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SCIENCE

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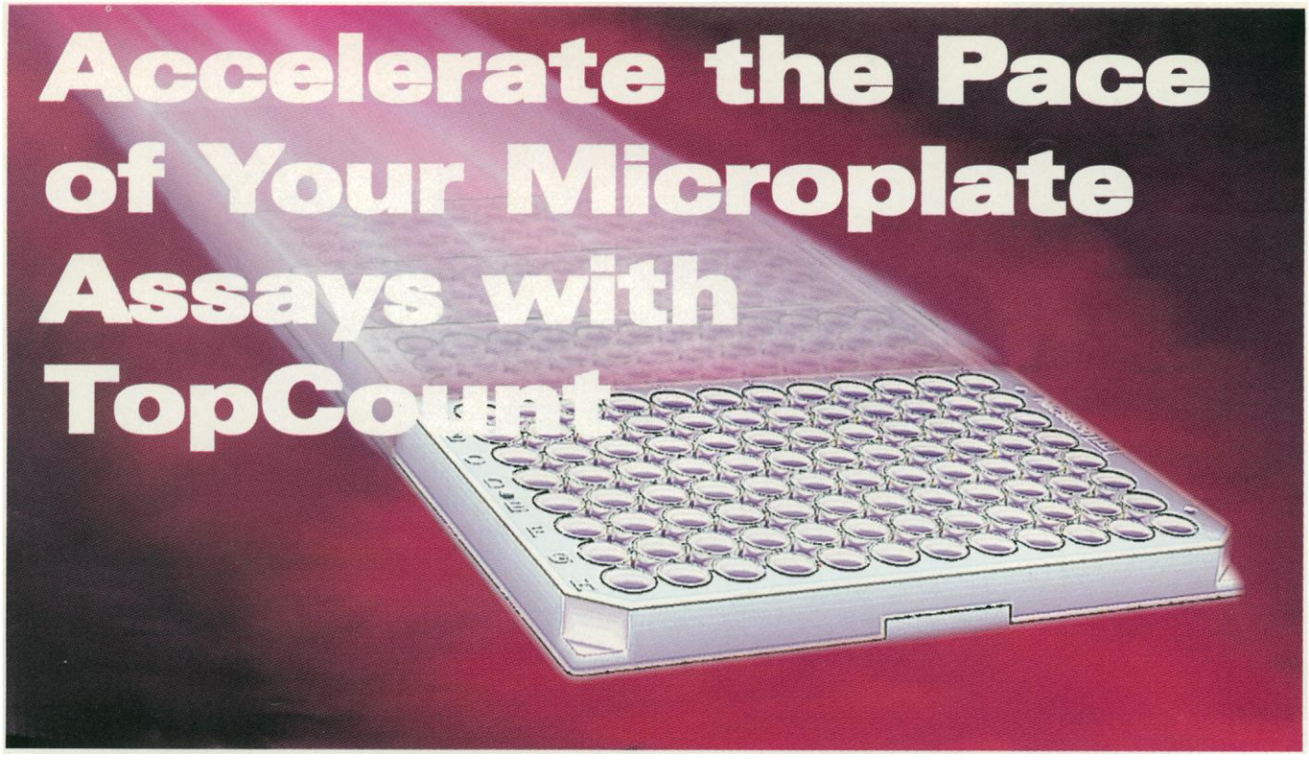

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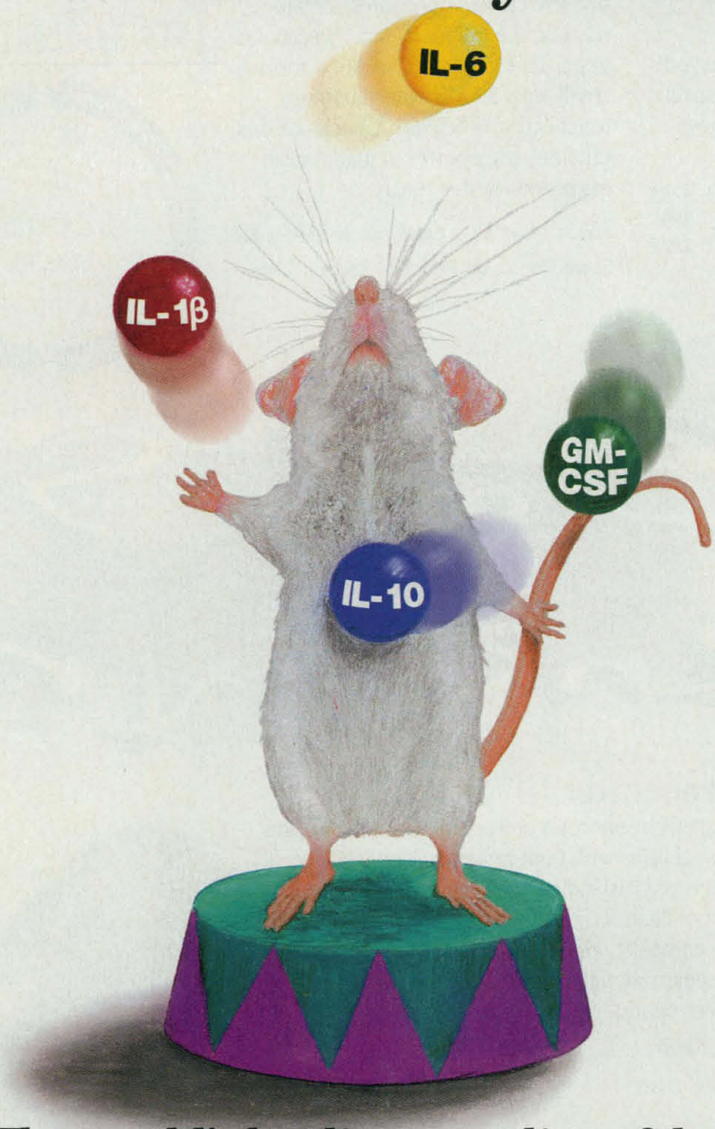

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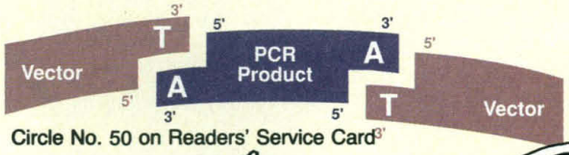

