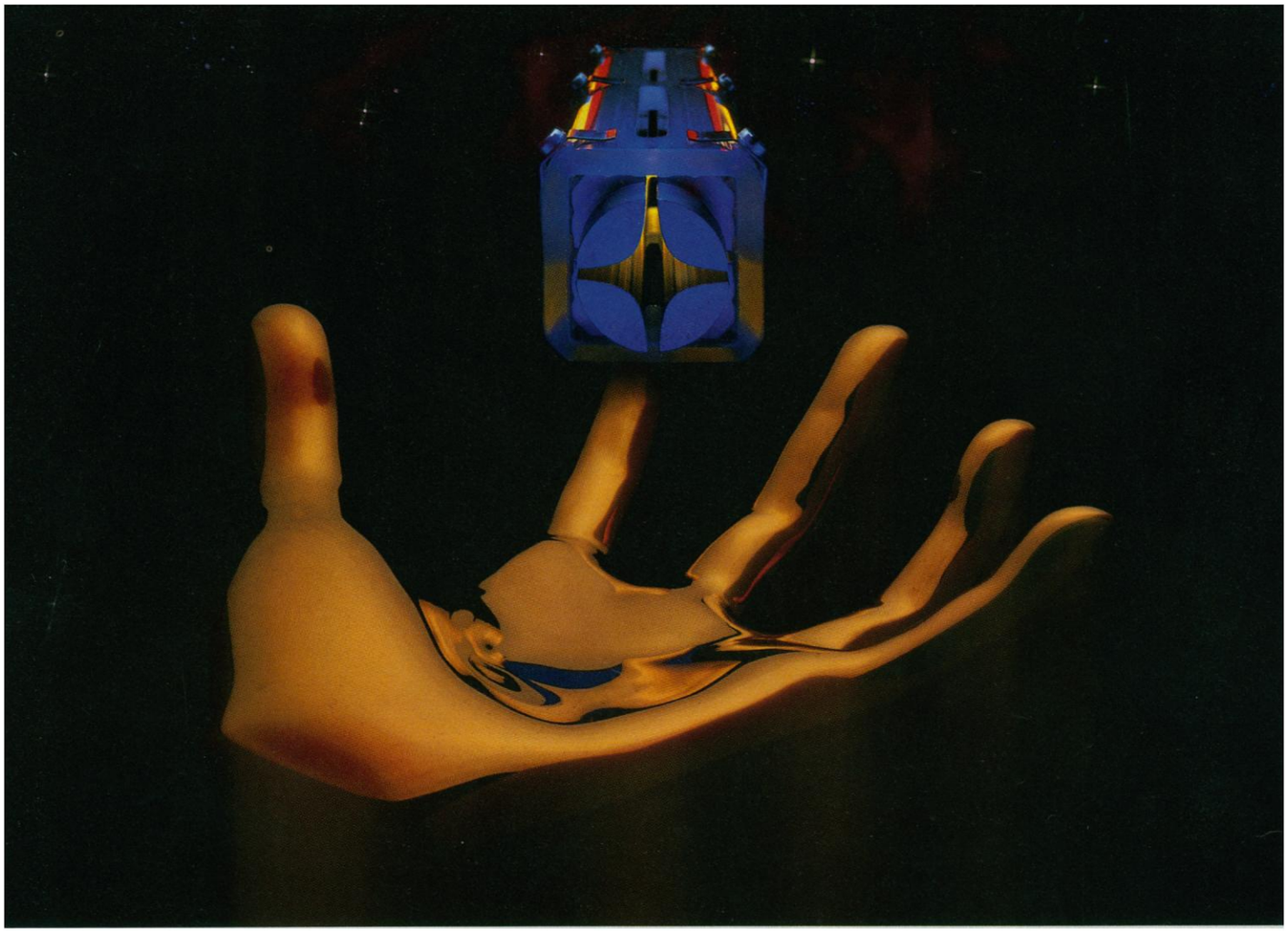

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As we all know, novel technology developments have played a pivotal role to propel research and generate new knowledge. A most vivid example is the recent discovery of PCR, which has revolutionized the concept and practice of molecular biology and genetics.

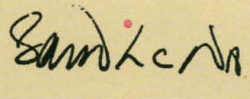
Thus, this meeting uniquely focuses on the process of research rather than on its findings. It showcases new technologies and instruments that scientists can use to conduct their own research more effectively. It also enables investigators to learn not only about new technologies but also about new applications of existing technologies.

The meeting program is constantly being expanded and refined to ensure that the presentation will represent the very cutting edge of biomedical research. It has been carefully structured to provide both a broad understanding of available new technologies and the detailed information you need to adapt specific techniques and applications to solve problems in your own area of research.

The organization of the conference is such that overviews of new technologies will be presented as plenary lectures in the mornings and evenings. The afternoons feature a selection of concurrent discussion sessions. Furthermore, you can exchange ideas with your colleagues at the poster sessions and experience the new technologies up close in the exhibition, as well as in the exhibitor workshops.

Finally, you will also have the opportunity to preview Emerging Technologies at a unique, last-day session highlighting the next frontiers of science.

Register now by completing and returning the Registration Form on page ten. I look forward to seeing you in Boston.



Savio L.C. Woo, Ph.D.
Science Innovation '93 Program Chair

Here's What Scientists Said About Science Innovation '92

"...this was an exciting meeting, one of the best I've attended in recent years."

— an MD doing chemistry research at a university

"Well organized, excellent speakers, good floor layout."

— a Ph.D. Biochemist working in industry

"The workshops were great... I learned quite a bit."

— a Ph.D. Cell Biologist working in industry

You Should Attend If You Are...

