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SCIENCE

12 JULY 1996
VOL. 273 • PAGES 149–280
$7.00

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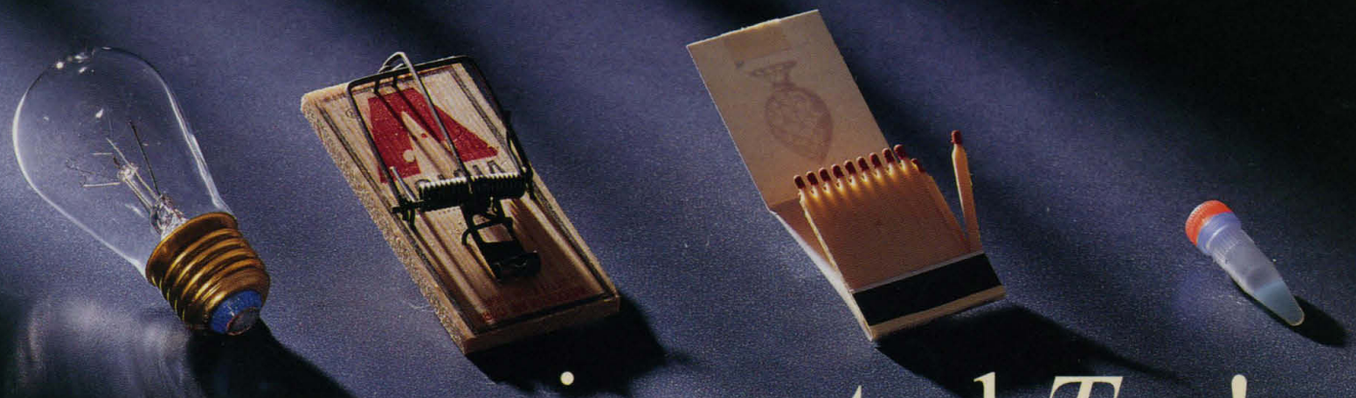

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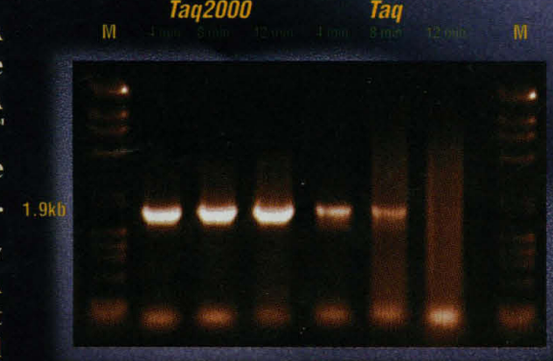

PCR amplifications were performed using Stratagene's *Taq2000* DNA polymerase or competitor's cloned *Taq* DNA polymerase. The PCR extension times were 4 minutes, 8 minutes and 12 minutes for a 1.9kb amplicon of transgenic mouse genomic target DNA.

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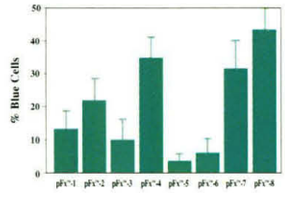

Figure 1: Percent blue cells produced by transfection of CHO cells with a lacZ control vector using PerFect Lipids™ (pFx™1 - pFx™8).

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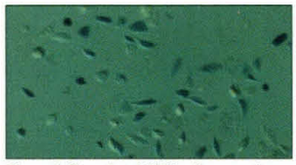

Figure 2: Transfected CHO cells expressing β-galactosidase, stained with X-gal.