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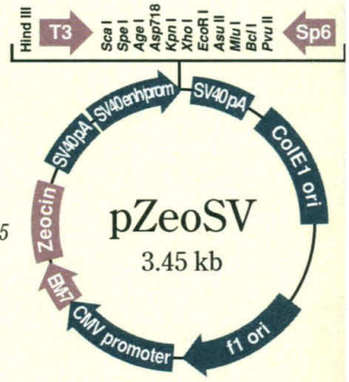

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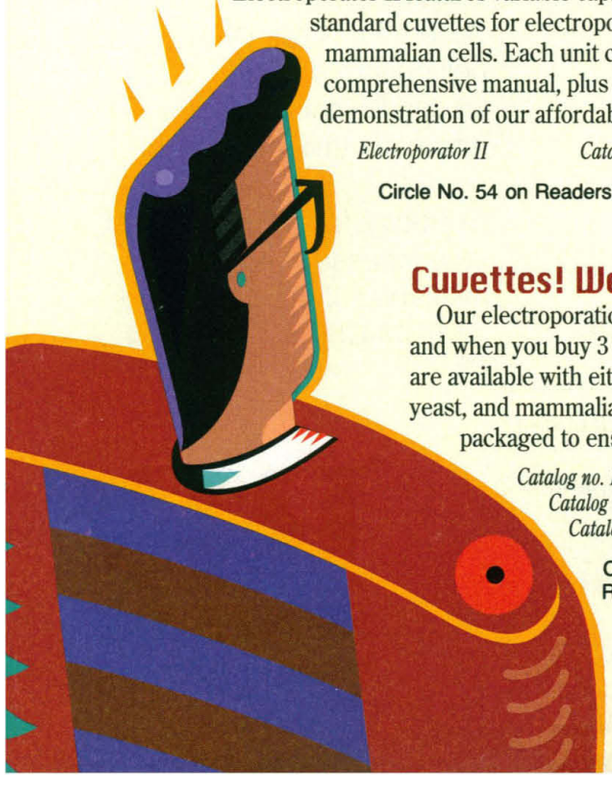

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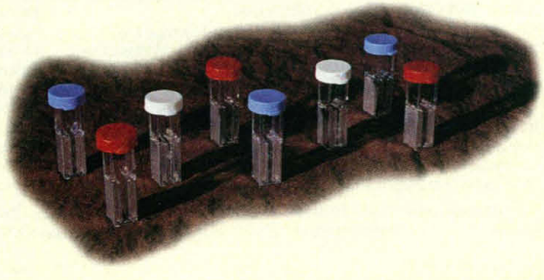

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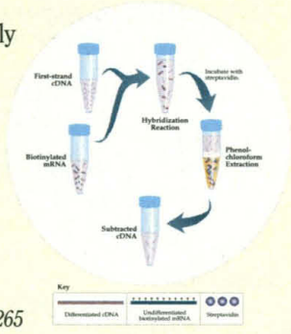

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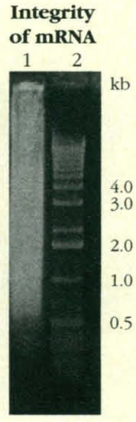

mRNA was isolated from 1 x 10^8 insect cells and resuspended in 30 µl of water. 10 µl was run on a 1% agarose gel (lane 1).

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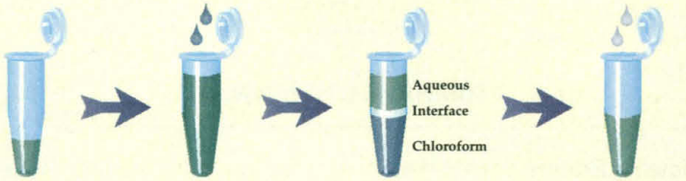

Add Lysis Solution. Incubate at 65°C for 10 minutes.

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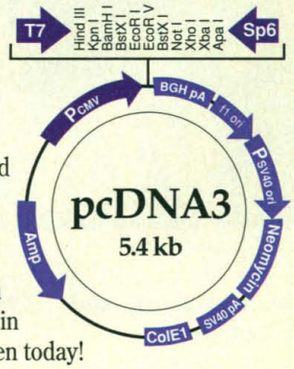

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SCIENCE

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Rookie manager strengthens his team

1369
Neuronal activity and cell adhesion

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVES

ARTICLE

DEPARTMENTS

COVER

Ventral view of an *Artemia franciscana* (brine shrimp) metanauplius larva stained with an antibody against the conserved region of the Distal-less protein. Distal-less, previously known to be required for proximodistal axis formation in developing insect limbs, has been found to be expressed in every branch of all developing arthropod limbs. The antibody recognizes Distal-less proteins from vertebrates as well as arthropods. See page 1363 and the related News story on page 1297. [Image: Grace Panganiban]

RESEARCH ARTICLE

REPORTS

1300 & 1319

Sea urchin larva: Representative of Precambrian Metazoa?

1315 & 1335

In bright arrays

Indicates accompanying feature

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edited by PHIL SZUROMI

Hopping cations

Diffusion of cations in crystalline solids can control many processes, including grain boundary growth, ionic conductivity, and phase separation. Xu and Stebbins (p. 1332) have followed the hopping of $^6Li^+$ cations in Li_4SiO_4 using two-dimensional nuclear magnetic resonance methods. This approach allowed the rates and activation barriers between particular sites in the crystal to be measured directly.

Barring Earth's halo

Ultraviolet images of the Earth reveal an auroral halo caused by the interaction of geomagnetic field lines with the solar wind. At times a connecting bar is seen that runs over the magnetic poles in the noon to midnight direction. It has been thought that this barred aurora, or θ-aurora, occurs when the interplanetary magnetic field (IMF) is pointed north. Newell and Meng (p. 1338) present satellite data which show that θ-auroras occur when the IMF flips south after a long period of pointing northward.

Opening the Red Sea

The Red Sea is an example of continental rifting forming a new ocean basin. Sea floor spreading seems to have initiated in the south and is now migrating toward the north, but knowledge of the early development of the rift is critical for testing models of continental breakup. Fission track dating studies by Omar and Steckler (p. 1341) show that the initial breakup of the crust involved two coherent pulses of uplift, erosion, and extension along the length of the future Red Sea, beginning about 34 million years ago. The plates were not unzipped from south to north, but opened as rigid bodies hinged to the north.

