

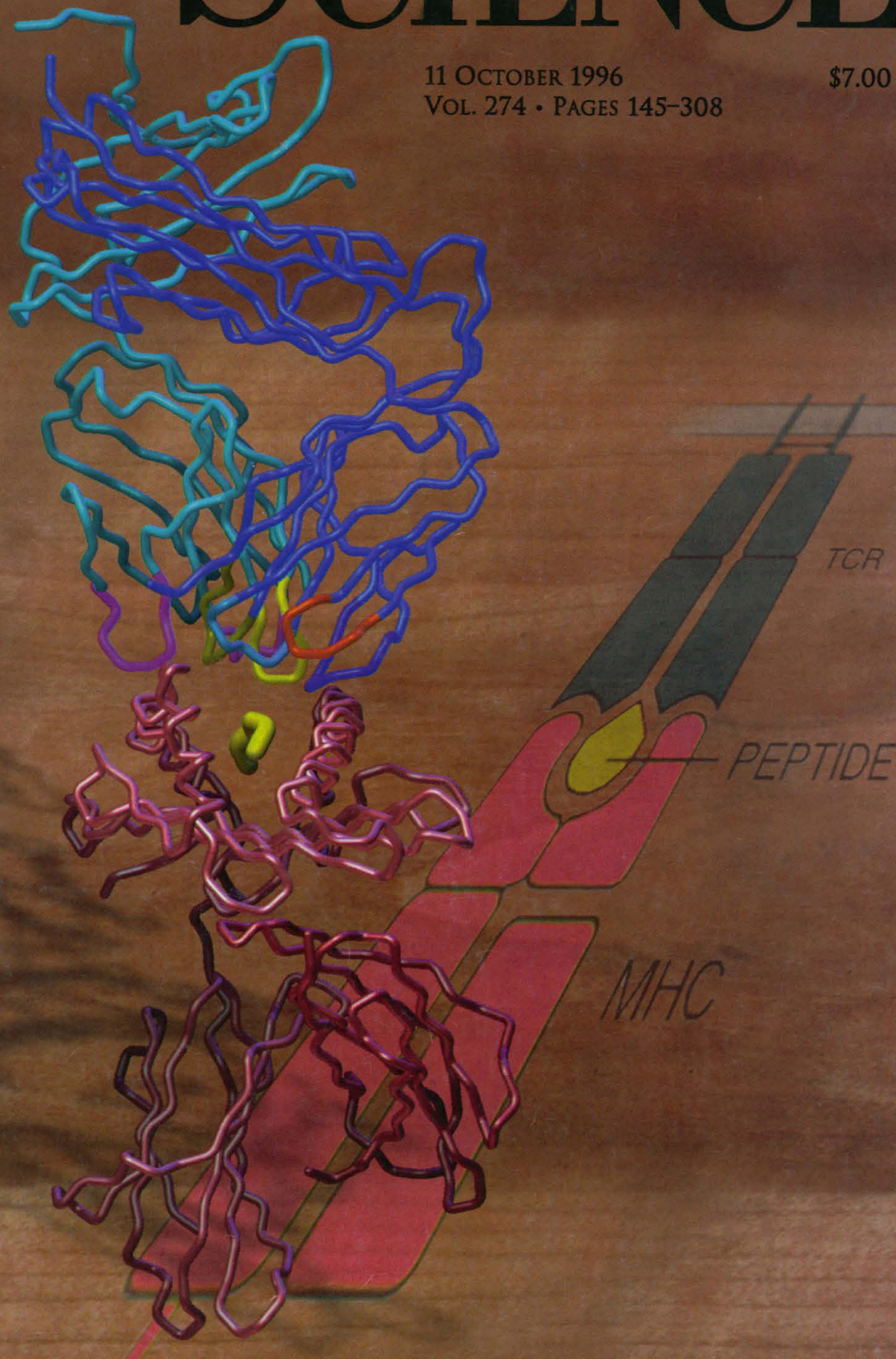


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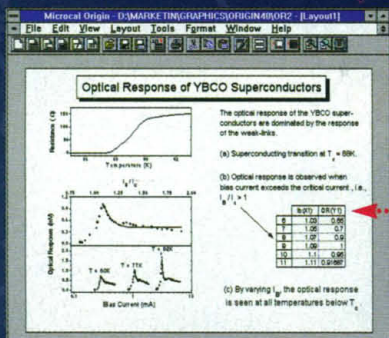
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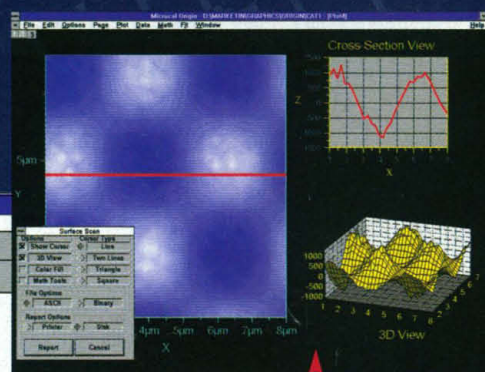
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