American Association for the Advancement of Science

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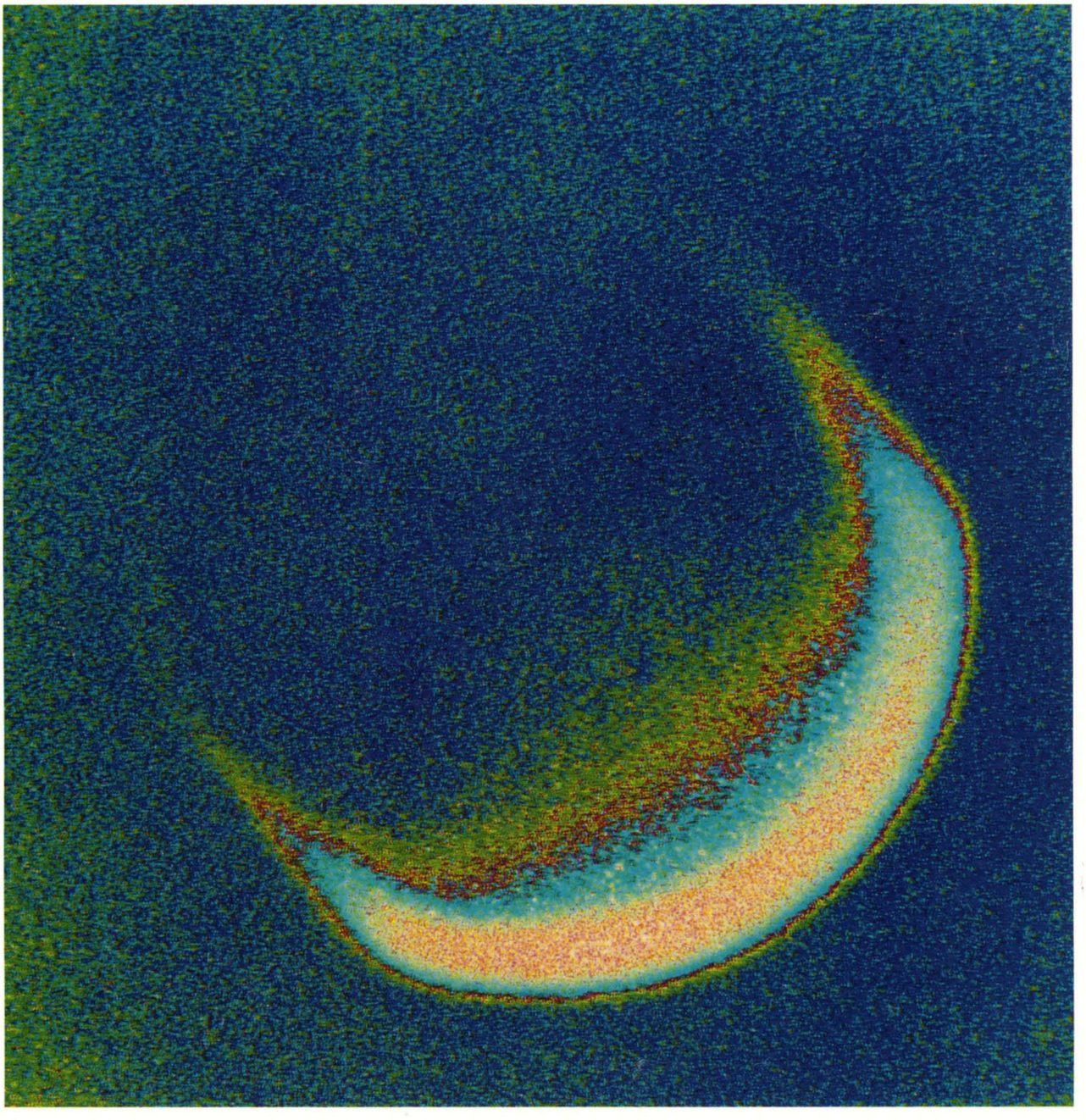

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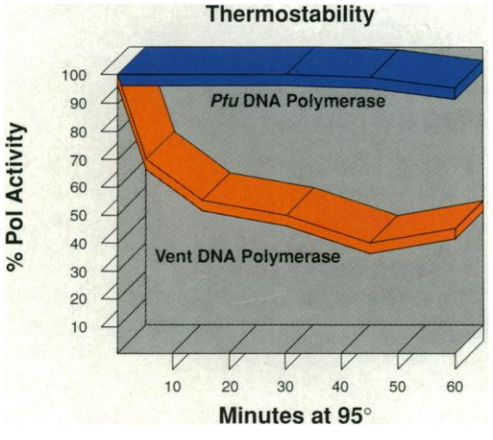

Figure 1: Thermostability of *Pfu* and Vent DNA Polymerases at 95°C.
To determine the thermostability of *Pfu* and Vent DNA polymerases at 95°C, 37.5 units of each enzyme were diluted to a final volume of 150 µl in the recommended reaction buffer and incubated at 95°C. At 0, 5, 15, 30, 45 and 60 minute time points, duplicated 10 µl aliquots (2.5 units) were assayed at 75°C for DNA polymerase activity.