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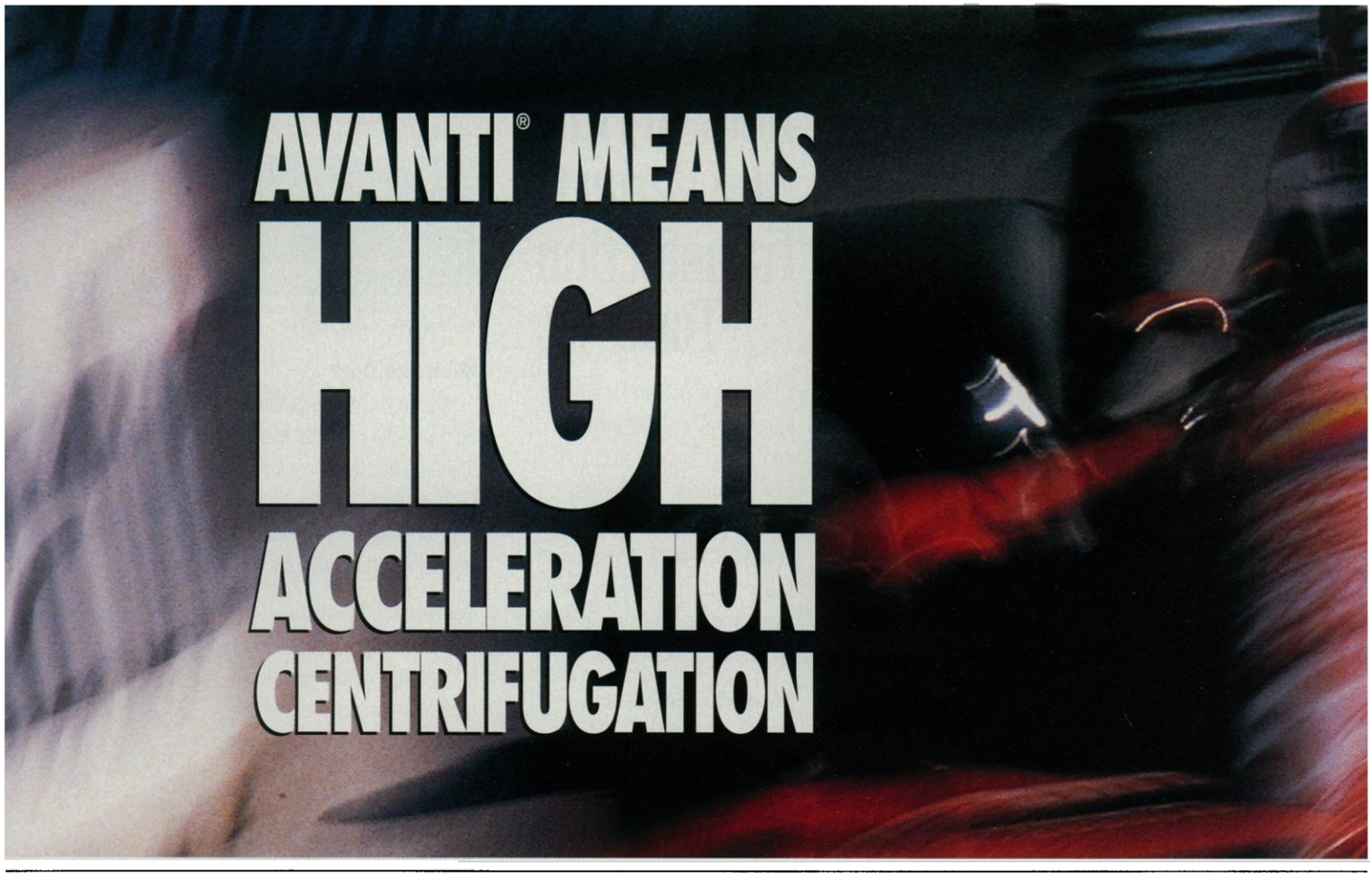
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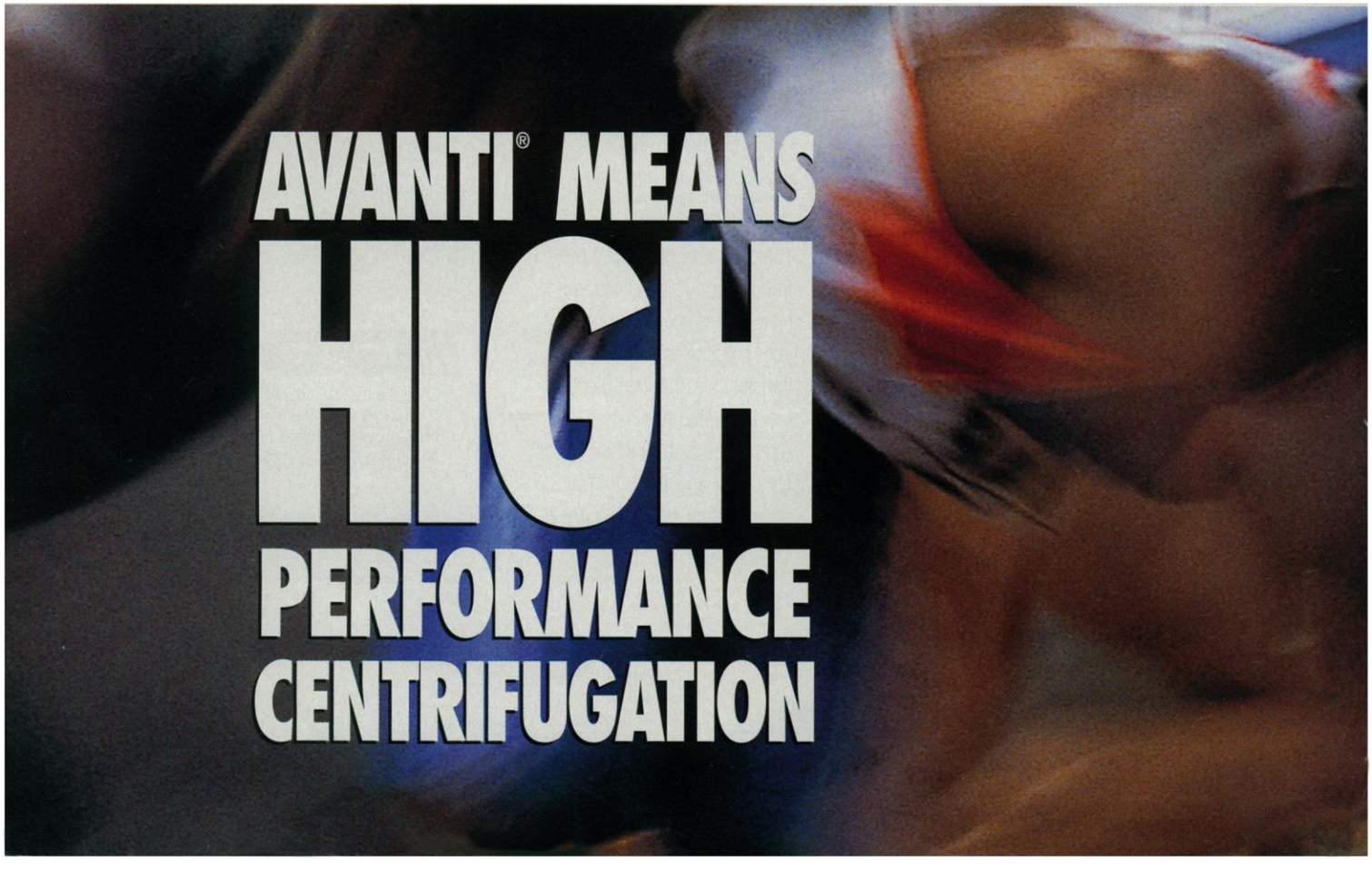
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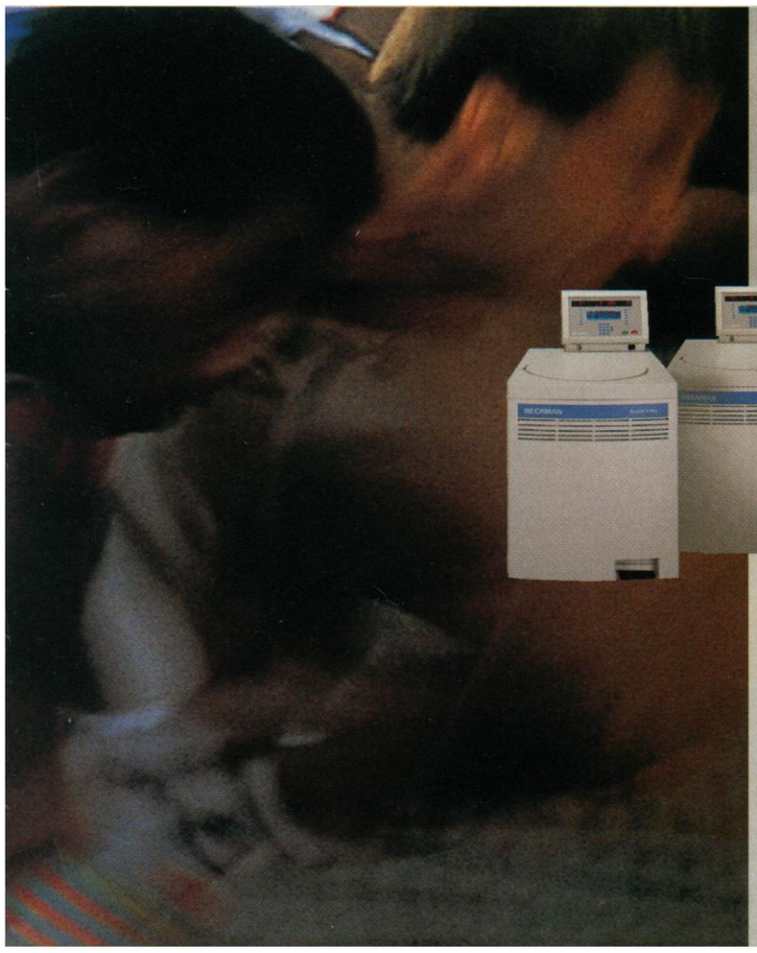

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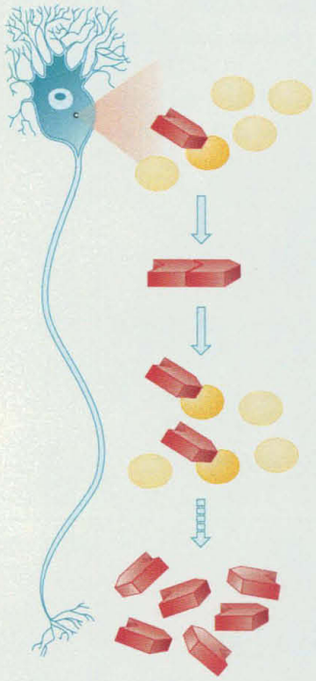

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Do prions mangle proteins?