- seeking to implement new techniques or buy new instruments
- trying to achieve better results from your technique
- faced with a research problem that your current lab techniques just won't solve
- looking for ideas from bench scientists to improve your instruments and technologies
- ready to unveil a new technique or technology to the scientific community
- responsible for supporting, directing, or communicating your lab's cutting edge research
- exploring ways to transfer basic research technology to new industrial products and medical applications
- curious about a technology in another field

Program Committee

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Savio L. C. Woo
Professor of Cell Biology and Molecular Genetics
Baylor College of Medicine
Science Innovation '93
Program Chair

Science Innovation '93 Advance Program

Hynes Convention Center
Boston
6-10 August 1993

* *Confirmed speaker*

Friday, 8/6

Noon–8:00pm
Registration

Noon–6:00pm
Employment Exchange

5:00–7:00pm
Exhibition Opening and Reception

7:00pm
Introduction
Savio L.C. Woo *
Science Innovation '93 Program Chair
Baylor Coll of Med

7:15pm
Thomas Alva Edison Lecture

DNA AMPLIFICATION
Kary Mullis *
Atomic Tags

8:15pm
Keynote Address

SCIENCE AND TECHNOLOGY
IN AMERICA
A View from the New Administration

Saturday, 8/7

7:00am–9:00pm
Registration

7:30am–6:00pm
Employment Exchange

8:30am–12:45pm/5:00–6:00pm
Career Development Seminars

8:00am–12:30pm
Plenary Sessions
11:00-11:20am
Coffee Break

HUMAN GENOME
Francis S. Collins *
Natl Ctr for Human Genome Rsch

GENE MAPPING
Eric Lander *
Whitehead Inst

GENE THERAPY AND TRANSFER
Kenneth Culver *
NIH

EMERGING TECHNOLOGIES
Alan Garfinkel *
Univ of California-Los Angeles
Chaos Control in Cardiac and
Other Physiological Systems

Flossie Wong-Staal *
Univ of California-San Diego
Ribozyme Gene Therapy Against HIV

10:00am–3:00pm
Exhibits

12:30–2:30pm
Lunch

1:00–2:15pm
Exhibitor Workshops

Automated Infrared DNA Sequencing
Li-Cor

Centrifugal Protein Concentration with Centricell
Polysciences, Inc

Preparative Electrophoresis Techniques
Hoefer Scientific Instruments

Data Acquisition, Analysis and Presentation in Microsoft Windows
MicroCal Software, Inc

2:30–5:00pm
Concurrent Discussions

DNA AMPLIFICATION
Julian Gordon *
Abbott Labs

Francois Ferre
Immune Response

OLIGONUCLEOTIDE SYNTHESIS AND ANTISENSE PHARMACEUTICALS
Paul Zamecnik *
Worcester Foundation Exptl Biology

Mark Matteucci *
Gilead Science

SENSORS
Raoul Kopelman *
Univ of Michigan

David Walt *
Tufts Univ

TUMOR IMMUNOGENICITY AND MARKERS
Jim Allison
Univ of California-Berkeley

NEW MICROSCOPY
Watt Webb
Cornell Univ

COMPLEX CARBOHYDRATE STRUCTURE ANALYSIS
John Klock *
Glyko, Inc.

5:00–7:00pm
Poster Session/Exhibits

8:00–10:30pm
Evening Concurrent Plenaries

PATENT LAW
Lynn H. Pasahow *
McCutchen, Doyle, Brown & Enersen
An Overview of the Patent System,
and Why You Might Care

SOLID PHASE SYNTHESIS
Marvin Caruthers *
Univ of Colorado
Synthesis of Polynucleotides
and Polynucleotide Analogs

Stephen B.H. Kent *
Scripps Rsch Inst
Total Chemical Synthesis of Enzymes

VECTOR DEVELOPMENT FOR GENE THERAPY
Joseph Glorioso *
Univ of Pittsburgh-Sch of Med
Herpes Simplex Virus and Gene Transfer
to Nervous System

Ron Crystal
NIH

Richard Jude Samulski *
Univ of Pittsburgh
Adeno-Associated Virus

Sunday, 8/8

7:00am–9:00pm
Registration

7:30am–6:00pm
Employment Exchange

8:30am–12:45pm/5:00–6:00pm
Career Development Seminars

8:00am–12:30pm
Plenary Sessions

10:00-10:30am
Coffee Break

NOVEL CHEMISTRY
George Whitesides *
Harvard Univ

DRUG DELIVERY AND TISSUE ENGINEERING
Robert Langer *
MIT

USING OPTICAL TWEEZERS TO LOOK AT BIOLOGICAL MOTORS
Steven Block *
Rowland Inst

10:00am–3:00pm
Exhibits

12:30–2:30pm
Lunch

1:00–2:15pm
Exhibitor Workshops

Rapid, Efficient Sample Preparation
Amicon, Inc

Immunochemical Staining Techniques
Dako Corp

Rapid DNA Sequencing with the GeneSprinter System
Fotodyne

2:30–5:00pm
Concurrent Discussions

NON-INVASIVE DIAGNOSTICS
Christopher Green *
General Motors

DRUG TARGETING AND LIPOSOMES
Phillip L. Felgner *
Vical Inc

CLINICAL IMMUNOLOGY/ IMMUNOSUPPRESSION/VACCINES
Gene M. Shearer *
NCI/NIH

Margaret A. Liu *
Merck Rsch Labs

W. Mark Saltzman *
Johns Hopkins Univ

BLOOD SUBSTITUTES
David Anderson *
Somatogen

Thomas H. Schmitz *
Baxter Healthcare Corp

CHEMICAL COMMUNICATION
May R. Berenbaum *
Univ of Illinois-Urbana

FLUORESCENT IN SITU HYBRIDIZATION AND NONISOTOPIC DETECTION
Irena Bronstein *
Tropix

NMR DETERMINATION OF PROTEIN STRUCTURE
Stephen Mayo *
California Inst of Technology

ANTIBODY CATALYSIS
Steve Benkovic
Pennsylvania State Univ

Donald Landry *
Columbia Univ

5:00–7:00pm
Poster Session/Exhibits

8:00–10:30pm
Evening Plenary

ENGINEERING PROTEINS
David A. Tirrell *
Univ of Massachusetts
Departing from Nature: Genetic Engineering of Solid State Properties of Artificial Proteins