Balancing act in neuronal development

Proper neuronal development requires that many neurons receive signals that cause them to undergo apoptosis and die. Xia *et al.* (p. 1326) have uncovered a role for mitogen-activated protein (MAP) kinases, which are activated by numerous extracellular stimuli, in regulating apoptosis. In pheochromocytoma cells that are deprived of nerve growth factor, two members of the MAP kinase family have opposing effects on apoptosis. Activity of ERKs—MAP kinases that are activated by growth factors—inhibits apoptosis, whereas activity of JNKs—MAP kinases that are activated by various forms of environmental stress—promotes apoptosis. The balance of the activities of these two signaling pathways is apparently critical in controlling survival of these cells.

Deactivating decoys

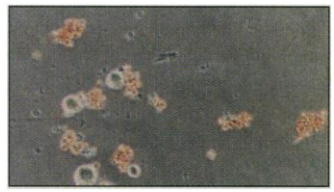
Cells infected with virus are targeted for destruction by cytotoxic T lymphocytes (CTLs). Meier *et al.* (p. 1360) show that mutations help HIV-infected cells evade this immune response. Activation of the CTL requires the interaction of the T cell receptor with a human leukocyte antigen class I surface complex on the infected cell that contains a viral peptide. Presentation of complexes with peptides that vary only slightly from the target peptide can inactivate or anergize the CTL, so instead of being destroyed, the infected cell actually inactivates a CTL that could have destroyed other cells containing different HIV variants.

Steroid enhancer

Steroid receptors form a family of ligand-inducible transcription factors that regulate genes in response to hormones. Onate *et al.* (p. 1354) have isolated and characterized a protein, SRC-1 (steroid receptor coactivator–1), that enhances the transcriptional activity of multiple steroid receptors in a ligand-dependent fashion. The enhancing activity of SRC-1 seems limited to steroid receptors. A truncated form of SRC-1 acts as a dominant negative repressor and prevents the hormone-induced transcriptional activity of several steroid receptors.

Taking such pains

Opioid analgesics, such as morphine, can block dull persistent pain but are ineffective against acute sensations like a pinprick. Taddese *et al.* (p. 1366) performed patch clamp experiments on nociceptive neurons,



which evoke pain responses, in the tooth pulp of rats. Activating the μ opioid receptors inhibited calcium channels of small, slow-conducting nociceptive neurons that transmit the signals for persistent pain but had no effect on the large, rapidly conducting nociceptive neurons that transmit the initial sharp pain response.

Neuronal activity and adhesion

Nervous system development is modulated both by neuronal activity and by cellular interactions through adhesion and recognition molecules located on the cell surface. Itoh *et al.* (p. 1369) found that when neurons taken from the mouse dorsal root ganglion were stimulated at a particular frequency before synaptogenesis, expression of the neural cell adhesion molecule L1 as well as adhesion of these neurons to other cell types was reduced. Stimulation at other frequencies, or after synaptogenesis, left L1 expression and intercellular adhesion unaffected. Certain types of neuronal activity can regulate expression of specific adhesion molecules that help pattern the developing nervous system.

CLIP unclips

Major histocompatibility complex (MHC) class II molecules present peptides derived from exogenous antigens. Newly synthesized class II molecules are prevented from binding endogenous peptides by a polypeptide known as the invariant chain. In particular, the CLIP fragment (for class II–associated invariant chain peptides) blocks the peptide-binding groove. The mechanism whereby CLIP is removed to allow binding of exogenous peptide is unclear. Recent evidence pointed to a role for the nonclassical MHC molecule HLA-DM, but a fraction of molecules in DM-negative cells are expressed normally. Kropshofer *et al.* (p. 1357) show that self-release of CLIP occurs under appropriate conditions. Self-release occurs at endosomal pH and is catalyzed by the amino-terminal segment, which lies outside the groove.

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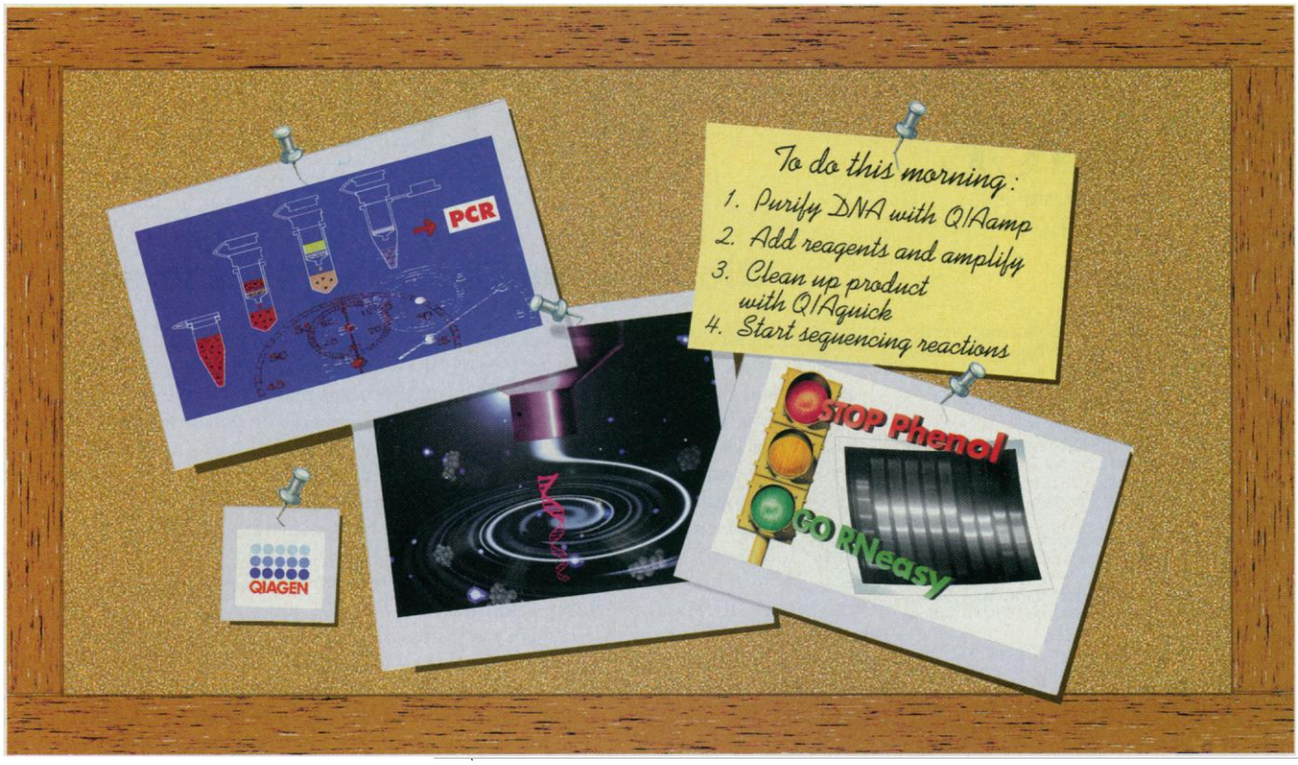