NEWS

SPECIAL NEWS REPORT

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DEPARTMENTS

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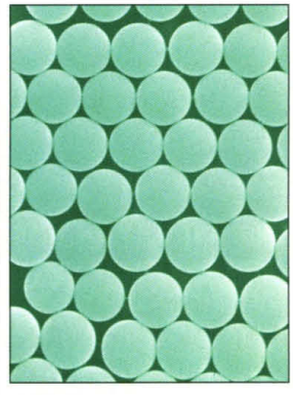
COVER

Section of a mural (dated 700 A.D.) found in an archeological site at Cacaxtla, Mexico [under protection of the Instituto Nacional de Antropología e Historia (INAH)]. The quetzal (70 centimeters, head to tail) is painted with Maya blue dye, a dye first discovered at Mayan sites. It is a mixture of clay, indigo, and metal particles in a silicate substrate. The clay and indigo form a superlattice, and scattered metal particles disperse light, producing this long-lasting blue color. See page 223. [Photo: Authorized reproduction of the INAH, under its responsibility.]

RESEARCH ARTICLE

REPORTS

TECHNICAL COMMENTS



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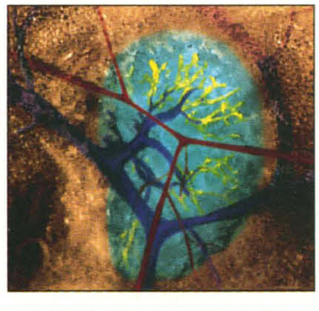
Porous polymers



252
Homing to the lymph nodes

Indicates accompanying feature

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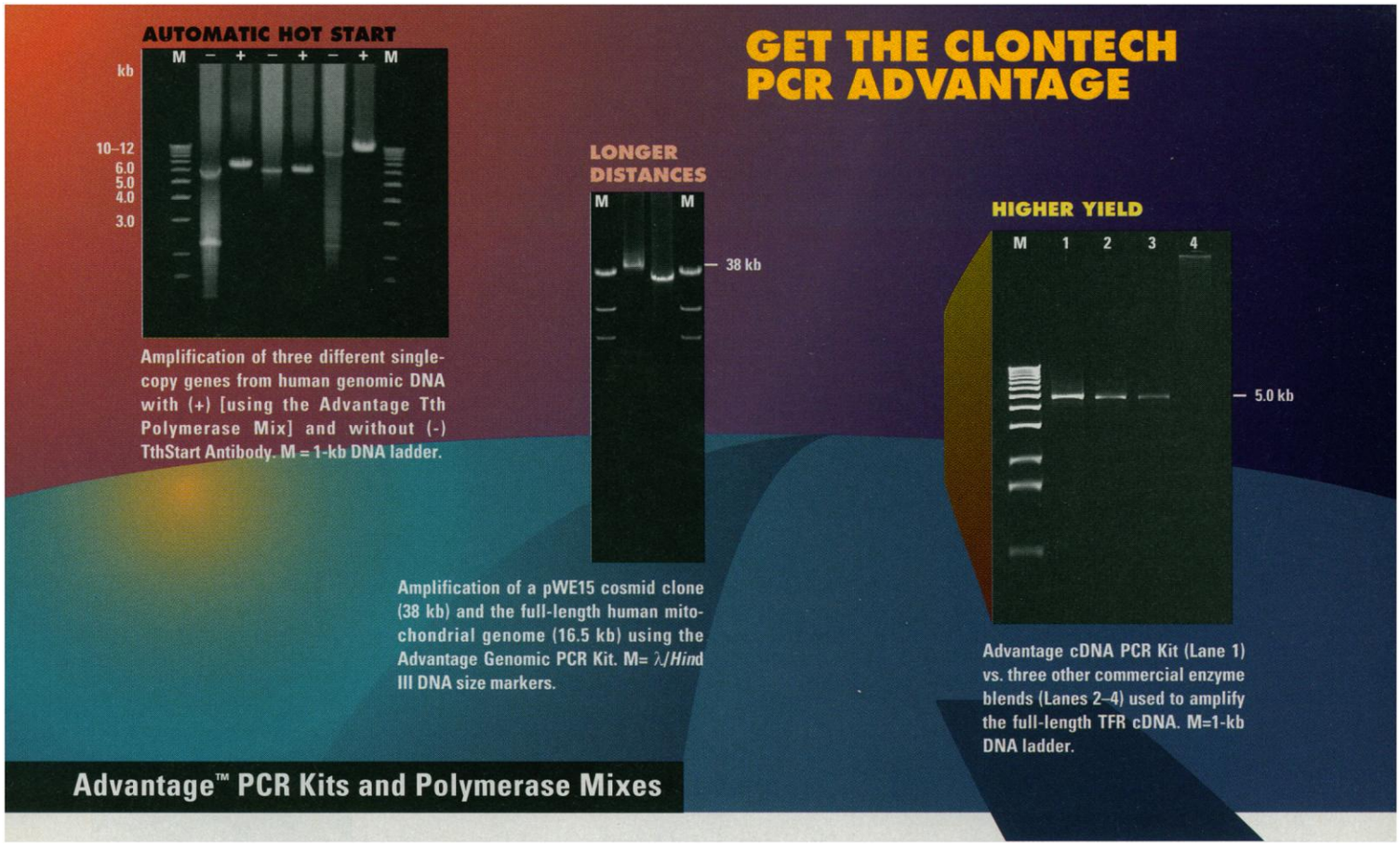

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(AD59033)

edited by PHIL SZUROMI

Symmetrical ice

Theoretical studies have predicted that the hydrogen bonds in water ice, when subjected to high pressure, could become symmetrical, but it has been difficult to study this effect experimentally. Goncharov *et al.* (p. 218) have measured the changes in the hydrogen bonds in protonated and deuterated ices to 210 gigapascals, using in situ synchrotron infrared reflectance spectroscopy in a diamond anvil cell. They find that at 60 gigapascals protonated ice transforms from a molecular solid with asymmetric hydrogen bonds to an ionic solid with symmetric hydrogen bonds.

■

Silver films with a silver mean

The fabrication of high-quality epitaxial films of metals on semiconductors, and vice versa, is difficult because the differences in surface diffusivity and in atomic bonding can lead to the patchy growth of thicker "islands" rather a uniform film. By using a two-step process of low-temperature deposition of a nanocluster film, followed by annealing, Smith *et al.* (p. 226) have grown epitaxial films of silver on gallium arsenide that are atomically flat over thousands of angstroms. The formation of the silver film requires a sharply defined critical thickness, and its surface is modulated by a long-range quasi-periodic arrangement with a "silver-mean" periodicity.

■

Maintaining a hold

Transcription elongation occurs in a ternary complex composed of RNA polymerase (RNAP), a DNA template, and a nascent RNA strand. The complex must resist complete dissociation yet must still allow movement along the DNA. Nudler *et al.* (p. 211; see the Perspective by Landick, p. 202) have found two components to RNAP-DNA interactions during elongation. The F contact, which may be used to mediate processivity, occurs ahead of the growing RNA and requires a zinc finger of the RNAP β subunit and a nonionic contact with 7 to 9 base pairs of duplex DNA. The R contact, which may maintain the nonprocessive complex, is mediated by the carboxyl terminus of RNAP β subunit and requires only the template strand of DNA.