Charles S. Craik *
Univ of California-San Francisco
Redesigning Proteases

Cori Gorman *
Genentech
Engineering Proinsulin Processing to Insulin

David Jackson *
Genentech
Improving Protein Function

Monday, 8/9

7:00am–9:00pm
Registration

7:30am–6:00pm
Employment Exchange

8:30am–12:45pm/5:00–6:00pm
Career Development Seminars

8:00am–12:30pm
Plenary Sessions

10:00-10:30am
Coffee Break

MOLECULAR AND GENETIC DISSECTION OF PLANT DEVELOPMENT: THE POWER OF INSERTIONAL MUTAGENS
Robert B. Goldberg *
Univ of California-Los Angeles

GENETIC ENGINEERING OF FILAMENTOUS FUNGI TO PRODUCE PHARMACEUTICAL PRODUCTS
William Timberlake
Myco Pharmaceuticals, Inc

NEUROIMAGING
Jack Belliveau *
Harvard Univ

ONCOGENES AND CANCER
David Housman *
MIT

10:00am–3:00pm
Exhibits

12:30–2:30pm
Lunch

1:00–2:15pm
Exhibitor Workshops

Principles of Fluorescence Polarization and the FPM-1 System
Jolley Consulting & Research, Inc

NASA Access Mechanism-Graphical Interface Information Retrieval System
NASA Scientific and Technical Information Program

Introduction to *Mathematica*
Wolfram Research, Inc

2:30–5:00pm
Concurrent Discussions

SCREENING
Michael Wigler
Cold Spring Harbor Lab

Joe Gray *
Univ of California-San Francisco

PEPTIDES AND COMBINATORIAL LIBRARIES
Ron Hoess *
Du Pont-Merck Pharmaceutical

George Smith
Univ of Missouri

IMAGING
Paul Bottomley *
General Electric

Thomas J. Brady *
Massachusetts Genl Hosp

DNA DIAGNOSTICS
C. Thomas Caskey *
Baylor Coll of Med

Janet D. Rowley *
Univ of Chicago

DRUG DESIGN
Ray Salemme *
3-D Pharmaceuticals

Joan S. Brugge *
ARIAD Pharmaceuticals

GROWTH FACTORS, CYTOKINES AND THEIR RECEPTORS: STRUCTURE AND FUNCTION
Joost J. Oppenheim *
NCI/Frederick Cancer Rsch Facility

Michael Klagsbrun *
Children's Hosp-Boston

GENE SEQUENCING TOOLS: MASS SPECTROMETRY AND OTHER METHODS
Lloyd Smith *
Univ of Wisconsin

Graham Cooks *
Purdue Univ

AIDS RESEARCH AND ANIMAL MODELS
Ronald C. Desrosiers *
Harvard Med Sch

PLANT DEVELOPMENT
Robert Fraley
Monsanto

THINKING MACHINES AND NEURAL NETWORKS
W. Daniel Hillis
Thinking Machines Inc

Dan Levine *
Univ of Texas-Arlington

5:00–7:00pm
Poster Session/Exhibits

8:00–10:30pm
Evening Concurrent Plenaries

GENOMIC LIBRARIES
David Page *
Whitehead Inst
YAC

Nat Sternberg *
Du Pont-Merck Pharmaceutical
Use of Bacteriophage P1 Cloning System for Construction of Mouse and Human Genomic Libraries and for Functional Characterization of Individual Cloned Fragments

Jean-Michel H. Vos *
Univ of North Carolina-Chapel Hill
Building HAECs: Human Artificial Episomal Chromosomes

Melvin Simon and Hiroaki Shizuya *
California Inst of Technology
Mapping Chromosomes with BACs and Fosmids

F. William Studier *
Brookhaven Natl Lab
DNA Sequencing by Primer Walking with Strings of Three Hexamers

RNA AND IN VITRO GENETIC SELECTION
Jack Szostak
Massachusetts General Hosp

Julius Rebek *
MIT
Recognition, Replication and Assembly in Organic Chemistry

GENE TRANSFER
Alan Colman *
Pharmaceutical Proteins Ltd
Protein Production in Transgenic Animals

Peter Linsley *
Bristol-Myers Squibb
Blocking Immunity

George Stamatoyannopoulos *
Univ of Washington
YAC Transfer to Transgenic Mice and Erythroleukemia Cells

Oliver Smithies
Univ of North Carolina
Knockout Mice

Tuesday, 8/10

7:00am–3:00pm
Registration

9:00am–1:00pm
Employment Exchange

8:00am–12:30pm
Plenary Sessions
10:00-10:30am
Coffee Break

PREDICTING FUNCTION BASED ON SEQUENCE
Russell F. Doolittle *
Univ of California-San Diego

CATALYTIC ANTIBODIES
Donald Hilvert
Scripps Rsch Inst

12:30–2:00pm
Lunch

2:00–5:00pm
Emerging Technologies

THE FUTURE OF BIOREMEDIATION: BIODEGRADATION OF CHLORINATED ORGANICS
Daniel A. Abramowicz *
General Electric Rsch & Devel

HOPE FOR THE INFERTILE: FUTURE TRENDS IN ADVANCED REPRODUCTIVE TECHNOLOGY
John Buster *
Univ of Tennessee

PREIMPLANTATION GENETIC DIAGNOSIS: MOLECULAR ANALYSIS OF SINGLE HUMAN BLASTOMERES
Mark R. Hughes *
Baylor Coll of Med

3-D AND VIRTUAL REALITY IN MEDICINE
Julian Rosenman *
Univ of North Carolina Med Sch

NITRIC OXIDE AND BRAIN MESSENGERS
David S. Bredt *
Johns Hopkins Univ

COMPUTATIONAL ANALYSIS OF GENOME DATABASES
David States
Washington Univ

CALL FOR PAPERS

DEADLINE: 15 JUNE 1993

The poster sessions at Science Innovation '93 provide an informal way for you to present your latest technique to your peers. Appropriate topics include technical developments relating to any of the concurrent sessions listed below. If your abstract is accepted, you will be assigned to a poster session and provided with a 4' x 4' bulletin board on which to display graphics and text. Although posters will be displayed in the Exhibit Hall during the entire meeting, presenters will be assigned two hours at their posters in which to discuss their work one-on-one with interested colleagues. Accepted abstracts will be published in the program book*, which will be distributed to all registrants.