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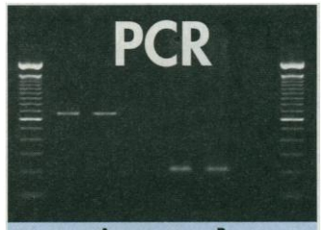

A B

Amplification of the ß-actin gene (A) and ß-actin mRNA (B) from HeLa cells using intron-spanning primers.

A. Amplification from genomic DNA isolated from HeLa cells with QIAamp Blood Kit.

B. Amplification from total RNA isolated from HeLa cells with RNeasy Total RNA Kit.

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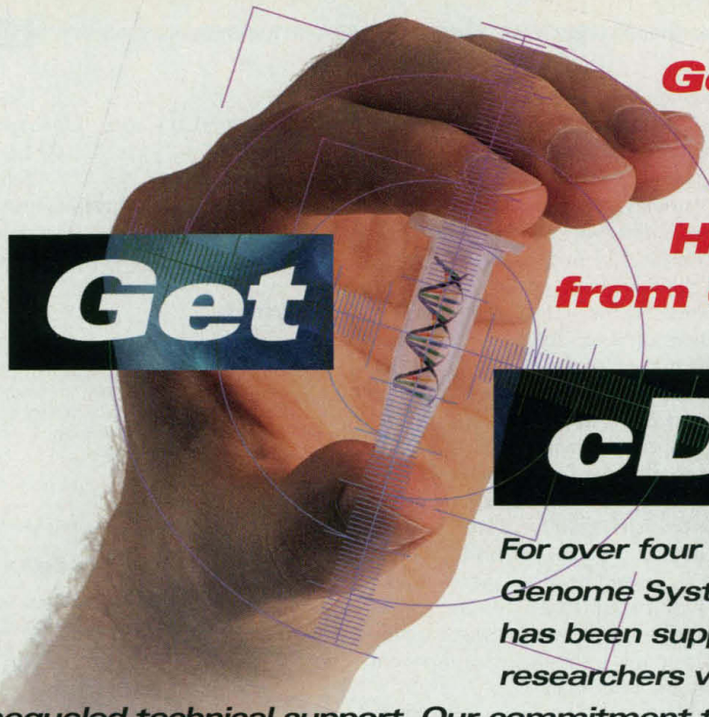

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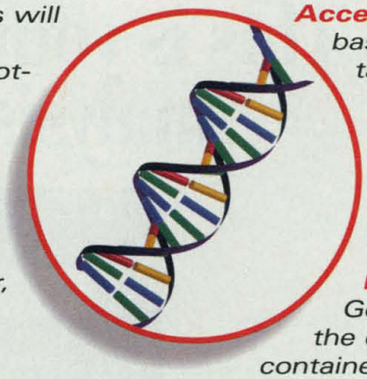

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1. *"The I.M.A.G.E. Consortium: An Integrated Molecular Analysis of Genomes and their Expression", Lennon, G.G., Auffray, C., Polymeropoulos, M., and Soares, M. B. [1995] Genomics.*

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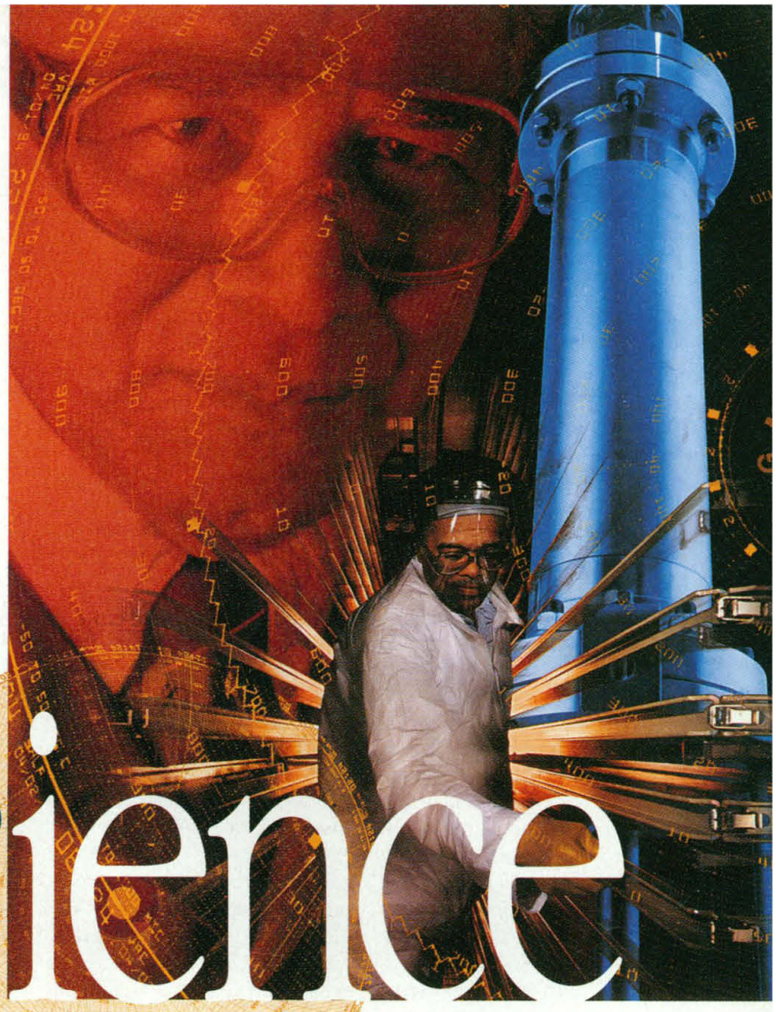