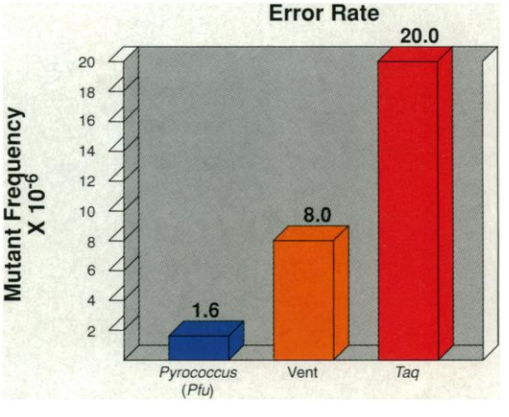

Figure 2: Polymerase fidelity was measured by modification of an assay described by Kohler *et al* (1991) *Pro. Natl. Acad. Sci. USA,* in press. Error rates reflect mutations per nucleotide incurred in the *lacI* gene during DNA synthesis. Vent is derived from *Thermococcus litoralis* and was obtained from New England Biolabs. *Pfu* is derived from *Pyrococcus furiosus* and is sold by Stratagene. *Taq* polymerase is derived from *Thermus aquaticus* and was obtained from Cetus Perkin Elmer.

Pyrococcus Polymerase	Catalog #
100 units	600135
500 units	600136

* Patents Pending

** Vent™ is a trademark of New England Biolabs

1. Bryant, F.O. and Adams, M.W.W. (1989) *J. Biol. Chem.* 264:5070-5079.
2. Fiala, G. and Stetter, K.O. (1986) *Arch Microbiol.* 145:56-61.
3. Eckert, K.A. and Kunkle, T.A. (1990) *Nucleic Acids Res.* 18:3739-3744.
4. Chien, A., Edgar, D.B. and Trela, J.M. (1976) *J. Bac.* 127:1550-1557.

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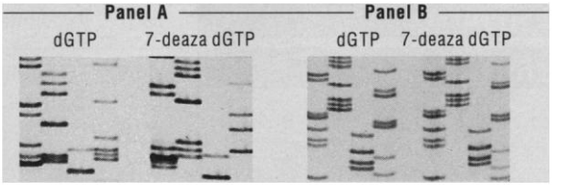

Resolution of compressed DNA at higher temperatures using the StrataTherm temperature controller.
ssM13 DNA was sequenced with dGTP or 7-deaza dGTP and electrophoresed on a 33cm 6% acrylamide gel maintained at constant temperature. Panel A: 40°C; panel B: 55°C.

Temp	Run Time	Mean Voltage
40°C	90 min.	1700 volts
55°C	50 min.	1900 volts

Table #1. Reduction in gel prewarming time and gel run time using the StrataTherm temperature controller.
Gels were prewarmed at 150 watts (W), 2500 volts (V). After reaching the specified temperature, the voltage was regulated by the StrataTherm temperature controller. Electrophoresis times (bromophenol blue dye to the bottom of the gel) are shown.

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* The polymerase chain reaction (PCR) process is covered by patents issued to Cetus Corporation.

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This Week in

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Medflies in California

Mediterranean fruit flies or medflies have been threating the agriculture industry of California for almost two decades. Eradication efforts have included spraying with pesticides and use of sterile flies to lower the percentage of productive matings. But, despite these tactics, the medflies reappear. Where are they coming from? Are they offspring of an established, resident population or are they new arrivals that are introduced from outside the state? Carey evaluates data on both the numbers of medflies captured each year and their distribution patterns (page 1369). Several trends are apparent. The annual catch is increasing. The area of occupation has expanded. And where medflies are caught—sometimes in the same neighborhoods in succeeding years—suggests that there is an established population in the state. Few medflies have been found at airports, in the mail, or at other ports of entry into California. Medflies are costly pests whose (so far unsuccessful) eradication has already been an expensive proposition; understanding their demographics should help to properly direct future eradication efforts. Barinaga takes a look at how the state of California is responding to the medfly controversy and at ongoing efforts to detect and control these pests (page 1351).

Protein folding

For a linear sequence of amino acids to become a protein it must fold itself into the correct three-dimensional shape. Such shapes involve helices, pleated sheets, and a variety of chemical bonds between parts of the linear molecule. How does the protein arrive at the correct shape? Thomas Creighton presented part of the answer 20 years ago for a small protein called BPTI: the folding requires a pattern of steps involving intermediate chemical species. What's more, some key intermediates include nonnative bonds (those not found in the finished protein). Now Weissman and Kim, using high-tech separation methods, find that the predominant intermediates are native molecules, with no bonds not present in the finished product (page 1386). Hoffman reports (page 1357) that the subject is so controversial few experts will go on record about who's right.

Fast sodium from Io

Jupiter is surrounded by a large torus of plasma that comes from the planet's volcanic satellite Io. Although many space-based and ground-based observations of Jupiter and Io have been made, much remains unclear about the Jovian system. For example, such basic questions as whether Io's atmosphere is mostly atoms or molecules and how the plasma is powered have yet to be answered. Although neutral sodium is only a trace component of the plasma, it is a strong emitter of light that can be detected with ground-based telescopes. Analyses of patterns of these sodium emissions are providing insights into how mass and energy flow between Io and Jupiter and into the types of chemical reactions that can take place in the Io atmosphere and in the plasma torus. Schneider *et al.*, working from the Catalina Observatory in Arizona, made observations of fast-moving sodium emissions and sulfur ions (page 1394). Jets of neutral sodium were observed fanning forward from Io at speeds of tens of kilometers per second. The observations are consistent with the generation of neutral sodium by recombination and dissociation of molecular ions in a stream of ions ejected from Io.