SPECIAL ORAL PRESENTATIONS

Authors of exceptional abstracts will be invited to make oral presentations in applicable concurrent discussions. Those selected for this honor will also be granted a full refund of their registration fees.

REQUIREMENTS FOR SUBMISSION

Abstracts will not be considered unless the presenter is a paid registrant of Science Innovation '93. (Use the Registration Form on page ten; registration fee will be refunded in full if abstract is rejected and presenter cancels registration by 23 July 1993.) Only one abstract per presenter may be submitted.

FORMAT OF ABSTRACTS

Abstracts not following the format shown to the right will be returned. The text of the abstract must fit within a 5" square in the center of an 8.5" x 11" sheet of white paper. Since the text will be electronically scanned, use a letter-quality (not dot matrix) printer. Use black ink for all hand lettering. Do not double space text, nor draw a box around the abstract. At least two lines above the 5" square, designate the name of the concurrent session to which the abstract relates and indicate whether you wish your abstract to be considered for oral presentation. At least two lines below the square, list the presenter's name, address, phone, and fax numbers.

MAILING INSTRUCTIONS

Mail the abstract flat (do not fold or bend). Faxes are unacceptable. Send original plus four photocopies to:

Science Innovation '93 Contributed Papers
AAAS Meetings
1333 H Street, NW
Washington, DC 20005
(202) 326-6450

*PUBLICATION DEADLINE

Abstracts received after 15 June 1993 will not be published in the program book but may be accepted for display. Applicants will be notified by early July regarding the status of their abstracts.

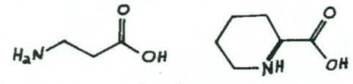
Name of concurrent session to which abstract relates
Type "Please consider for oral presentation" if applicable.
(Skip at least 3 lines before beginning abstract.)

5"

5"

Indent 7 Spaces and Type Title in Upper and Lower Case Letters and Underline. PRESENTER'S NAME IN UPPER CASE (Institution Name in Upper and Lower Case Within Parentheses), Additional Author in Upper and Lower Case (Institution), etc.

Skip one line and type abstract. The full width of the column of typed material should be 5 inches (12.7 cm) and must not extend beyond that. The total length of the material, from top of title to bottom of footnotes, must not exceed 5 inches (12.7 cm). Abstracts that exceed these parameters will be returned. Any special symbols or signs that must be hand lettered should be rendered in black ink as clearly and carefully as possible. The entire submission should be of camera-ready quality so that it can be photographed and printed. The printed abstract will be about 2/3 the size of the typed version. Avoid paragraphing, as this wastes space. However, you may use your allotted space to neatly letter equations and diagrams as you deem necessary, as in this example:



You may also use your allotted space for footnotes.*

*Skip one line and type footnotes, if any.

(skip at least 2 lines after abstract)
Name of Presenter
Presenter's Street Address
Presenter's City/State/Zip
Presenter's Country
Presenter's Phone Number
Presenter's FAX Number

EXHIBITS AND WORKSHOPS

The Science Innovation exhibition offers you the unique opportunity to personally examine the techniques and new technologies presented by top scientists in the morning plenary sessions. In addition, you will have the opportunity to experience hands-on demonstrations of these technologies in afternoon exhibitor workshops. You'll see first-hand how leaders in your field are using new technologies to advance their research. Attend the exhibits and workshops and arrange for implementation of new techniques and technologies in your own lab. Plan ahead—mark your calendar now with the companies and booth numbers you want to visit and the workshops you want to attend.

SCIENCE INNOVATION '93 EXHIBITORS *(at press time)*

Booth	
619	Academic Press, Inc.
914	Advanced Magnetics, Inc.
815	Alza
511	American Association for the Advancement of Science
514	Amersham Corp *
208	Amicon, Inc *
200	AutoDesk
417	BBN
608	Beckman Instruments
322	Bio-Rad Life Laboratories
632	Bio-Tek Instruments
420	Biological Detection Systems, Inc.
209	BioTechniques/BioTechNet
215	Biotechnologies Industries Organization
409	Brinkmann Instruments
318	Carl Zeiss, Inc.
316	Cell Press
416	Cell Robotics, Inc.
414	Coherent
618	Corning, Inc.
317	CPG
614	Cruachem
101	Dako Corp. *
609	David Kopf Instruments
313	Digene Diagnostics, Inc.
217	Dynatech Laboratories
204	Endogen
308	Finnigan MAT
315	Fisons Instruments
212	FMC BioProducts
819	Forma Scientific, Inc.
512	Fotodyne *
617	General Valve
418	Genset
413	Hamilton
522	Hitachi Software Engineering America
918	Hoefer Scientific Instruments *
400	IntelliGenetics/Betagen
518	International Biotechnology Suppliers Association (IBSA)
623	International Equipment Company
519	J.T. Baker, Inc.
622	Jolley Consulting & Research, Inc.*
412	Li-Cor *
1003	MicroCal Software, Inc. *
1018	MicroPatent
616	Millipore
624	MJ Research
508	Molecular Dynamics
805	NASA Scientific and Technical Information Program *
312	National Biosciences
612	National Instruments
523	New England Biolabs
627	Novex
408	Olympus
915	Owl Scientific, Inc.
423	Packard Instruments
222	Perkin-Elmer
611	PerSeptive Biosystems
801	Pharmacia Biotech, Inc.
1020	Polysciences, Inc. *
531	Princeton Separations
516	Protein & DNA ImageWare Systems
105	Research Information Systems
419	S.A.I.C.
509	Science Magazine
109	Seikagaku America
903	Stovall Life Science
123	Tecan/SLT Labinstruments
421	Time Logic, Inc.
529	Tropix
422	US Dept of Energy, OTD
626	Wallac
415	Wolfram Research, Inc. *
620	Yamato Scientific America and Baxter Scientific Products