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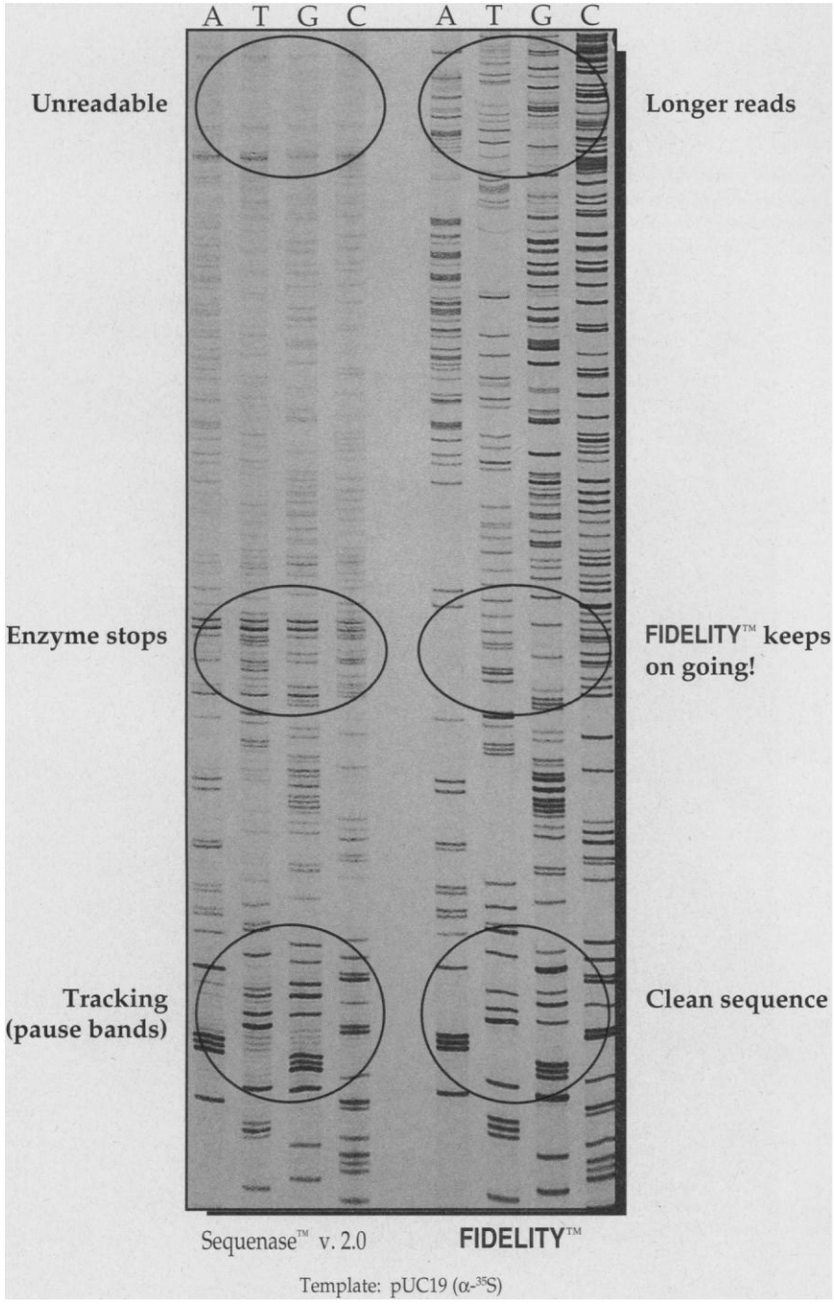

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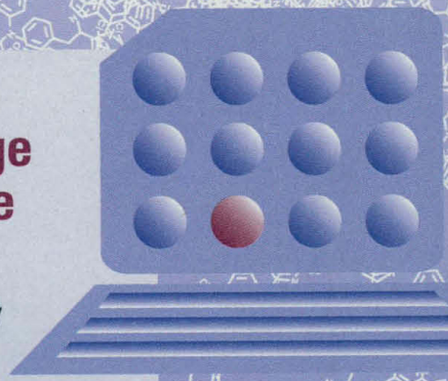

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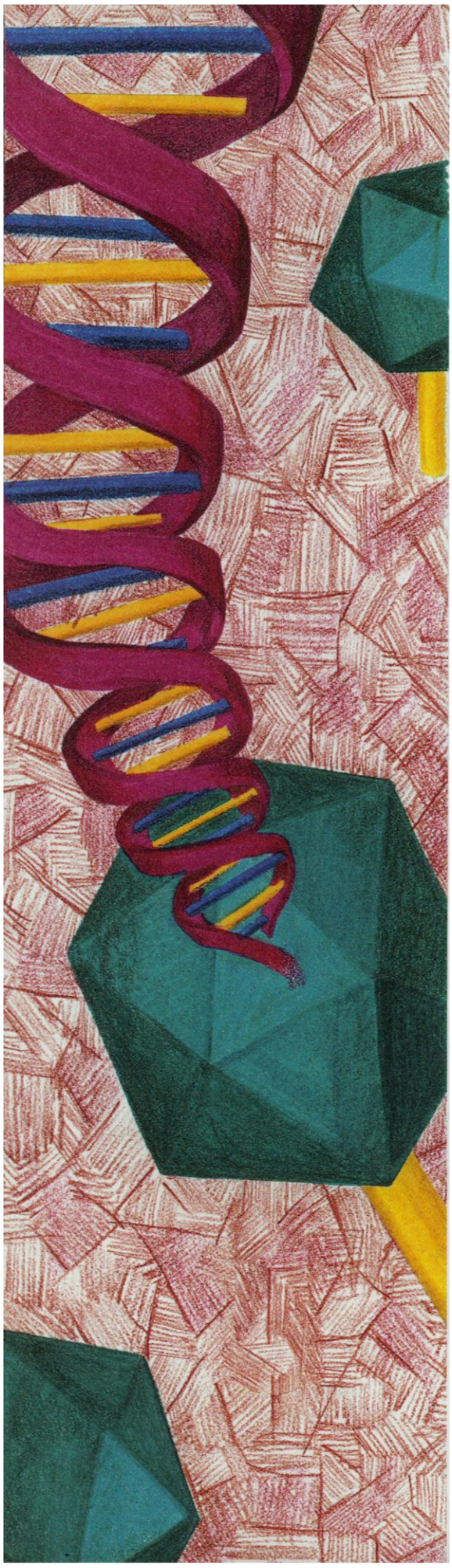