Class II knockout mice

Few of the helper ($CD4^+$) subset of T lymphoid cells develop in mice that do not express class II major histocompatibility complex molecules (page 1417). Under normal conditions, the class II molecules, which are present on epithelial cells in the cortex of the thymus, interact with immature double positive $CD4^+CD8^+$ T cells; single positive $CD4^+$ cells then develop (as do $CD8^+$ cells when the interaction is with another histocompatibility complex antigen); they migrate from the thymus to the spleen, lymph nodes, gut, and other peripheral lymphoid organs where they become engaged in immune responses. Class II expression was knocked out with gene targeting, a process by which the gene for class II molecules was made dysfunctional in embryonic cells. Grusby *et al.* found that, in the animals deficient in class II molecules, normal numbers of immature double positive cells appeared in the thymus but mature $CD4^+$ cells did not develop; $CD8^+$ cells did. Thus interaction of immature thymic T cells with class II molecules is an important step in the maturation of $CD4^+$ cells. Functional studies showed that immune responses attributed to the $CD4^+$ cells were also poor. The "class II knockout mice" should serve as a valuable model for evaluating the parts played by class II molecules in development and maturation of the immune system.

Exciting inhibitor

Neurotransmitters can have either excitatory or inhibitory effects; that is, they either turn on or turn off the firing of neurons. One of the major inhibitory neurotransmitters of the brain is γ-aminobutyric acid (GABA). Unexpectedly, GABA has been found to have powerful excitatory effects as well on cells in the brain's hippocampus (page 1420). Michelson and Wong made intracellular recordings in cells of the hippocampus and found that GABA synchronized the activity of inhibitory interneurons. These cells along with excitatory pyramidal cells are the main cells in the hippocampus. GABA enhanced the electric output of the interneurons, and this gave rise to synchronized rhythmic postsynaptic potentials, or IPSPs. Although GABA was exciting the cells, the synchronous firing of inhibitory interneurons had the effect of inhibiting neurotransmission. ■ RUTH LEVY GUYER

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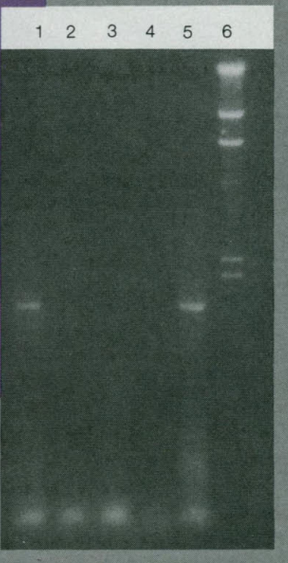

Inactivation of Target DNA by UV Irradiation. *10 ng of a 1.5 kb fragment were exposed to UV irradiation for 0, 10, 20, and 30 minutes (lanes 5, 1, 2, 3, respectively). After irradiation, primers, Taq polymerase, nucleotides, and reaction buffer were added to the UV-treated DNA. Lane 4 shows primer in the absence of other reaction components. Lane 6 is lambda DNA cleaved with Hind III. All reaction mixtures were amplified using 30 cycles of PCR.*

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**patent pending.* *mRNA model courtesy of* BIOSYM

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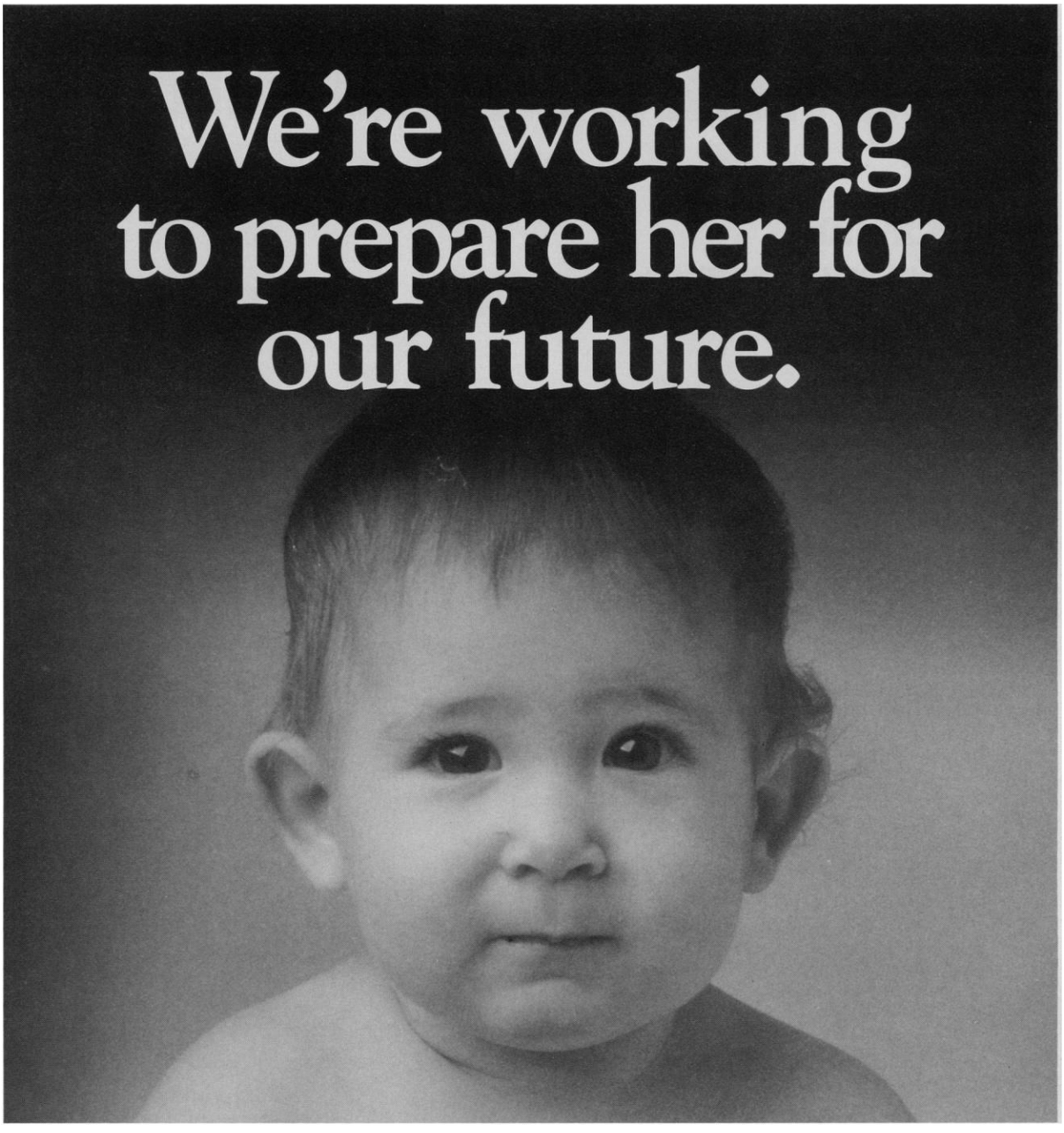