* Exhibitors conducting workshops

EXHIBITS AND WORKSHOPS

EXHIBIT HOURS

Friday 8/6
Opening Reception 5:00–7:00pm
Saturday 8/7
10:00am–3:00pm
Break
5:00–7:00pm
Sunday 8/8
10:00am–3:00pm
Break
5:00–7:00pm
Monday 8/9
10:00am–3:00pm
Break
5:00–7:00pm
Tuesday 8/10
Exhibit Close

WORKSHOP HOURS

Friday 8/6
No workshops
Opening Reception in Exhibit Hall
Saturday 8/7
1:00–2:15pm
Sunday 8/8
1:00–2:15pm
Monday 8/9
1:00–2:15pm
Tuesday 8/10
No workshops
For workshop topic and description see Program Schedule on page 4-7.

INVITATION TO EXHIBIT

By exhibiting at Science Innovation '93, your organization can reach bench scientists from all the disciplines that contribute to the field of biomedical research.

The exhibition is the place where attendees can examine technologies cited by the plenary lecturers and workshop leaders and arrange for the implementation of those technologies in their labs. Through industry workshops and exhibits, you can forge relationships with scientists who are potential users of your products and services.

For details about exhibiting, call or FAX Ed Leonardo at:
Phone 202-326-6462
FAX 202-289-4021

GENERAL MEETING INFORMATION

LOCATION

Sessions and exhibits will be in the Hynes Convention Center, 900 Boylston Street, Boston, MA.

ON-SITE REGISTRATION HOURS

Friday 6 August, noon-8:00pm

Saturday-Monday 7-9 August, 7:00am-9:00pm

Tuesday 10 August, 7:00am-3:00pm

FOR MORE INFORMATION, CONTACT

AAAS Meetings
1333 H Street, NW
Washington, DC 20005
Tel: 202-326-6450
Fax: 202-289-4021

NETWORKING LUNCHES

Lunch will be available in the Exhibit Hall for Science Innovation '93 attendees seeking an extra opportunity to network with colleagues and address special research problems or questions. A sign on each table will indicate a suggested discussion topic. Topics and table numbers will be listed in the program, so you will have a chance to pick out preferred topics in advance. A very limited number of lunch tickets will be available on-site, so be sure to purchase lunch tickets when you preregister for the meeting.

BOSTON AREA TOURS

AAAS is exploring the possibility of conducting field trips to areas of scientific interest (Woods Hole institutions, MIT robot labs, among others) as well as guest tours (Boston, Salem, art tours are possibilities). Most trips would range from $20-30. Fax your interests to Jackie Wester by 1 June 1993.
Fax: 202-289-4021.

DISCOUNT AIR FARES

Get discount airfare to Science Innovation '93 and your next flight may be free!

Make your reservations through Gil Travel to save money on discounted air fares for travel to and from Boston on selected major airlines from 30 July–13 August 1993.

- Save 10% on most unrestricted coach fares. No minimum stay required. 7-day advance reservation and ticketing required. No one-way discounts.
- Save 5% off the lowest applicable round trip fare, subject to availability.

Plus, you may win a free ticket: All Science Innovation '93 registrants who make their reservations through Gil Travel will be entered into a drawing for a round trip ticket to any location in the continental United States.

This promotional offer is available only through the Gil Travel convention reservation desk. Certain standard restrictions apply.

For details and reservations, call or fax Gil Travel at the number below. Be sure to tell them that you are attending Science Innovation '93.

Toll-free number: 1-800-223-3855

Outside the U.S.: 1-215-568-6655

Fax number: 1-215-568-0696

TRANSPORTATION

Boston's "T" (subway) system provides convenient transportation around the city. Basic fare is $0.85. You can get a Boston Passport, which allows for unlimited "T" rides plus discounts to major tourist attractions for $5 for 1 day, $9 for 3 days, and $18 for 7 days. The passport is available at the Hynes Convention Center station. For information on public transportation from Logan airport to the Back Bay area, call MASSPORT, 24 hours a day, at 1-800-23-LOGAN.

Taxis are available around the clock; fares run about $15-20. Reserved car service is available from Logan airport to AAAS hotels for $24, refer to account 18980, by calling BostonCoach at 1-800-672-7676. Van service is available from City Transportation for $7.50 one way, $13 round trip. Meet outside baggage claim at the Courtesy bus Lane.

HOUSING

Reduced rate guest rooms are available at a number of Boston hotels if you make your reservations using the AAAS Hotel Reservation Form on page 11. Reservations must be made through the AAAS Housing Bureau and must be received by 9 July 1993.

AAAS has negotiated discounted room rates at the hotels listed. We strongly encourage you to stay at one of these official hotels. You will get a chance to meet and network informally with fellow Science Innovation participants. In addition, for each participant's stay in one of these hotels, AAAS gets credit for our part in filling the hotel. This helps to defray speaker costs, which in turn helps to keep registration fees lower. Thank you for your support.

Sheraton Boston Hotel & Towers*, with direct access to the Hynes Convention Center, is the largest hotel in New England. The Sheraton has a fitness center (complete with pool), business center and all the other full services to make your stay a comfortable one.

The Back Bay Hilton, across the street from the Hynes, prides itself on quiet and privacy (only 16 guestrooms per floor). A sundeck adjoins the pool and fitness room.

The Colonnade Hotel, not your ordinary convention hotel, is a small, newly renovated hotel that prides itself on personal attention to each guest's needs—down to the rubber duck in every tub.