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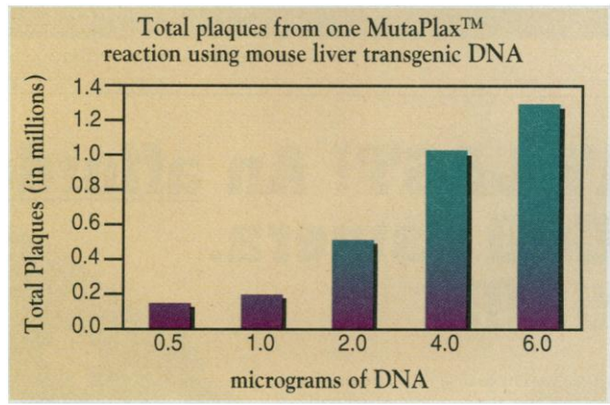

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Transgenic Models of Metabolic Disease
C. Ronald Kahn, Joslin Diabetes Center
E.M. Rubin, University of California

Intracellular Membrane Trafficking
Jennifer Lippincott-Schwartz, National Institute of Child Health and Human Development

Ion Transport and Disease***
William Harris, Children's Hospital, Boston
Mark T. Keating, University of Utah

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Allan S. Detsky, University of Toronto

Regulation of Apoptosis: Cellular, Molecular and Genetic Factors
John D. Mountz, University of Alabama at Birmingham

Translational Research in Dermatology*
Juoni Uitto, Thomas Jefferson Medical College

Delivering Information to Clinicians in the Era of National Networking***
Edward H. Shortliffe, Stanford University School of Medicine
David Lipman, National Library of Medicine

Developmental Biology: Organogenesis***
Jeffrey A. Whitsett, Children's Hospital Medical Center, Cincinnati
Jeffrey I. Gordon, Washington University School of Medicine

The New Biology of Obesity
Jeffrey S. Flier, Harvard Medical School

Emerging Infections***
Ruth Berkelman, National Center for Infectious Diseases
Monica M. Farley, Emory University School of Medicine

Training in Subspecialty Medicine: Current Status and Public Policy
Eric G. Neilson, University of Pennsylvania
Robert J. Mayer, Harvard Medical School

Abstract Presentations

Original abstracts will be presented either in oral sessions, chaired by teams of senior investigators, or in poster sessions.

Infectious Diseases/AIDS
James B. Dale, University of Tennessee School of Medicine

Cardiovascular
Christine Seidman, Harvard Medical School

Hematology
Dorothea Zucker-Franklin, New York University

Oncology
George Bosl, Memorial Sloan Kettering Cancer Center

Clinical Epidemiology/ Health Care Research**
Pamela G. Williams - Russo, Cornell University Medical Center

Pulmonary/Critical Care
Jeffrey M. Drazen, Harvard Medical School

Gastroenterology/Hepatology/ Nutrition
Tadataka Yamada, University of Michigan School of Medicine

Immunology/Allergy/ Rheumatology
William J. Koopman, University of Alabama at Birmingham

Gerontology/Aging
Mark A. Supiano, University of Michigan School of Medicine

Endocrinology/Metabolism
Leslie DeGroot, University of Chicago Medical Center

Renal/Hypertension
Barry M. Brenner, Harvard Medical School

Inflammation
William M. Nauseef, University of Iowa

Regulation of Gene Expression
Herbert H. Samuels, New York University

Physiology
J. Chris Gillin, University of California, San Diego

Cytokines/Growth Factors
Derek LeRoith, National Institute of Diabetes and Digestive and Kidney Diseases