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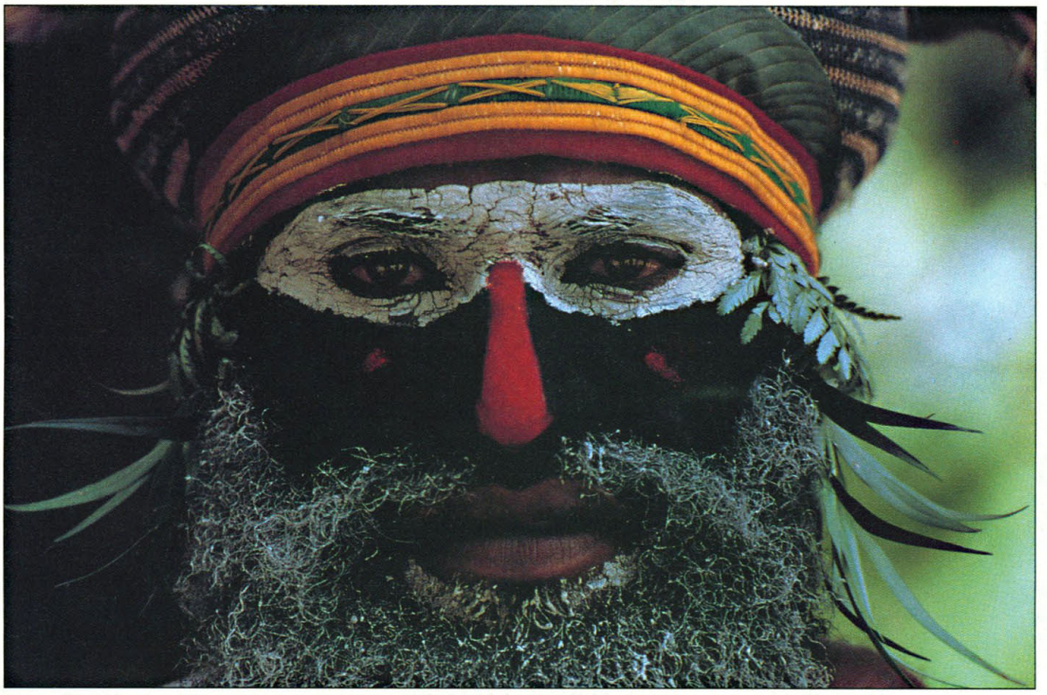
Native Expression



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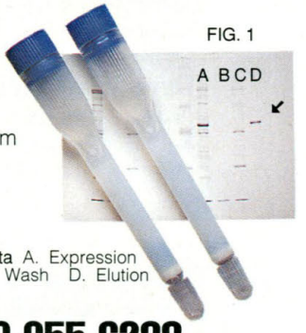

Figure 1: Expression Data A. Expression B. Flow Through C. Wash D. Elution

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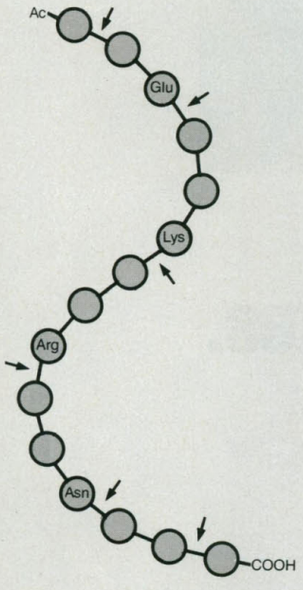

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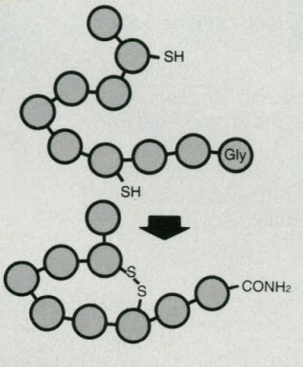