An α-helical coat protein in HIV-1

The RNA genome of human immunodeficiency virus–type 1 undergoes packaging and unpackaging by accessory proteins during its life cycle. One of the major constituents of the mature virus is the p24 capsid protein, which also binds directly to the cellular protein cyclophilin, which in turn is the target of the immunosuppressive drug cyclosporin. Gitti *et al.* (p. 231) present the nuclear magnetic resonance structure of the core domain of the capsid protein, which, unlike other viral coat proteins, is almost entirely α-helical. Further, the proline residue on which cyclophilin, a proline rotamase, may act is revealed in both its cis and trans forms, suggesting a role for cyclophilin in the disassembly of the capsid that occurs after viral entry into a cell.

■

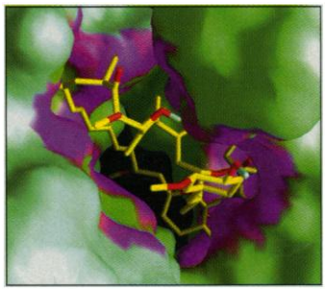
Measles and depressed immunity

The century-old observation that intercurrent measles infection depresses cell-mediated immunity to other infectious agents may at last be explained. The receptor for the measles virus on the surface of human monocytic cells is a molecule known as CD46. Karp *et al.* (p. 228) show that the cross-linking of CD46 by infecting virus particles (productive infection by the virus is not required) down-regulates the production of the cytokine interleukin-12. Because interleukin-12 is critical for the development of the cell-mediated response, the host is left vulnerable to infection by intracellular pathogens.

■

Held together

Biochemical signals that alter cellular function are often mediated by dimerization of proteins. An example is immunosuppression by rapamycin, a small cell-permeable molecule that causes the association of FKBP12 (the FK506-binding protein) and another protein called FRAP (the FKBP-rapamycin–associated protein). Choi *et al.* (p. 239; see the news story by Balter, p. 183) present the crystal structure of the binding domain FRAP in a tertiary complex with FK506 and FKBP12. Rapamycin holds the complex together by interacting with both proteins, whereas there is little interaction of the proteins themselves. This structural information on FRAP may help to elucidate the properties of related proteins that have important functions in control of the cell cycle, DNA repair, and recombination.



■

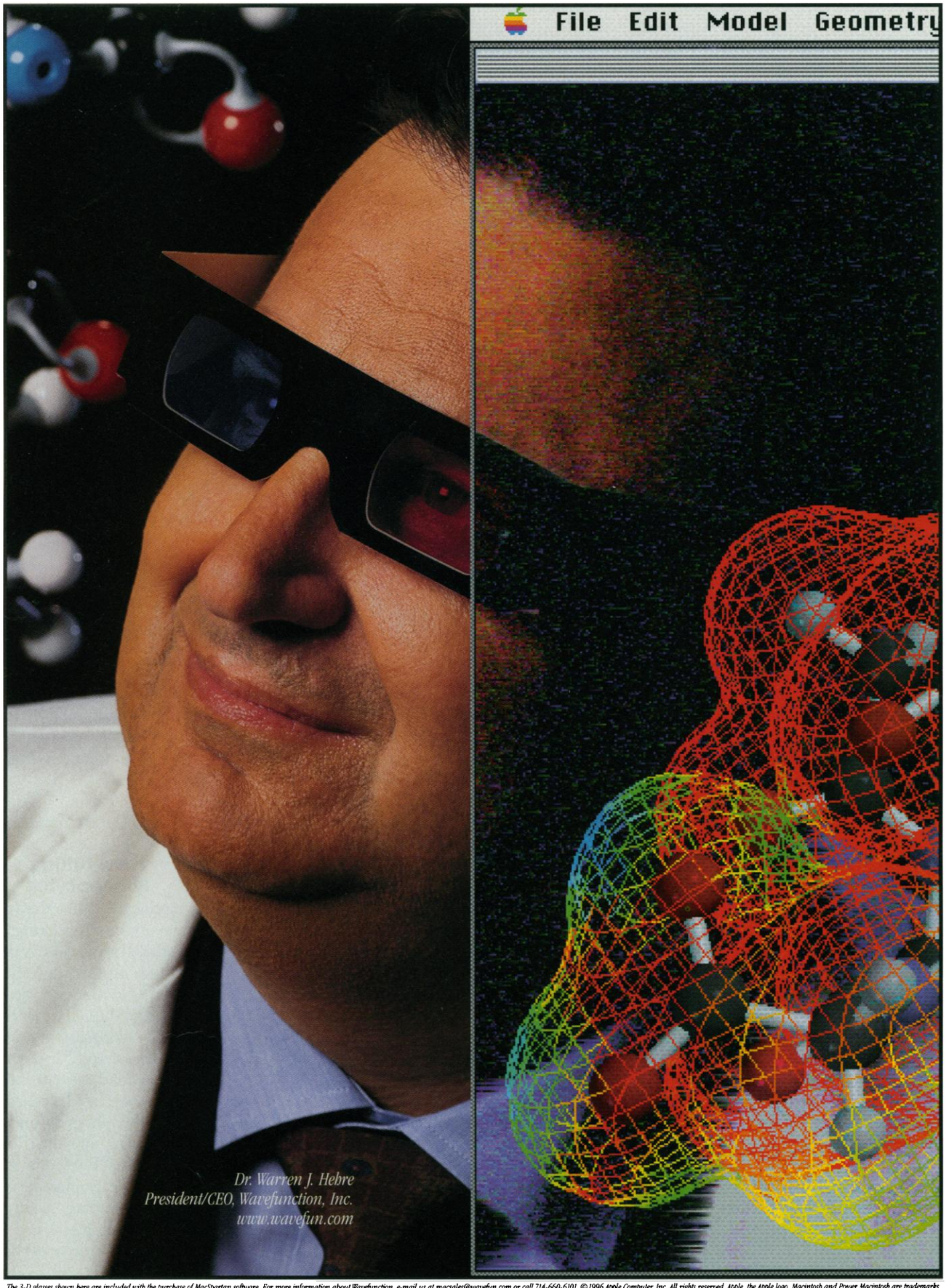
Mismarked stem cells?

All blood cells start life as hematopoietic stem cells (HSCs), and these critical progenitor cells have been characterized as those carrying the CD34 marker. However, when Osawa *et al.* (p. 242) used a monoclonal antibody to the mouse analog of CD34 to purify mouse HSCs, the primitive adult bone marrow HSCs were in the none-to-low fraction for this marker. Such cells were used to temporarily reconstitute the immune system of lethally irradiated mice. These results suggest that CD34 may not be an exclusive marker for HSCs.

■

Hitchhiking lymphocytes

Lymphocytes enter the lymph nodes by moving along high endothelial venules (HEVs) with a rolling motion that can be mediated by the binding of L-selectin on the cell with peripheral node addressin on the HEVs. Diacovo *et al.* (p. 252) now show that a second mechanism can operate. Activated platelets can bind to lymphocytes and produce rolling motion through the platelets' P-selectin receptor, even for lymphocytes lacking L-selectin. This second pathway may help platelets deliver lymphocytes to areas of chronic inflammation.