Dermatology*
Juoni Uitto, Thomas Jefferson Medical College

Gene Therapy
Elizabeth G. Nabel, University of Michigan

Satellite Symposia/Meetings

Molecular Medicine Society
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Conference Title	*Chair or Co-Chairs*	*Date*	*Location*
Adhesion, Science of	Van P. Thompson	Aug 4-9	Tilton School
Archaea: Ecology, Metabolism and Molecular Biology	William Whitman	July 14-19	Plymouth State College
Atomic and Molecular Interactions	David Nesbitt	June 30-July 5	Colby-Sawyer College
Bacterial Cell Surfaces	Thomas Silhavy	June 30-July 5	New England College
Basement Membranes	Brigid Hogan & Peter Yurchenco	June 9-14	New England College
Biocatalysis	Paul Van Eikeren & Romas Kazlauskas	July 7-12	Kimball Union Academy
Bioelectrochemistry	James Weaver	July 21-26	Salve Regina University
Bioengineering and Orthopedic Science	Steven Goldstein	July 28-Aug 2	Proctor Academy
Biological Regulatory Mechanisms	Ralph Isberg & Susan Lindquist	June 23-28	Colby-Sawyer College
Biomineralization	Henry Margolis	Aug 4-9	Plymouth State College
Biomolecular Recognition & Immobilization	Jannette Carey	Aug 4-9	Colby-Sawyer College
Bioorganic Chemistry	Craig Wilcox & Diane Trainor	June 23-28	Plymouth State College
Biopolymers	Ken Johnson & Carlos Bustamante	June 16-21	Salve Regina University
Cancer	Frank J. Rauscher III	Aug 4-9	Salve Regina University
Cardiac Regulatory Mechanisms	Marlene Hosey	July 7-12	Colby-Sawyer College
Catalysis	Rostam J. Madon	June 23-28	Colby-Sawyer College
Cell Biology of the Neuron	Thomas Sudhof & Richard Scheller	June 16-21	Plymouth State College
Cellular Basis of Adaptation to Salt & Water Stress in Plants	Andrew D. Hanson	Aug 11-16	Tilton School
Cellular & Molecular Mycology	Paul Magee & Anne Desjardins	June 16-21	Holderness School
Cement-Based Materials, Chemistry & Physics of (NEW)	Francis Young	July 28-Aug 2	Plymouth State College
Ceramics, Solid State Studies in	D. S. Wilkinson	Aug 4-9	Kimball Union Academy
Chemical Senses: Taste & Smell	Barry Ache	Aug 18-23	Salve Regina University
Chemical Sensors & Interfacial Design	Richard M. Crooks	July 28-Aug 2	Colby-Sawyer College
Chemotactic Cytokines	Dan Witt	June 23-28	Holderness School
Compositon, Structure, & Dynamics of the Earth's Interior (NEW)	Gerald Schubert & J. Michael Brown	June 30-July 5	Plymouth State College
Computational Chemistry	Thomas A. Halgren	June 30-July 5	New Hampton School
Correlated Electron Systems (NEW)	Gordon A. Thomas	Aug 18-23	Proctor Academy
Corrosion - Aqueous	William B. Smyrl	July 7-12	Colby-Sawyer College
Diamond Synthesis	James E. Butler	Aug 4-9	Plymouth State College
DNA Alteration in Transformed Cells (NEW)	Alan Pinter & Janos Minarovits	June 30-July 5	Tilton School
Drug Metabolism	Terrence J. Monks	July 7-12	Holderness School
Dynamics of Simple Systems	R. Stephen Berry	Aug 11-16	Proctor Academy
Elect Donor-Acceptor Interactions	Gary Schuster	Aug 11-16	Salve Regina University
Electrodeposition (NEW)	Jan Talbot	Aug 11-16	Colby-Sawyer College
Electron Spectroscopy	Neville V. Smith	July 7-12	New England College
Electronic Processes in Organic Materials	Glen Kepler	July 21-26	Proctor Academy
Energetic Materials	Jimmie Oxley	June 16-21	New Hampton School
Environmental Sciences: Water	Alan T. Stone	June 23-28	New Hampton School
Enviromentally Benign Organic Synthesis (NEW)	Paul T. Anastas	July 21-26	New England College
Enzymes, Coenzymes & Metabolic Pathways	Michael A. Marletta & David Cane	July 14-19	Kimball Union Academy
Fractals	Michael Shlesinger	June 16-21	New England College
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Gravitational Effects on Living Systems	Manning Correia	July 14-19	Colby-Sawyer College
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Heterocyclic Compounds	Paul J. Reider	July 7-12	New Hampton School
High Pressure, Research at	Dieter Hochheimer	June 23-28	Kimball Union Academy
High Temperature Chemistry	J. G. Edwards	July 21-26	Tilton School
Hormonal & Neural Peptides	Donald Steiner	July 28-Aug 2	New Hampton School
Hormone Action	Jacques Drouin	July 28-Aug 2	Kimball Union Academy
Innovations in College Chemistry Teaching	Brock Spencer	June 30-July 5	Plymouth State College
Inorganic Chemistry	David Thorn	July 21-26	New England College
Interaction of Water with Surfaces	Frederick T. Wagner	July 28-Aug 2	Plymouth State College
Interfaces, Chemistry at	John Texter	July 21-26	Kimball Union Academy
Intermediate Filaments	Michael Klymkowsky	July 14-19	Holderness School
Ion Channels	Bruce P. Bean	July 7-12	Tilton School
Lasers in Medicine and Biology	Joseph T. Walsh	June 30-July 5	Kimball Union Academy
Laser Interactions with Surfaces	Thomas Dickinson	June 9-14	Holderness School

Conference Title	*Chair or Co-Chairs*	*Date*	*Location*
Lipid Metabolism	Larry Rudel	June 16-21	Kimball Union Academy
Lysosomes	Stuart Kornfeld	June 30-July 5	Proctor Academy
Mammalian Gametogenesis & Embryogenesis	Susan Heyner	Aug 11-16	Colby-Sawyer College
Mechanisms of Toxicity	William J. Greenlee	July 28-Aug 2	New England College
Medicinal Chemistry	Eric Larson	Aug 4-9	Colby-Sawyer College
Meiosis	G. Shirleen Roeder	June 9-14	Colby-Sawyer College
Microbial Stress Response	Janet Westpheling	July 21-26	Holderness School
Microbial Toxins & Pathogenicity	Alison O'Brien	July 14-19	Proctor Academy
Mitochondria & Chloroplasts	Kathleen Newton	June 16-21	Plymouth State College
Modeling of Flow in Permeable Media	Michael Celia	Aug 4-9	Proctor Academy
Molecular Biology, Diffraction Methods in	James Pflugrath & Charles W. Carter, Jr.	June 16-21	Proctor Academy
Molecular Cell Biology	Judith White & David Morgan	June 16-21	Tilton School
Molecular Genetics	Winship Herr	July 28-Aug 2	Salve Regina University
Motile and Contractile Systems	Jonathan Scholey	July 7-12	New England College
Multiphoton Processes	Ed Grant	June 9-14	Colby-Sawyer College
Muscle: Contractile Proteins	Peter D. Vibert	July 28-Aug 2	Colby-Sawyer College
Mutagenesis	Philip C. Hanawalt	June 23-28	Plymouth State College
Nanostructure Fabrication	Margaret Stern	June 23-28	New England College
Natural Products	William R. Baker	June 30-July 5	New England College
Neural Development	Joshua Sanes	June 23-28	Salve Regina University
Nitrogen Fixation	Dennis R. Dean & Douglas Rees	June 30-July 5	Colby-Sawyer College
Nondestructive Evaluation	Christopher M. Fortunko	Aug 18-23	Kimball Union Academy
Nuclear Chemistry	Wolfgang Trautmann	June 16-21	Colby-Sawyer College
Nuclear Proteins, Chromatin Structure & Gene Expression	Sarah Elgin	July 14-19	Tilton School
Nucleic Acids	Brenda Bass & Richard I. Gumport	June 9-14	New Hampton School
Order and Disorder in Solids	Werner Press	July 21-26	Colby-Sawyer College
Organic Geochemistry	Robert Alexander	Aug 11-16	Holderness School
Organic Reactions and Processes	Russell Linderman	July 14-19	New Hampton School
Organometallic Chemistry	John Gladysz	June 30-July 5	Salve Regina University
Particle-Solid Interactions	Nghi Lam	July 21-26	Plymouth State College
Peptide Growth Factors	Michael Klagsbrun	Aug 11-16	Kimball Union Academy
Phase Transitions in Non-Metallic Solids	Gustaaf van Tendeloo & Ekhard Salje	June 9-14	New England College
Photonuclear Reactions	Alan Nathan	July 28-Aug 2	Tilton School
Photosynthesis, Biochemical Aspects of	Charles Yocum	Aug 4-9	New Hampton School
Photosynthetic CO_2 Fixation by Green Plants	S. C. Huber	Aug 18-23	Tilton School
Physical Metallurgy	Alton D. Romig, Jr., Darrel Frear & C. J. van Tyne	July 28-Aug 2	Holderness School
Plant Molecular Biology	Athanesios Theologis	July 21-26	New Hampton School
Plant Senescence	Alan Bennett	July 14-19	Plymouth State College
Plasma Processing Science	Steven L. Girshick	Aug 11-16	New Hampton School
Point & Line Defects in Semiconductors	Leonard Feldman	July 21-26	Plymouth State College
Polymer Physics	Karl Freed	July 14-19	Salve Regina University
Polymers (East)	Russell Gaudiana	June 23-28	New England College
Proteoglycans	Bryan Toole	July 7-12	Proctor Academy
Proteolytic Enzymes and Their Inhibitors	Guy Salvesen	July 21-26	Colby-Sawyer College
Radiation Chemistry	John M. Warman	July 7-12	Salve Regina University
Reproductive Tract Biology	Leland Chung	July 7-12	Plymouth State College
Second Messengers and Protein Phosphorylation	Thomas Sturgill	June 9-14	Kimball Union Academy
Solar Terrestrial Physics, Modeling in	Karen Flammer & Dan Baker	June 16-21	New England College
Solid State Chemistry	M. Stanley Whittingham	July 14-19	Colby-Sawyer College
Solid State Ionics	Steve W. Martin	June 16-21	Colby-Sawyer College
Stereochemistry	Sarah E. Kelly	June 9-14	Salve Regina University
Tetrapyrroles, Chemistry & Biology of	Joseph Bloomer	July 14-19	New England College
Theoretical Biology and Biomathematics	Lisa Fauci & Bard Ermentrout	June 9-14	Tilton School
Thermosetting High-Performance Materials	Richard Farris	July 7-12	Plymouth State College
Tribology	Jorn Larsen-Basse	June 30-July 5	Holderness School
Vascular Cell Biology	Elizabeth Nabel & Israel Charo	June 23-28	Proctor Academy
Vibrational Spectroscopy	Anne Myers	July 14-19	New England College
Water & Aqueous Solutions, Physics & Physical Chemistry of	George E. Walrafen	Aug 4-9	Holderness School