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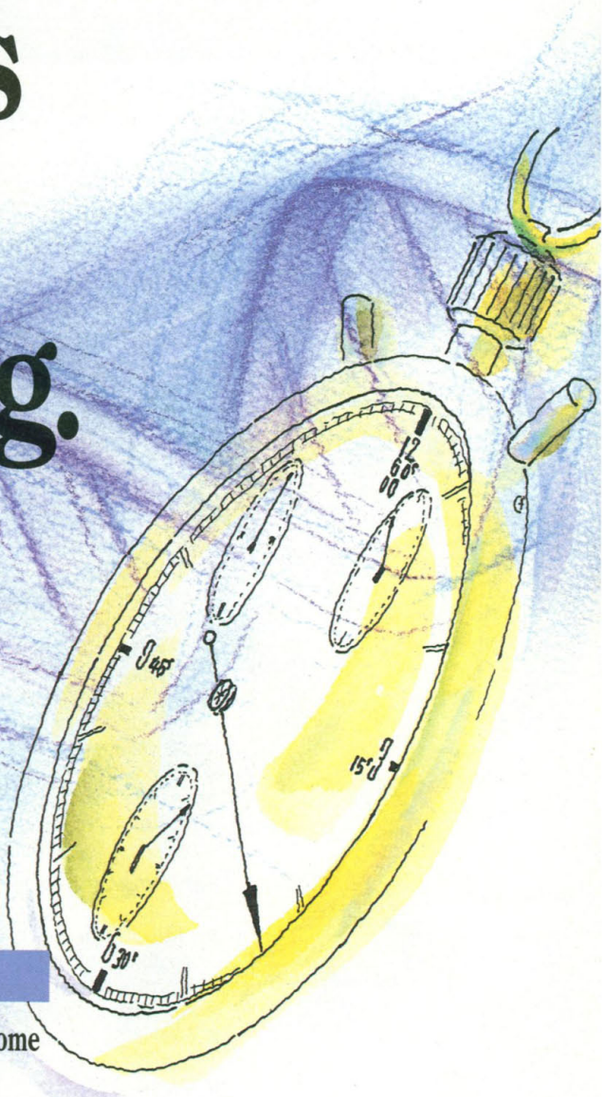

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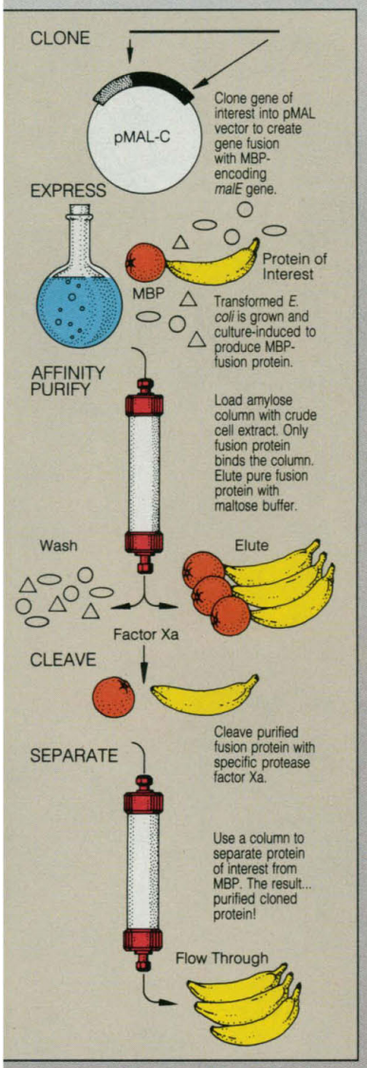

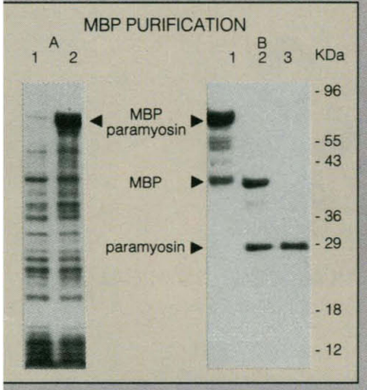

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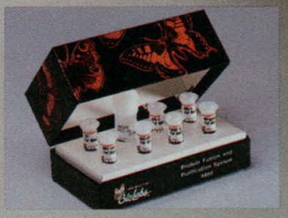

SDS-polyacrylamide gel electrophoresis of fractions from the purification of MBP-paramyosin-ΔSal. A:Lane 1:uninduced cells. Lane 2:induced cells. B:Lane 1:purified protein eluted from amylose column with maltose. Lane 2:purified protein after factor Xa cleavage. Lane 3:paramyosin fragment eluted from second amylose column.

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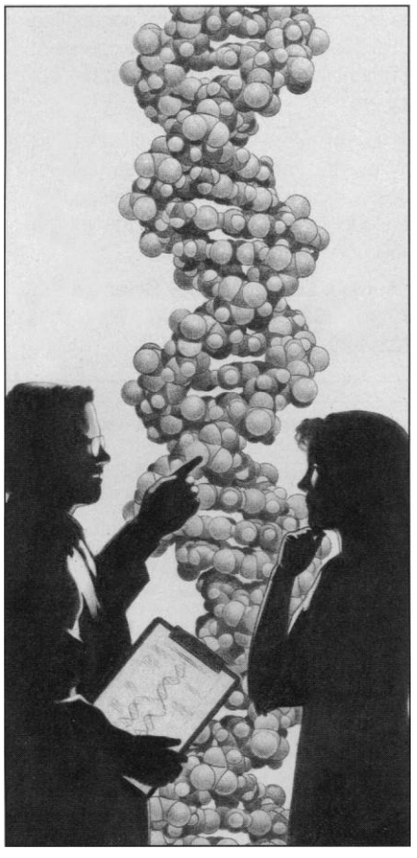
LEADING EXPERTS SHARE INSIGHTS WITH MOLECULAR BIOLOGISTS, MEDICAL RESEARCHERS, FORENSIC SCIENTISTS AND OTHER LIFE SCIENTISTS

The Genetic Analysis Revolution



SCIENTIFIC SEMINAR SERIES

New technologies in DNA analysis offer exciting possibilities for dozens of life science applications. Applied Biosystems is sponsoring this series so that scientists of worldwide reputation can offer you a preview of new applications and techniques in DNA analysis. The seminars will also provide opportunities for interaction with presenters.