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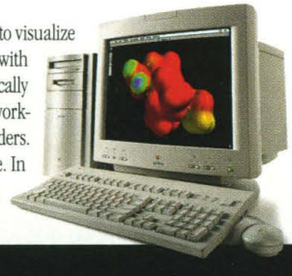

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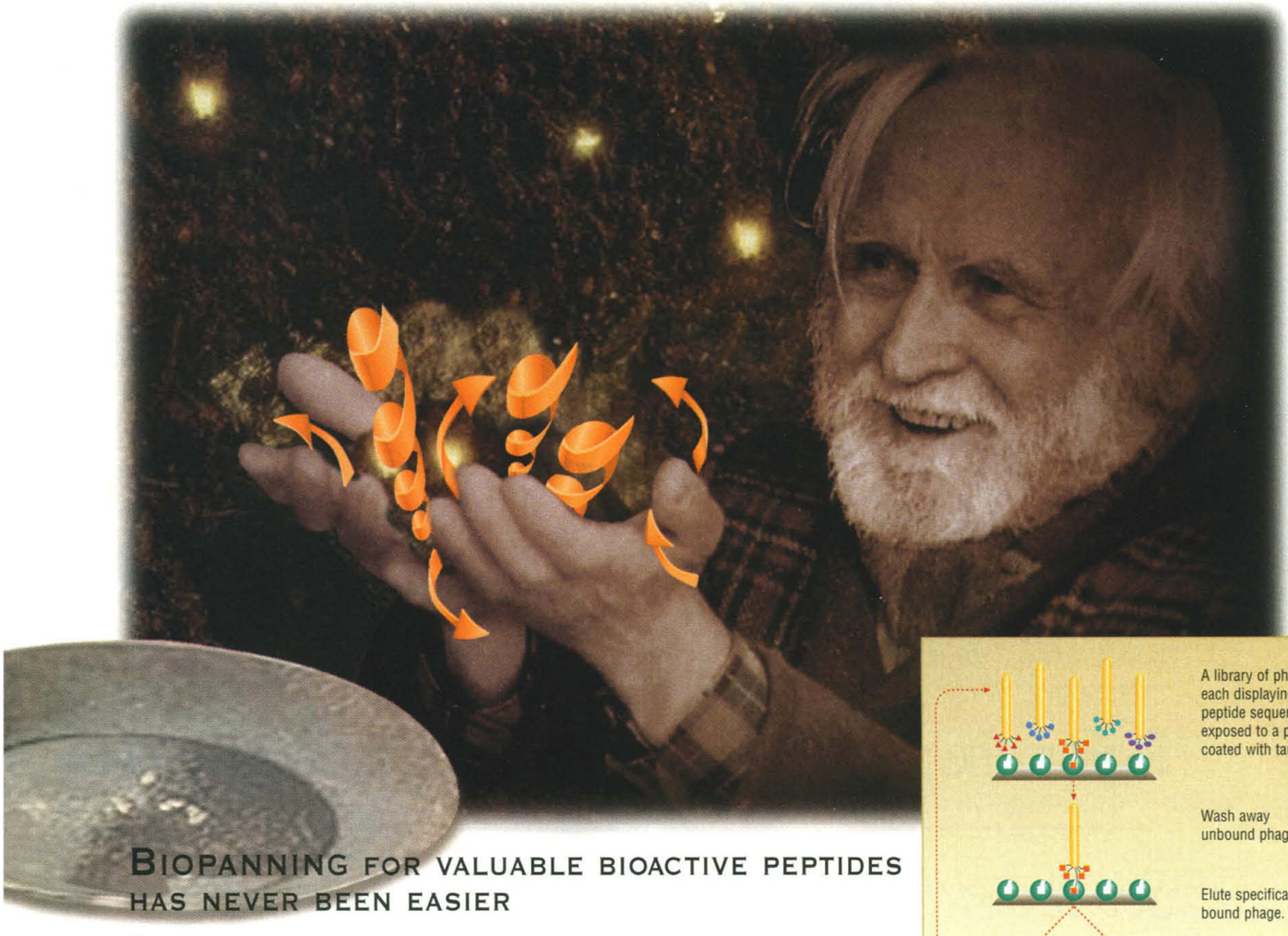

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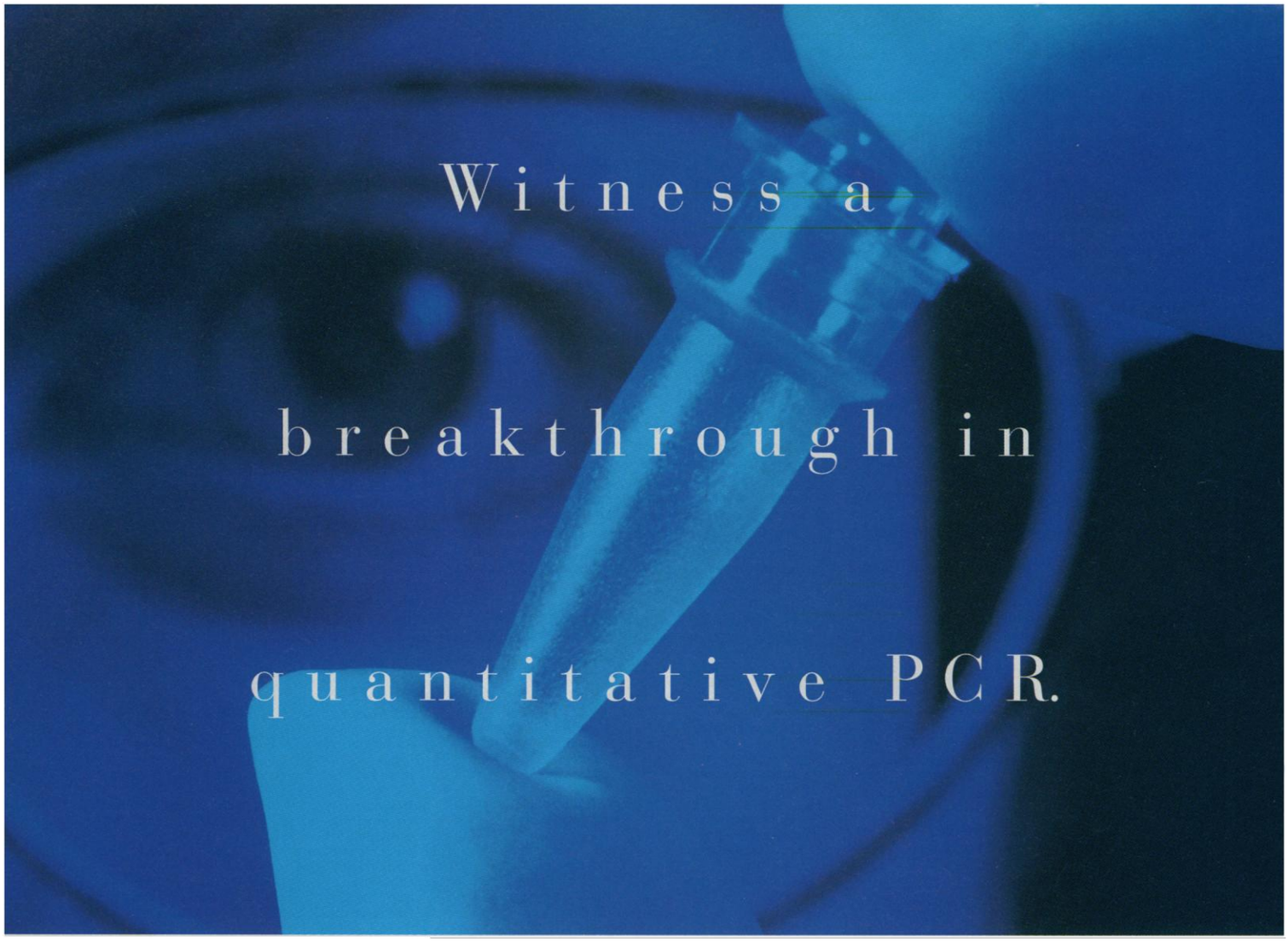