The Boston Marriott Copley Place has a glass-enclosed walkway to the Hynes, and has direct access to the Copley Place shopping complex. A full-service hotel very convenient to all modes of transportation.

Located adjacent to the Boston Common and Public Gardens, the **Boston Park Plaza** maintains the luxury and splendor that has attracted heads of state, famous stars and anyone who cherishes the era of grand American hotels.

The Copley Plaza Hotel, a landmark since 1912, has undergone a $20 million restoration. Now restored to its original grandeur, with full concierge services, health club, and period antique reproductions.

Each room at the **57 Park Plaza Hotel,** located adjacent to the Public Garden and theater district, has a private balcony overlooking the heart of Boston. The hotel has an enclosed pool with sundeck and saunas, and offers its guests free parking.

Convenient to Cambridge, every room is a suite at the **Guest Quarters Suite Hotel.** This spacious alternative to traditional hotels has all the amenities you will want, and a first-class jazz cabaret too.

The best view of Boston's skyline is from the **Hyatt Regency Cambridge.** Across the river, this is a great choice for those with meetings at MIT, Harvard or Boston University. Special Camp Hyatt program for children is available with activities and babysitting.

*Headquarters Hotel

SCIENCE INNOVATION

Advance Registration Form

Science Innovation '93
Hynes Convention Center — Boston
6-10 August 1993

DEADLINE: 16 JULY

REGISTRANT INFORMATION (Please type or print legibly)

First Name (as you would like it to appear on your badge)

Family Name (as you would like it to appear on your badge)

Institution/Company (will appear on badge, subject to abbreviation)

Mailing Address

City

State

Zip Code

Country

Daytime Phone Number

Fax Number

AAAS membership number (if member) _____
(appears on AAAS membership card and above your name on Science subscription label)

SPECIAL HOUSING NEEDS

☐ Check here if you need special services due to a disability (we'll call you).

☐ Non-smoking room ☐ Other _____

CONCURRENT DISCUSSION

Please indicate the three sessions you're most interested in attending (check three):

- ☐ DNA Amplification
- ☐ Gene Sequencing Tools
- ☐ Fluorescent In Situ Hybridization and Nonisotopic Detection
- ☐ Screening
- ☐ Peptides and Combinatorial Libraries
- ☐ NMR Determination of Protein Structure
- ☐ Antibody Catalysis
- ☐ Non-invasive Diagnostics
- ☐ Imaging
- ☐ DNA Diagnostics
- ☐ Oligonucleotide Synthesis and Antisense Pharmaceuticals
- ☐ Drug Design
- ☐ Drug Targeting and Liposomes
- ☐ Clinical Immunology, Immunosuppression and Vaccines
- ☐ Growth Factors/ Cytokines/Receptors
- ☐ Tumor Immunogenicity and Markers
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- ☐ Thinking Machines and Neural Networks
- ☐ Carbohydrate Structure Anaylsis

MEETING FEES

Registration fees[1] (Check one box only)	*Advance by 16 July '93*	*On Site*
☐ Regular AAAS member	$295	$395
☐ Regular nonmember	$395	$495
☐ Student[2] AAAS member	$125	$200
☐ Student[2] nonmember	$175	$250

☐ If registering at the student rate, check here and attach a copy of your student ID card.

Luncheon Fees (Check all that apply)

☐ Lunch, Saturday 7 August	$21
☐ Lunch, Sunday 8 August	$21
☐ Lunch, Monday 9 August	$21
☐ Lunch, Tuesday 10 August	$21

Membership Dues[3] (Optional)

If you're not a AAAS member, you can join now by checking the appropriate box below—and take advantage of discounted *member* registration fees. You'll also get a year's subscription (51 weekly issues) to the journal SCIENCE[3].

	USA	**Canada**	**International**
☐ Regular	$87	$146.59 US	$182 US
☐ Student	$47	$103.79 US	$142 US
☐ Postdoctoral	$62	$119.84 US	$157 US
☐ Retired	$47	$103.79 US	$142 US

PAYMENT

Meeting registration fee[5] .....$ _____

Luncheon fee total .....$ _____

Membership dues (if joining now).....$ _____

Total amount.....$ _____

☐ Check enclosed[5] ☐ VISA ☐ MasterCard
(no other credit cards accepted)

☐ Original institutional purchase order attached

Credit card number

Expiration date Signature

MAILING INSTRUCTIONS (16 JULY DEADLINE[1])

Mail to: Science Innovation '93, P.O. Box 630285, Baltimore, MD 21263. Or fax (credit card payments only) to 202-289-4021.

AS3GS

IMPORTANT FOOTNOTES

[1] Deadline for advance registration is 16 July! Registrations received after this date will not be processed, however, you may register on site at the Hynes Convention Center beginning at noon on 6 August. One-day registration is available on site only at the following rates: Regular member-$195, regular non-member-$245, student member-$95, student nonmember-$125.

[2] To qualify for student rate, you must be a graduate or undergraduate student and must attach a copy of your student ID card. Registrations received without appropriate verification will be charged at the Regular rates.

[3] Membership: $47 of dues plus international postage fees are allocated to *Science*. Canadian dues include GST. Please allow 6-8 weeks for receipt of first issue of *Science*.

[4] Cancellations must be received in writing by 23 July 1993. No refunds will be made for cancellations received after this date. Refunds are subject to a $50 cancellation charge. No refunds will be processed until after the meeting.

[5] Checks must be in United States currency and must be payable on a U.S. bank. Please make checks payable to Science Innovation '93.