The information presented at "The Genetic Analysis Revolution" may constitute a critical edge for your research in today's demanding scientific environment. Call today to register for this important event.

SPEAKERS

- **Kevin Sullivan,** Ph.D., Senior Scientific Officer, British Home Office; pioneering techniques in DNA fingerprinting (all locations)
- **Richard Gibbs,** Ph.D., Baylor College of Medicine; genetic mutation detection and HIV sequence variation (Philadelphia)
- **Scott Diehl,** Ph.D., Medical College of Virginia; pioneer in mapping genes associated with human disease (Rockville)
- **Richard M. Myers,** Ph.D., University of California, San Francisco; molecular basis for mental disease (San Francisco)
- **Steven M. Wolinski,** M.D., Northwestern University Medical School; HIV-1 pathogenesis research (Chicago)
- **Kenneth K. Kidd,** Ph.D., Yale University School of Medicine; DNA sequence variation, genetics of mental disease (Boston)
- **David Gelfand,** Ph.D., VP Scientific Affairs, Cetus Corporation; discoverer of *Taq* polymerase (New York)
- **Haig Kazazian, Jr.,** M.D., Johns Hopkins University; genetic disease characterization at the molecular level (RTP)

Speakers appearing at all locations:

- **J. Fenton Williams,** Ph.D., Customer Support Manager, Perkin-Elmer-Cetus
- **Alex Andrus,** Ph.D., Senior Scientist, ABI
- **Sandy Koepf,** Research Associate, ABI
- **Mel Kronick,** Ph.D., Senior Scientist, ABI
- **Lincoln J. McBride,** Ph.D., Staff Scientist, ABI
- **Gerald Zon,** Ph.D., Director of DNA Therapeutics, ABI

TOPICS TO INCLUDE:

Strategies and Methods for Detecting Genetic Mutations
DNA Fingerprinting in Forensics, Agriculture and Medicine
HIV Sequence Variation
Quantitative Gene Expression Studies
Human Genome Mapping, Sequencing and Data Computation
Antisense Oligonucleotide Therapeutics
Oligonucleotides: Synthesis, Labeling, Purification and Analysis
Second Generation PCR Technology and Applications

Washington, D.C.: Monday, November 4
Philadelphia, PA: Tuesday, November 5
San Francisco, CA: Friday, November 8
Chicago, IL: Monday, November 11
Boston, MA: Tuesday, November 12
New York, NY: Wednesday, November 13
RTP, NC: Thursday, November 14

For more information and to register, please call Applied Biosystems' Seminar Registration Hotline toll-free at 1-800-874-9868 x 7600.

Applied Biosystems

MISCONDUCT IN SCIENCE— RECURRING ISSUES, FRESH PERSPECTIVES

November 15–16, 1991 · Hyatt Regency Hotel · Cambridge, Massachusetts

The American Association for the Advancement of Science—American Bar Association National Conference of Lawyers and Scientists and the **Office of Scientific Integrity Review, U.S. Department of Health and Human Services** will cosponsor a conference that will address key issues related to handling allegations of misconduct in scientific research. The meeting will offer a variety of perspectives on such topics as delineating boundaries between poor scientific practices and flagrant misconduct or fraud; the appropriate roles of universities and the government in investigating allegations; various models used by universities and the government in conducting investigations; practical questions that arise in the course of a university or government inquiry; and the need to protect good faith whistleblowers.

This conference will be of interest to scientists from all disciplines, university administrators and counsel, government funding agencies, attorneys, scientific societies, public policy makers, and students and scholars of the ethical dimensions of science.

Contact: Deborah Runkle, Directorate for Science and Policy Programs, AAAS, 1333 H Street, N.W., Washington, D.C. 20005; (202) 326-6794.

1992 McKNIGHT NEUROSCIENCE SCHOLARS AWARDS

The McKnight Endowment Fund for Neuroscience is soliciting applications in preparation for awarding McKnight Scholars Awards which commence July 1, 1992.

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

Up to six 1992 McKnight Scholars will be selected from applicants who hold the M.D. and/or Ph.D. degree and have completed formal postdoctoral training. Candidates should have demonstrated meritorious research in areas pertinent to the interests of The McKnight Endowment Fund for Neuroscience and should be in the early stages of establishing their own independent laboratory and research career. Candidates must be citizens or lawful permanent residents of the United States. Award payments will be made directly to a sponsoring institution which must be located within the U.S.

Each McKnight Scholars Award provides $40,000 annually in 1992, 1993 and 1994. Funds may be used in any way that will facilitate development of the Scholar's research program. Funds may not be used for indirect costs.

Applications will be evaluated by a review committee which will recommend to the Board of Directors of the Endowment Fund candidates for appointment. Award announcements will be made on or before April 15, 1992.