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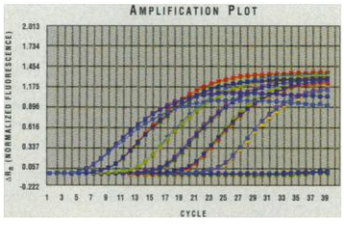

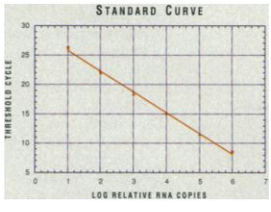

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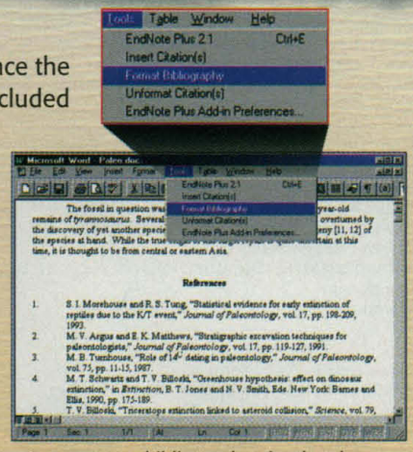

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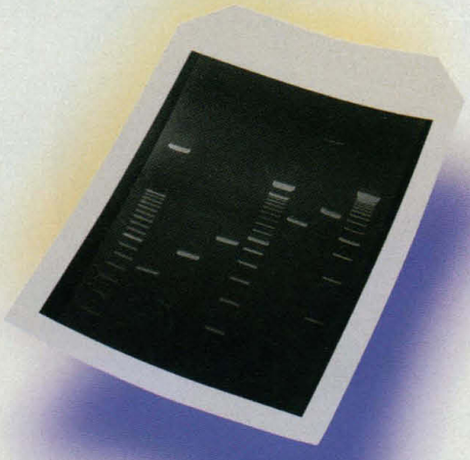

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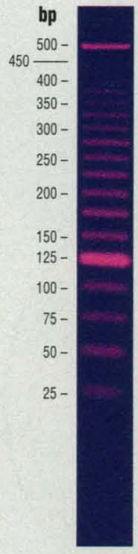

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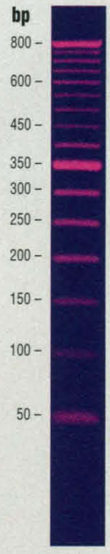

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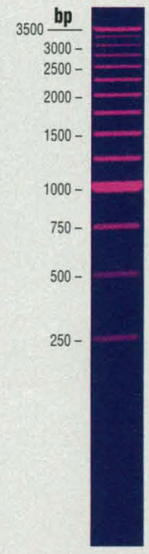

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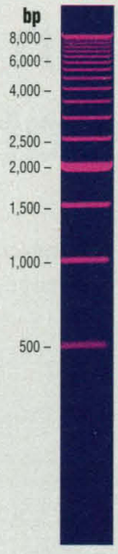

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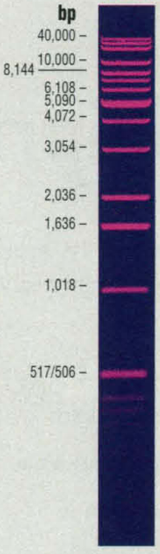

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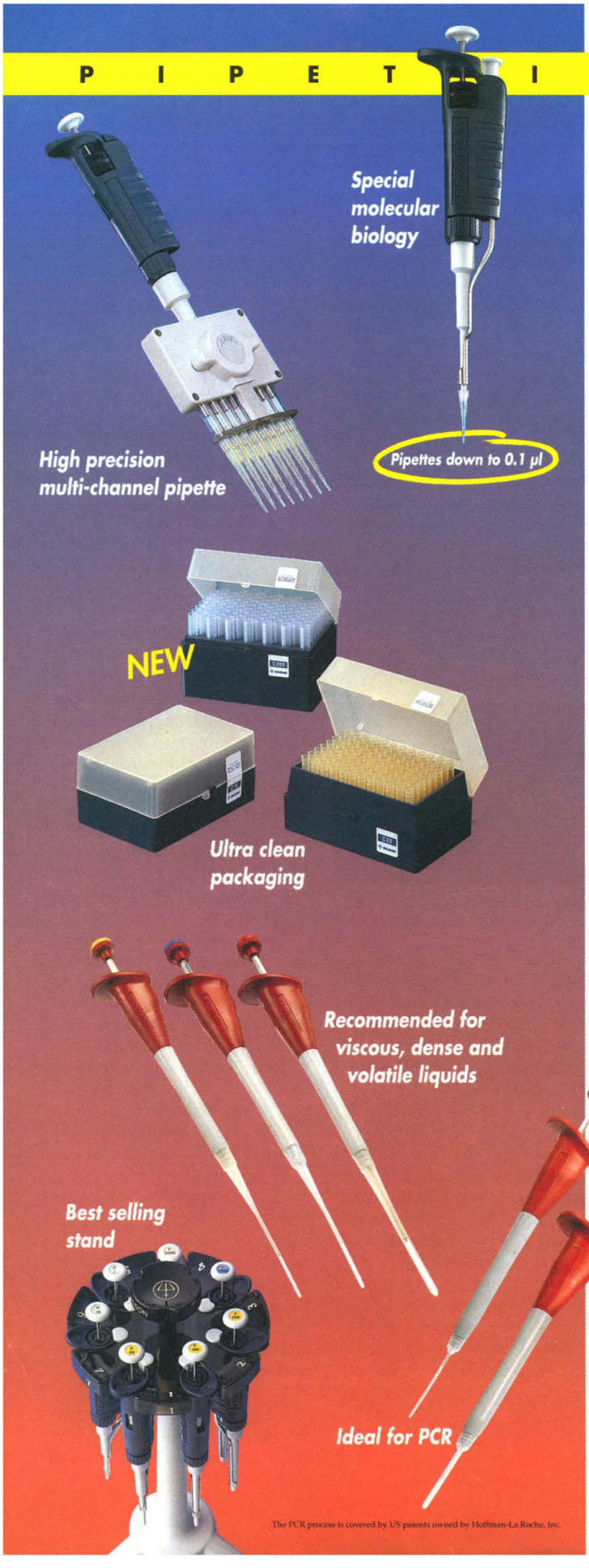

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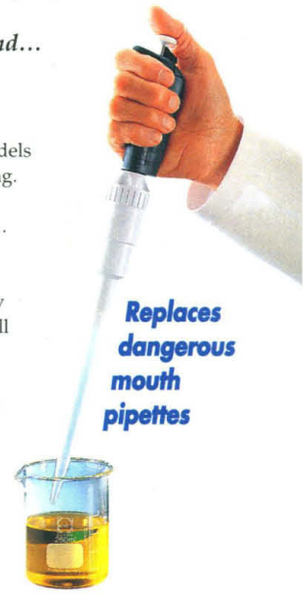