Hotel Reservation Form

SEND CONFIRMATION TO (please type or print legibly)

DEADLINE: 9 JULY

First/Given Name _____ Last/Family Name _____

Institution/Company (if part of address) _____

Address _____

City _____ State _____ Zip _____ Country _____

Phone _____ Fax _____

Names of All Room Occupant(s) (name) _____ (name) _____

(name) _____ (name) _____

Hotel Choice **Hotel Name**

1st _____

2nd _____

3rd _____

4th _____

Most important (check one):

☐ *proximity to the meeting site* ☐ *comparable room rate*

Type of room desired (check one):

☐ *Single (1 person, 1 bed)* ☐ *Double (2 people, 1 bed)* ☐ *Double/Double (2 people, 2 beds)*

☐ *Triple (3 people, 2 beds)* ☐ *Quadruple (4 people, 2 beds)* ☐ *1-bedroom suite* ☐ *2-bedroom suite*

ARRIVAL DATE _____ TIME _____ DEPARTURE DATE _____ TIME _____

Special housing needs:

☐ *Wheelchair-accessible room* ☐ *Nonsmoking room*

☐ *Other* _____

All reservations must be guaranteed with a deposit or credit card at least 14 days prior to arrival.

☐ *VISA* ☐ *MasterCard*

Credit Card # _____

Exp. Date _____ Card User Name (please print) _____

Signature _____

If you do not wish to use a credit card guarantee, a deposit check for the first and last night's stay will be required by the assigned hotel at least 14 days prior to arrival. **Deposit checks should not be sent to the housing bureau; if received they will be returned.** The check should be sent directly to the hotel where you have been assigned after you receive the hotel confirmation. If credit card information is not provided or if a deposit check is not received at least 14 days prior to arrival, the hotels reserve the right to release your reservation.

MAILING INSTRUCTIONS (9 JULY DEADLINE)

Send your completed form via mail or fax (not both) to:

Science Innovation '93, AAAS Housing Bureau, Prudential Tower, Suite 400, P.O. Box 490, Boston, MA 02199
FAX 617-536-0813

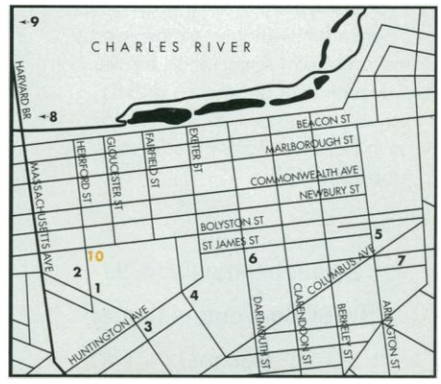
Reservation forms must be received by 9 July 1993. Housing requests received after 9 July 1993 are conditional on room availability. Do not mail this form to AAAS; see the mailing address above. It is recommended that you keep a photocopy of this form for your records.

Science Innovation '93
Hynes Convention Center — Boston
6-10 August 1993

HOTEL ROOM RATES

	Hotel Name	Single	Double	Extra Person
1	Sheraton Boston*	$121	$133	$20
2	Back Bay Hilton	113	113	20
3	Colonnade Hotel	103	103	—
4	Marriott Copley Place	145	165	20
5	Boston Park Plaza	125	135	20
6	Copley Plaza	125	145	20
7	57 Park Plaza	100	110	15
8	Guest Quarters Suites†	110	120	20
9	Hyatt Regency Cambridge†	110	120	25

*Headquarters Hotel
† not shown on map
see page 9 for Hotel Descriptions



The meeting will be located at the Hynes Convention Center #10 on map.

RESERVATIONS

The AAAS Housing Bureau will make hotel reservations on a first-come, first served basis upon receipt of a properly completed Science Innovation '93 housing form. Reservations will be processed in order of receipt, based on choice and availability. Acknowledgments will be sent directly to the occupant by the Housing Bureau and will be followed by a confirmation from the assigned hotel. Telephone reservations cannot be accepted. To complete this form:

[1] Use a separate reservation form for each room requested, not for each individual. Send only one form if sharing with a colleague; duplicate forms cause delays in processing and may result in double charges.

[2] List at least four hotels, in order of preference, where you'd like to stay. Check whether rate or proximity is most important to you.

[3] Check the type of room you would like.

[4] Complete the remainder of the form, being sure to include your arrival and departure dates, credit card number and expiration date (if using credit card for your deposit), and any special requests you might have (nonsmoking room, wheelchair accessibility, etc.).

[5] Please be thorough; failure to include all pertinent information may delay processing of your reservation.

[6] Children: there is usually no charge for children under a particular age; check with the hotel to which you are assigned.

CANCELLATIONS/CHANGES

To cancel or make changes to reservations, contact the Housing Bureau at 617-536-9028 until 9 July. After that, please contact the hotel directly. No refunds will be given for cancellations made less than 72 hours prior to the opening of the conference.

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INNOVATION

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Science Innovation is the annual conference on the latest techniques and instruments in biomedical research.

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Science Innovation is sponsored by the American Association for the Advancement of Science and its renowned journal, SCIENCE. Join us in Boston…don't miss Science Innovation '93.

Science Innovation '93
Hynes Convention Center
Boston
August 6–10, 1993

EMPLOYMENT EXCHANGE

The Employment Exchange is a career opportunities/career development service for job candidates and employers. Interview scheduling, position posting, a message center, job and resume referrals, career development seminars, and private interview booths are provided during the week of Science Innovation '93. If you have positions to be filled or are currently seeking employment, you should take advantage of this program.

EMPLOYER BENEFITS

- Access to hundreds of top-notch candidates' resumes cross-referenced by discipline.
- On-site interview facilities and scheduling services at no extra charge.
- Unlimited position available postings.
- Copy of the "Pre-Meeting Bulletin", including a brief profile of candidates who are expected to attend the meeting.
- Special rates for Science Innovation exhibitors, nonprofit organizations, and AAAS Corporate Members.

CANDIDATE BENEFITS

- FREE enrollment for AAAS member candidates. Nonmembers pay a modest $10 enrollment fee.
- Hundreds of current position openings in a variety of disciplines and experience levels.
- On-site interview facilities, including on-the-spot interviews.
- Access to full descriptions of all available positions.
- On-site career development seminars focusing on resumé writing, interview presentation skills, and career enhancement strategies.
- Employment Exchange Only fee for non-conference attendees.