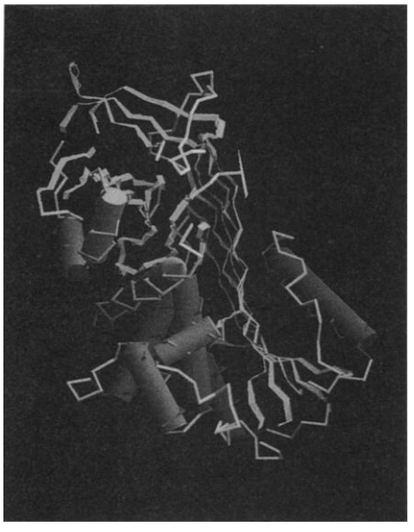
Potential applicants should write or call the office of The McKnight Endowment Fund for Neuroscience to request application forms and guidelines. Completed applications must be postmarked no later than January 2, 1992.

THE McKNIGHT ENDOWMENT FUND
FOR NEUROSCIENCE
600 TCF Tower • 121 South Eighth Street
Minneapolis, Minnesota 55402
Telephone 612-333-4220

VITAL NEW INFORMATION FOR LIFE SCIENCE RESEARCHERS

Technological Advances in Protein/Peptide Research:

Trends & Techniques for the '90s



A WORLDWIDE SCIENTIFIC SEMINAR TOUR SPONSORED BY APPLIED BIOSYSTEMS

Rapid advances in protein/peptide research have broadened the applications and increased the challenges of this dynamic field. As some scientists delve more deeply into the complexities of protein/peptide structure and function, and others find this information becoming vital to new areas of research, the incorporation of the latest powerful techniques becomes essential.

This event will feature leaders from a variety of scientific disciplines who will provide an overview of the trends and advances which are reshaping protein/peptide research. In addition, leading scientists from Applied Biosystems will chair interactive workshops discussing many techniques readily applicable to participants' current research needs.

The information presented at "Technological Advances in Protein/Peptide Research" can provide information critical to your research in today's demanding scientific environment. Call today to register for this important one-day offering in a city near you.

PLENARY SESSION TOPICS

- **Advances in Protein Structure Analysis/Prediction**
- **The Functional Role of Post Translational Modification**
- **Current Trends in Modern Glycobiology**
- **Characterization of Peptide/Protein-Based Therapeutics**

SPECIAL WORKSHOPS

- **The Role of PDMS in the Protein Structure Laboratory**
- **Microanalysis of Electroblotted Proteins**
- **Immunochemical Applications of Synthetic Peptides**
- **Capillary Electrophoresis and the Structural Analysis of Proteins and Peptides**
- **Approaches to Glycoprotein Structural Analysis**
- **New Approaches to the Micropreparative Isolation of Membrane and Native Proteins**

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Houston, TX: Thursday, October 17
Irvine, CA: Friday, October 18
San Francisco, CA: Monday, October 21
Rockville, MD: Wednesday, October 23
Philadelphia, PA: Thursday, October 24
Chicago, IL: Tuesday, October 29
Indianapolis, IN: Wednesday, October 30

SPACE IS LIMITED

For more information and to register, please call Applied Biosystems' Seminar Registration Hotline toll-free at 1-800-874-9868 x 7500.

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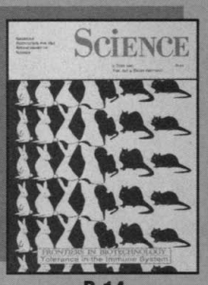

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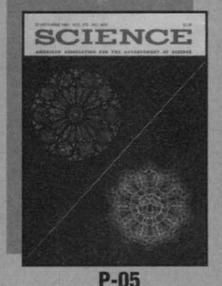

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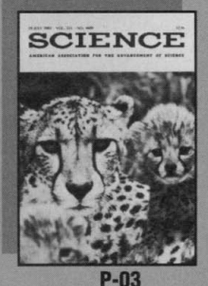