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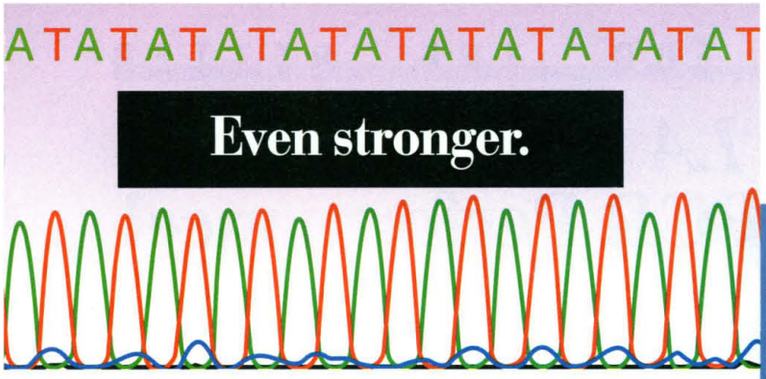

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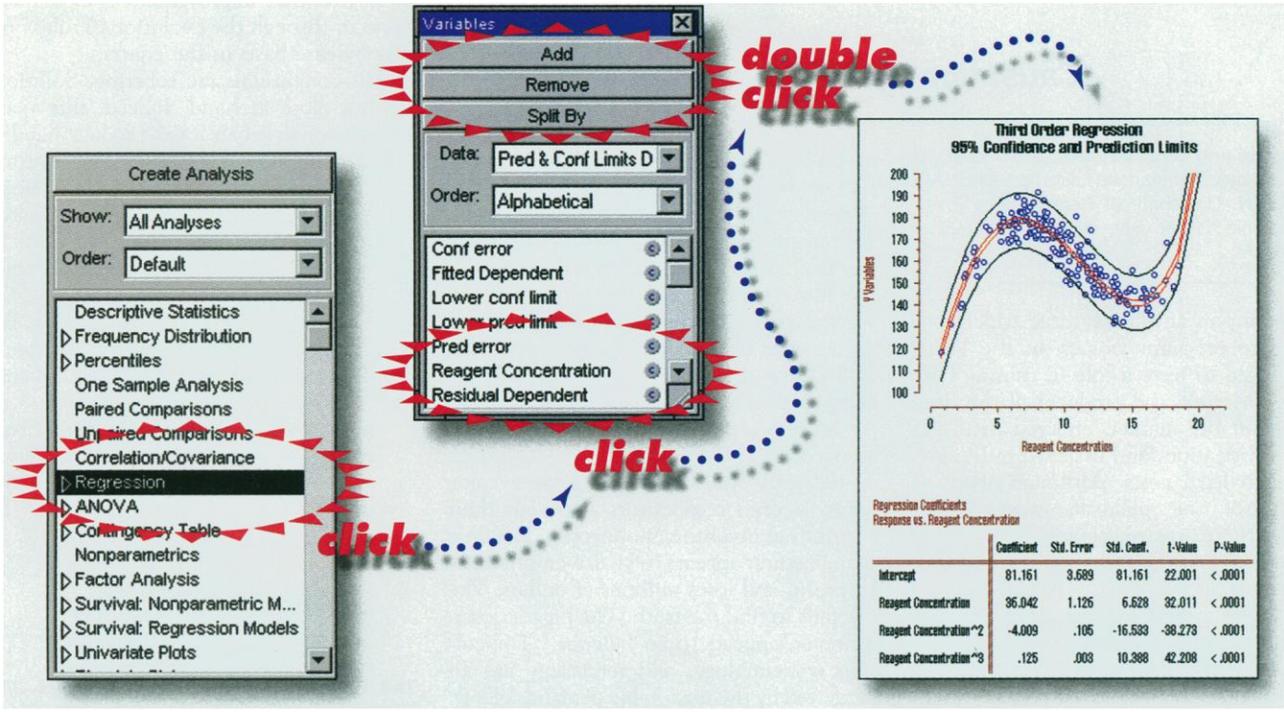

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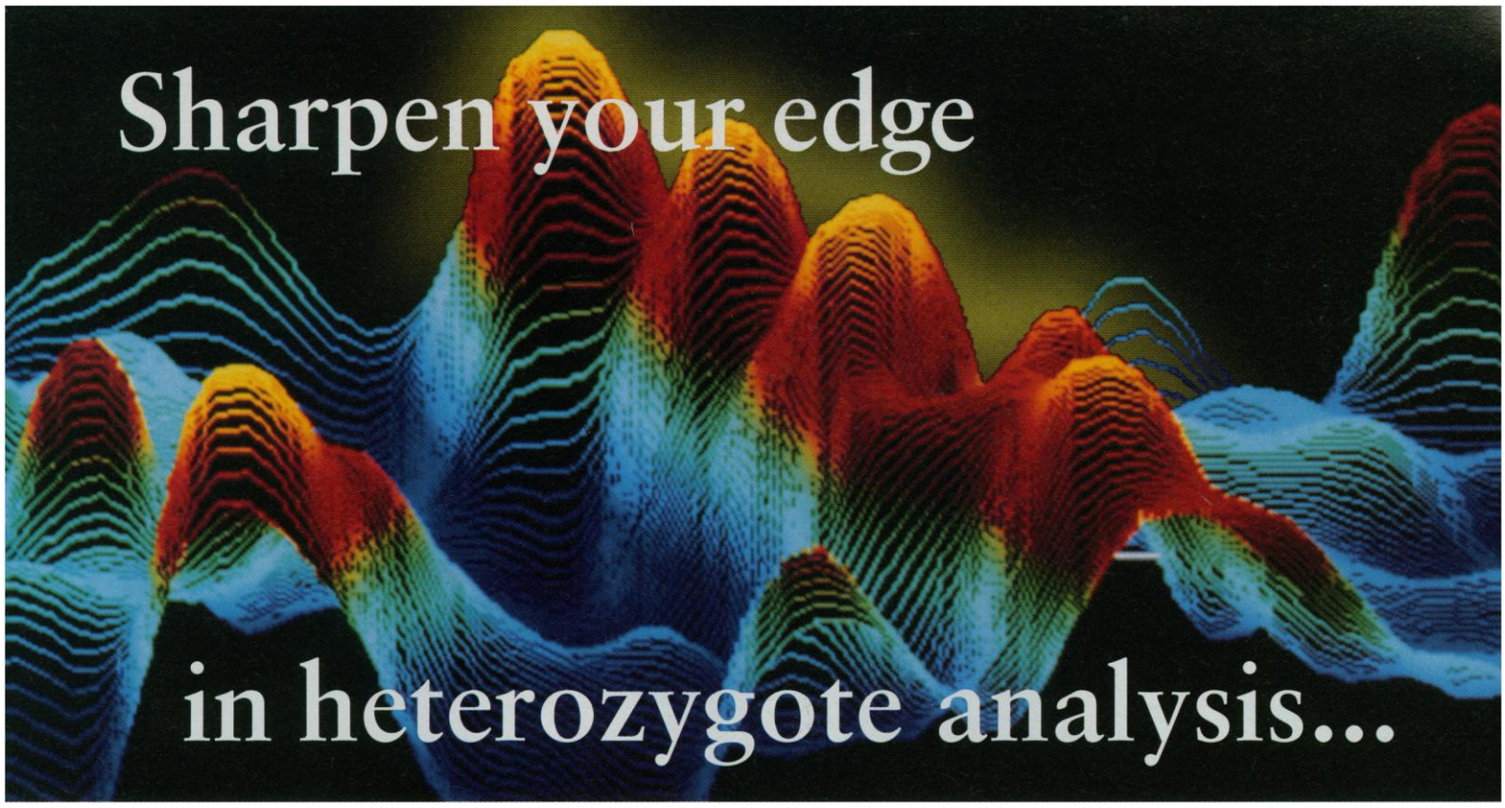