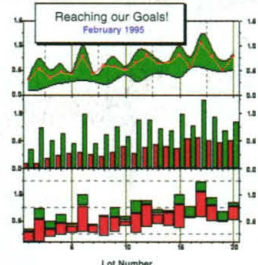
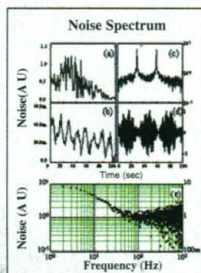
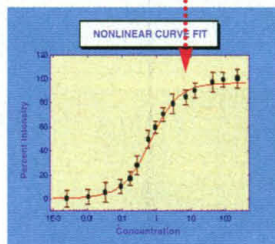
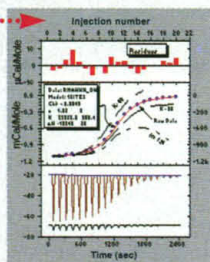
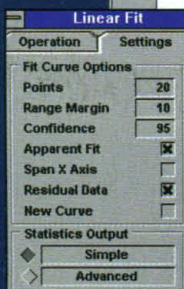
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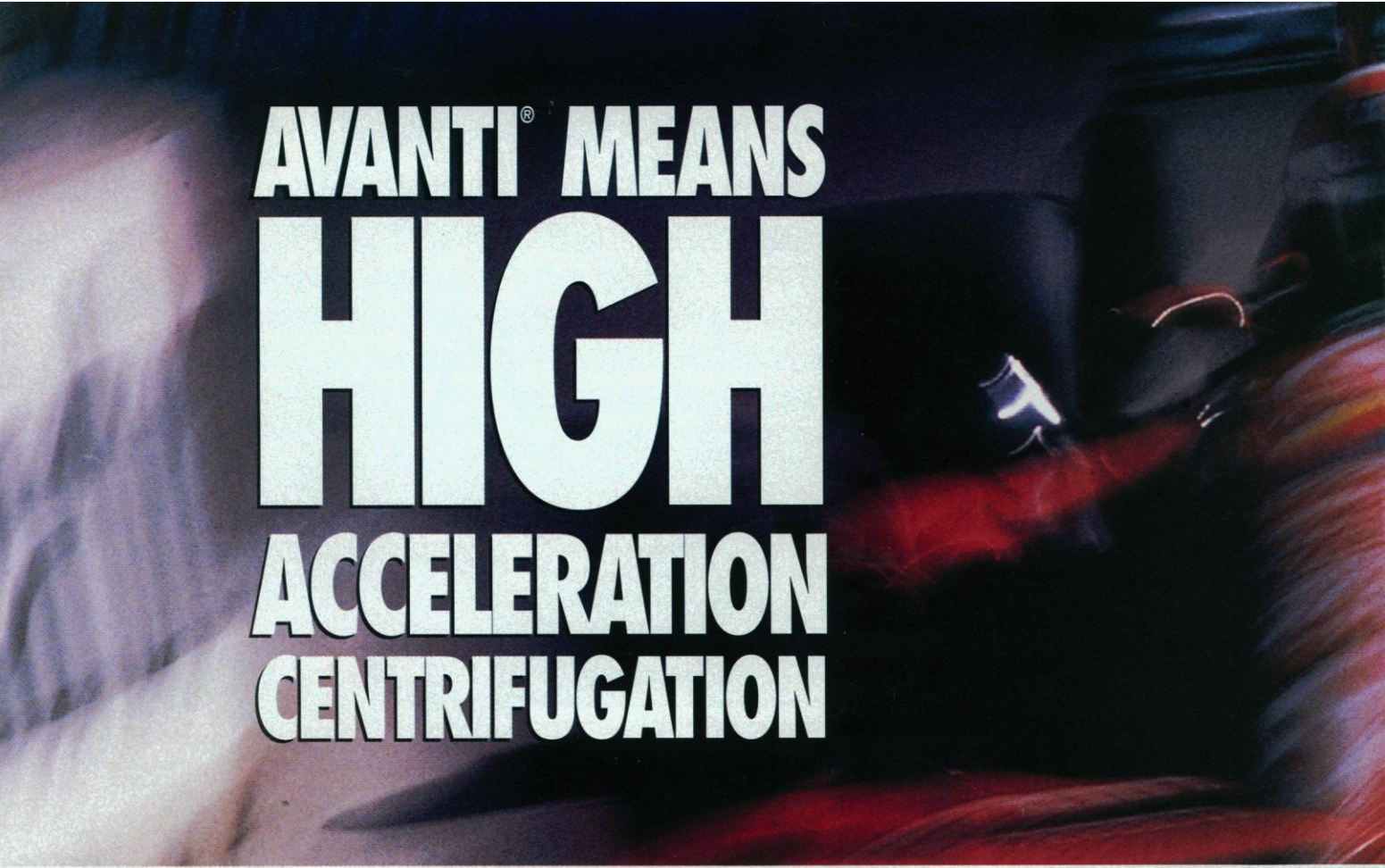