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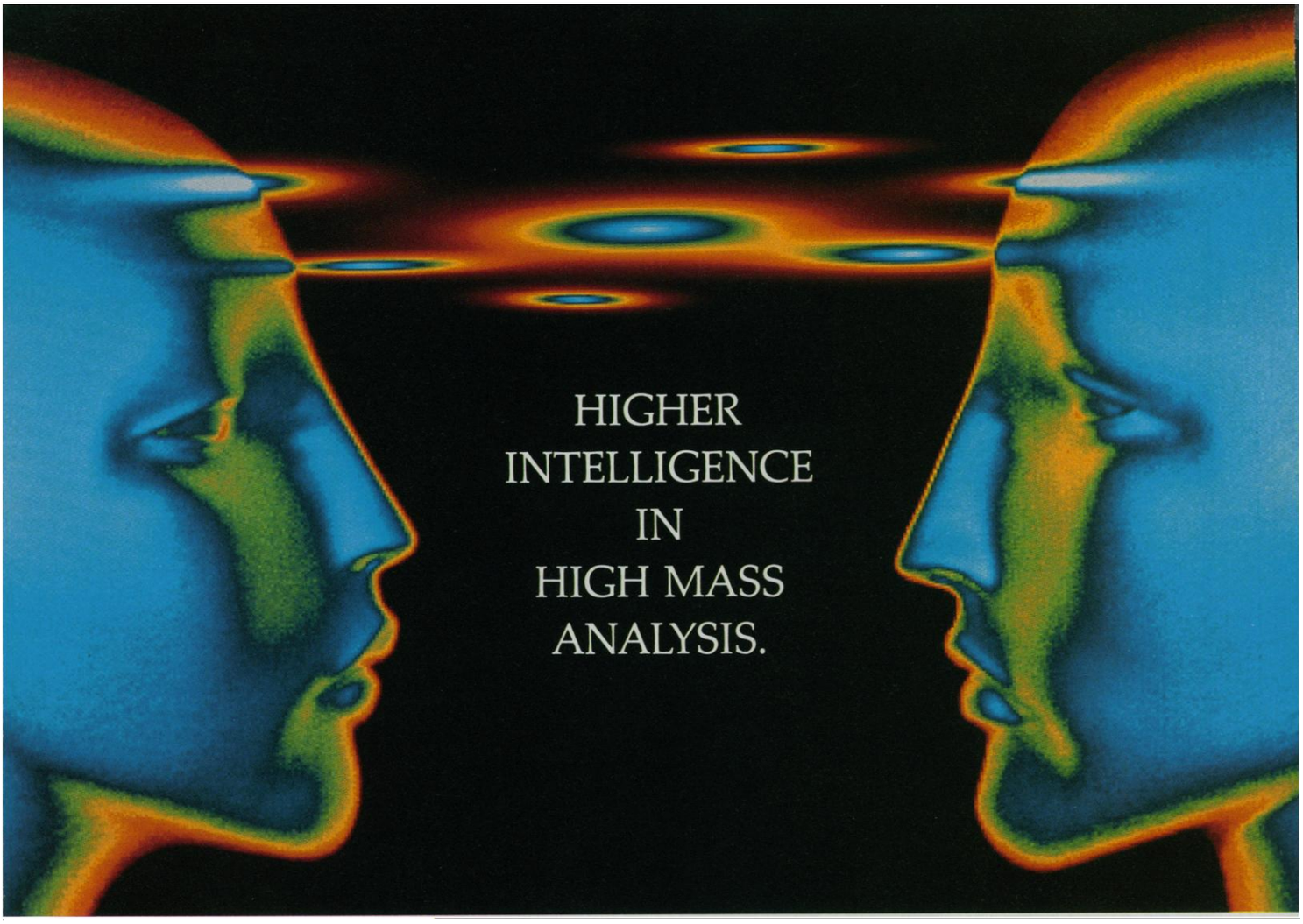

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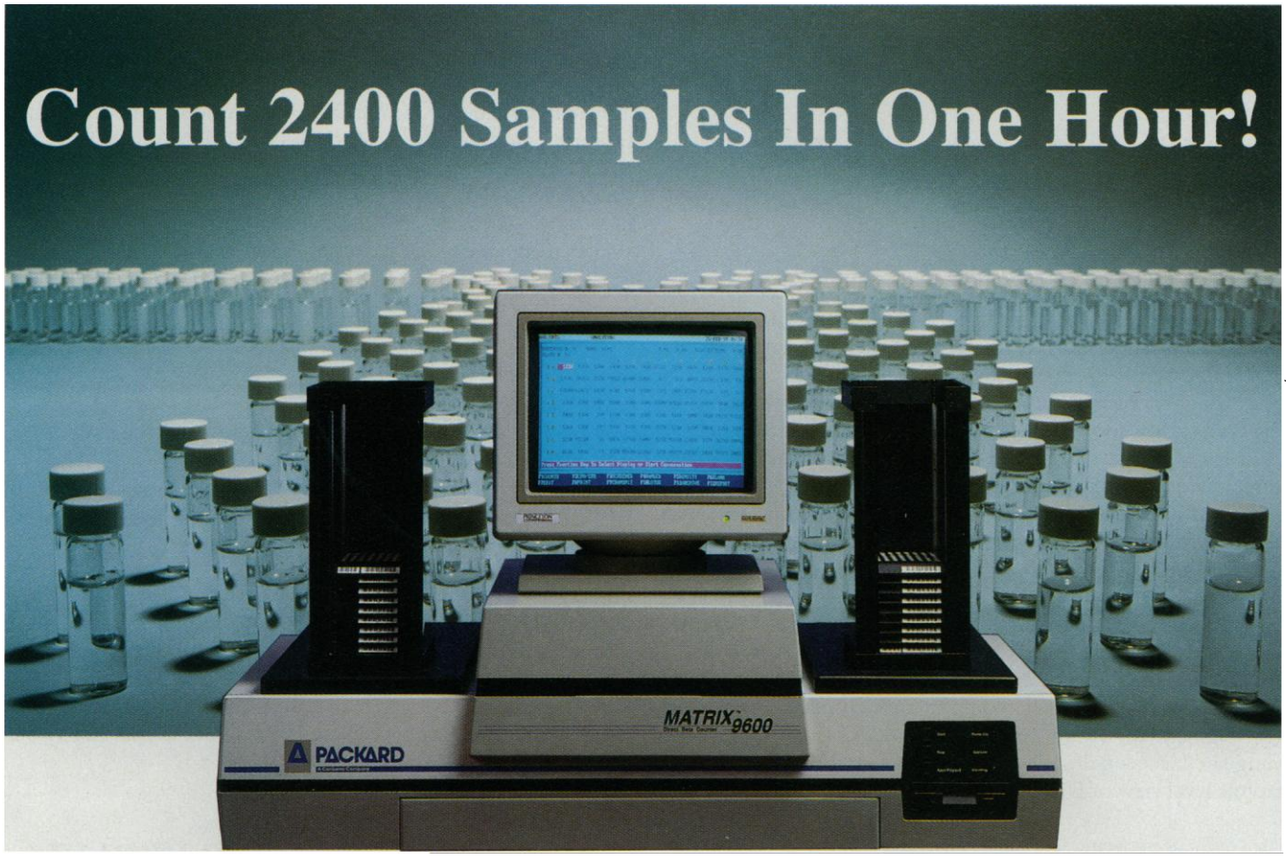

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