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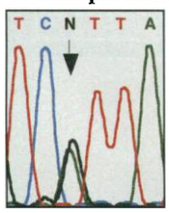
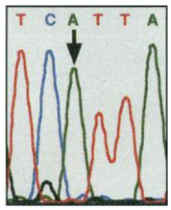


Heterozygous A and G



Homozygous A

* The Polymerase Chain Reaction (PCR) is covered by patents owned by Roche Molecular Systems and F Hoffman-LaRoche Ltd. A license to use the PCR process for certain research and development activities accompanies the purchase of certain reagents from licensed suppliers such as Amersham International plc and Affiliates when used in conjunction with an authorized thermal cycler.

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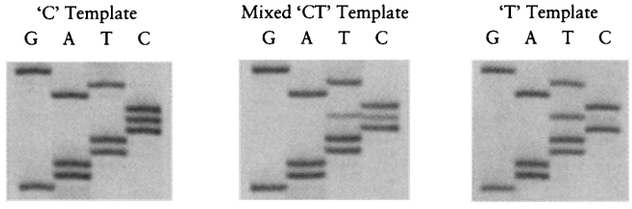

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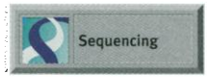

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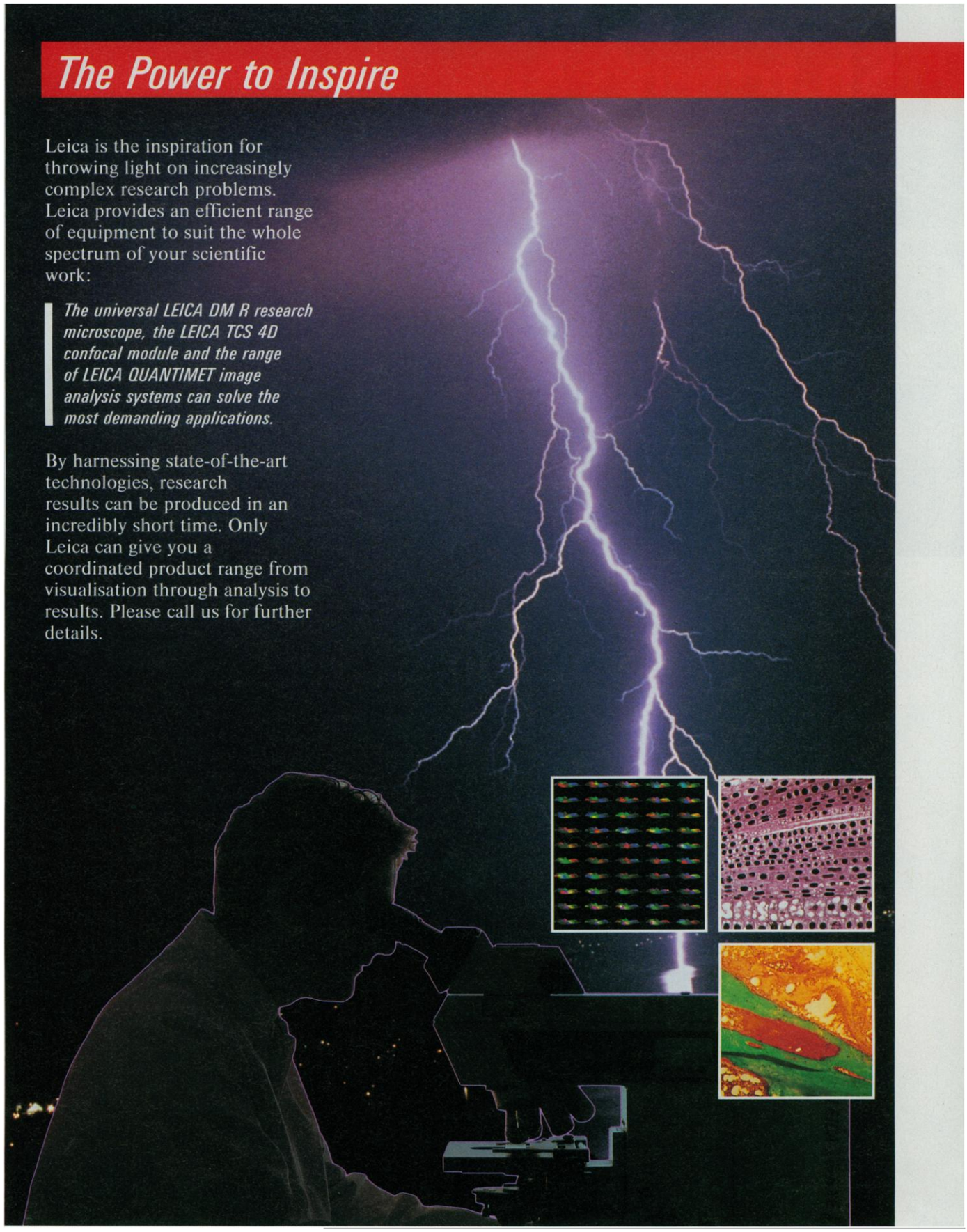

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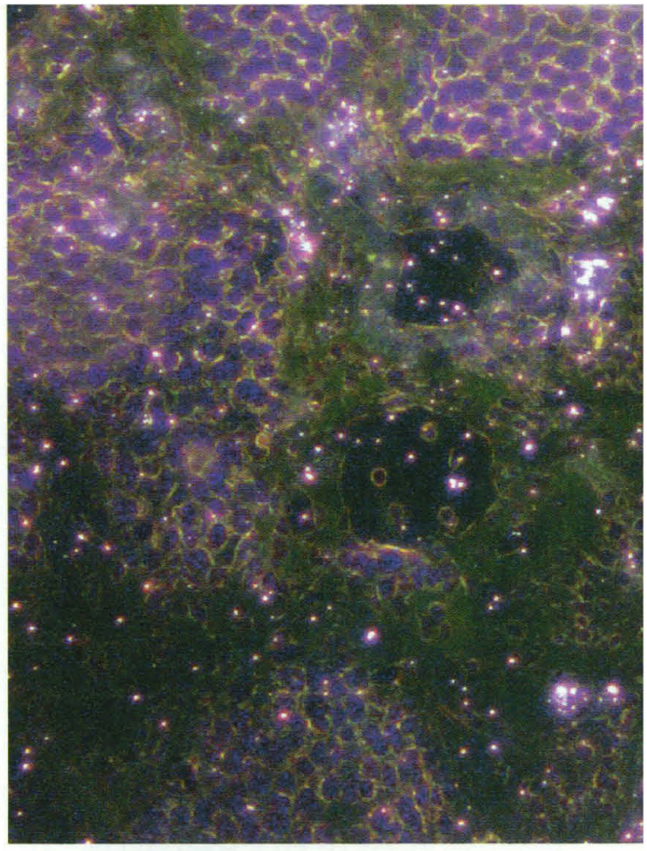

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