1996 INTERNATIONAL SCHEDULE

Conference Title	*Chair or Co-Chairs*	*Date*	*Location*
Chemotherapy of Experimental & Clinical Cancer*	John A. Hickman	Sept 15-20	Queen's College, Oxford, UK
Glycolipids and Sphingolipids, Structure of* *Jointly sponsored with the Naito Foundation*	Yoshi Nagai	Sept 29-Oct 4	Japan
Macromolecular Organization & Cell Function* *(formerly Enzyme Organization)*	James Clegg	Sept 1-6	Queen's College, Oxford, UK
Molecular & Ionic Clusters	Mark Johnson & Udo Buck	May 5-10	Il Ciocco, Barga, Italy
Molecular Cytogenetics*	David Ward	April 21-26	Il Ciocco, Barga, Italy
Myelin*	David Colman	April 28-May 3	Il Ciocco, Barga, Italy
Nuclear Waste & Energy (NEW)	Jiri Janata & Stanley Hermanek	Sept 8-12	Pruhonice, Czech Republic
Organic Structures and Properties (NEW)	Hiizu Iwamura	Sept 23-28 (Tues-Sat.)	Japan
Statistics in Chemistry & Chemical Engineering*	Age Smilde	Aug 25-30	Queen's College, Oxford, UK

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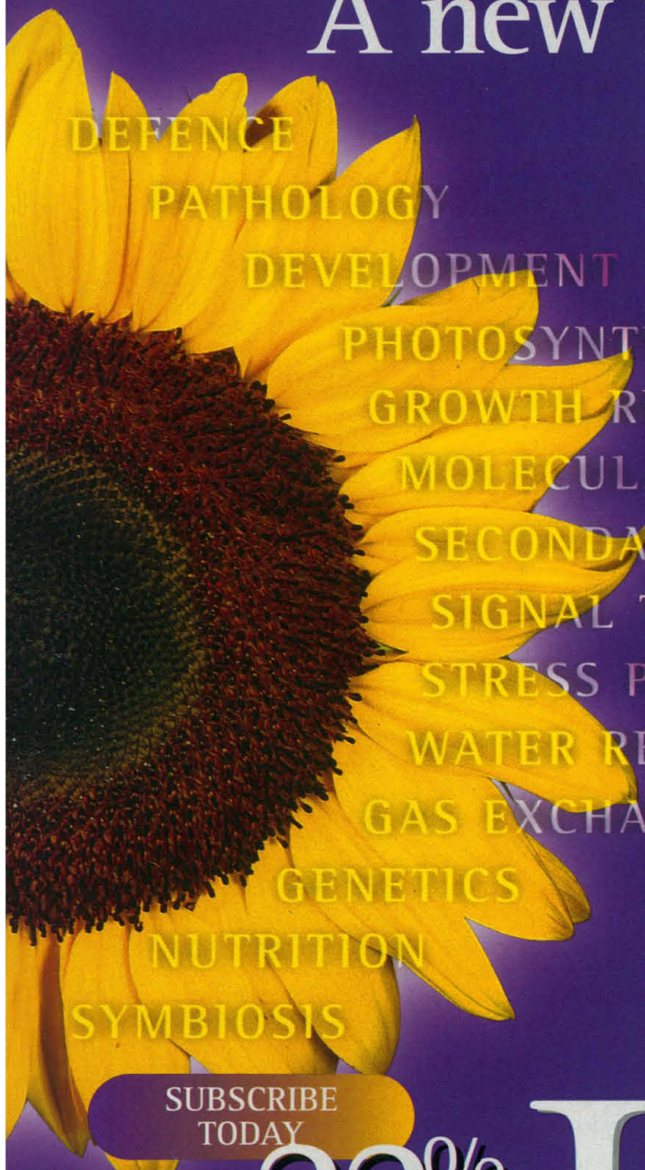

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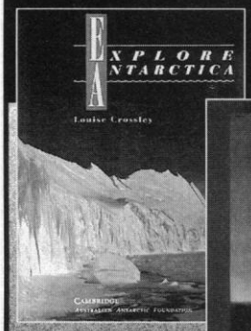

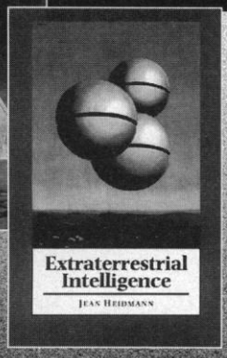

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