FOR MORE INFORMATION

Candidates and employers who wish to participate in the Employment Exchange please contact:

Jacquelyn Roberts
AAAS Employment Exchange
1333 H Street, NW, Suite 1163
Washington DC 20005
Phone: 202-326-6737
Fax: 202-842-1065

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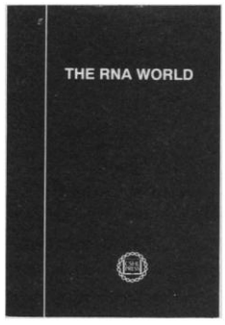
The RNA World

Monograph 24

Edited by Raymond F. Gesteland, *University of Utah;* John F. Atkins, *University of Utah.* With Foreword by Francis Crick and Prologue by James D. Watson



"The lively and authoritative chapters of this book deal comprehensively both with the hypothetical RNA world and with the complexities of RNA structure and function we find around us today. I recommend it to all molecular biologists and especially to anyone fascinated by the baroque complexity of the nucleic acids and of RNA in particular."

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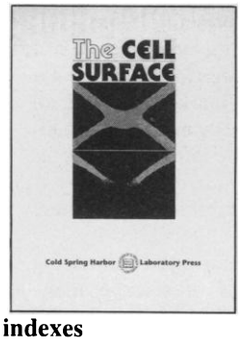

Over 70 leading investigators present data on receptor-ligand interactions, membrane organization, signal transduction, peptide transport, cell adhesion, and the regulation of developmental processes. Provides a wide-ranging, eclectic review of a topic central to the understanding of cell structure and function.

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Reverse Transcriptase

Monograph 23

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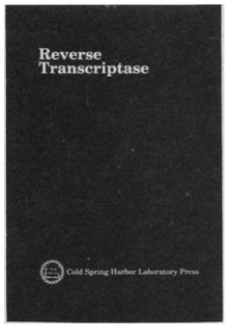

The first comprehensive review of the enzyme's biology. Includes rare discussions of RT's functions outside the context of retroviruses, the latest structural data on RT and a review of the antiviral activity of the enzyme's inhibitors.

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Regional Physical Mapping

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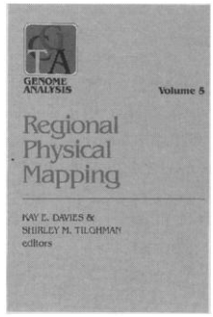

This volume presents detailed analyses of several well-characterized regions of the human genome, each with fascinating biology: the dense MHC locus; large genes on chromosome X; the telomeres of chromosome 16; the diverse T-cell receptor loci; and the tumor suppressor genes of chromosome 5.

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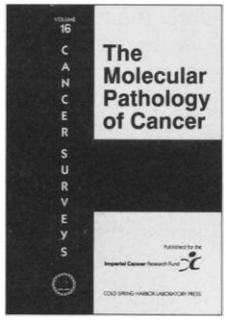

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Edited by N. Lemoine, *Imperial Cancer Research Fund;* N.A. Wright, *Imperial Cancer Research Fund*

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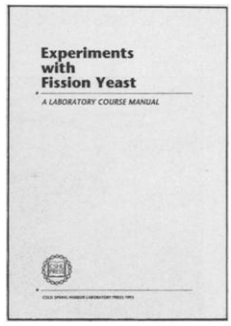

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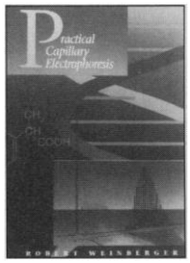

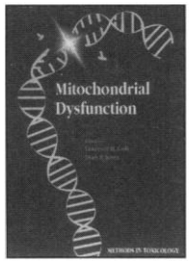

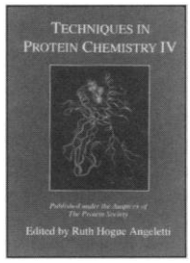

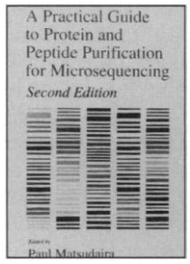

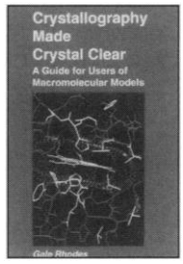

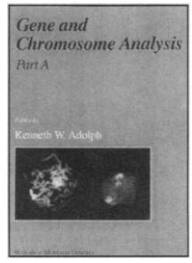

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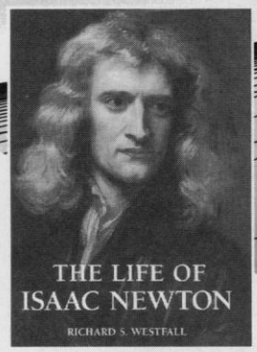

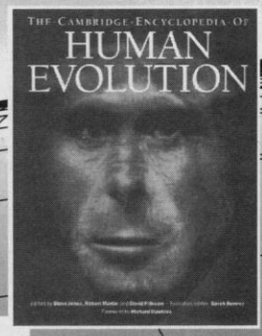

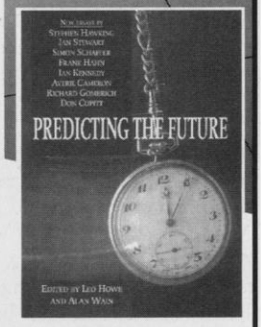

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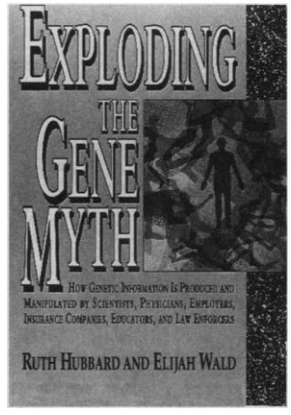

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