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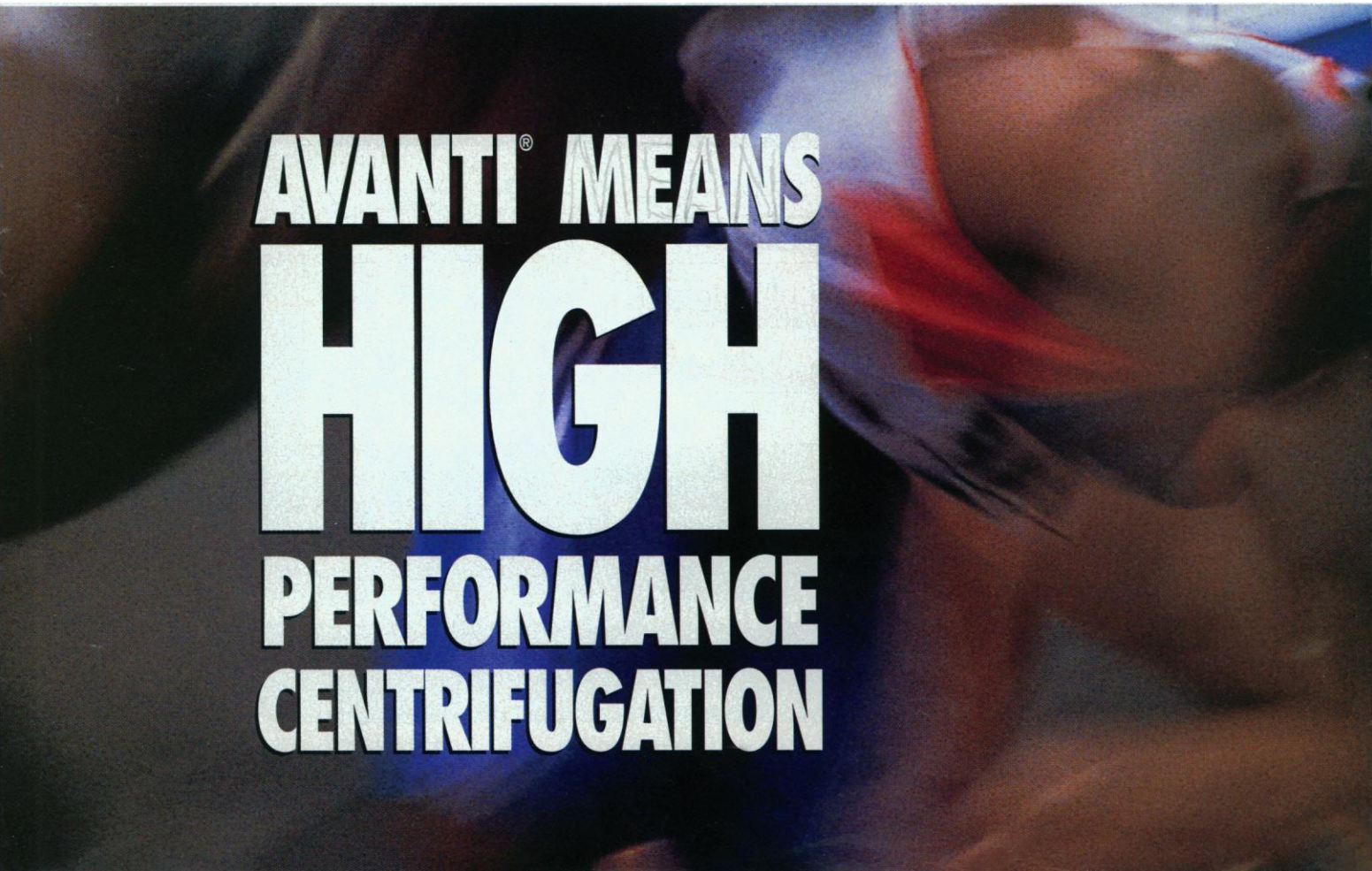
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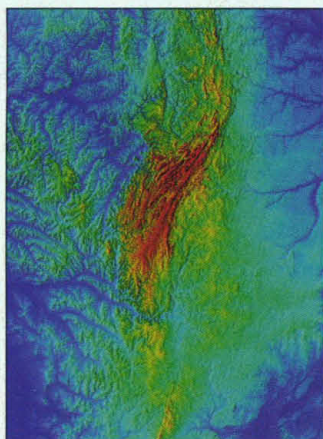
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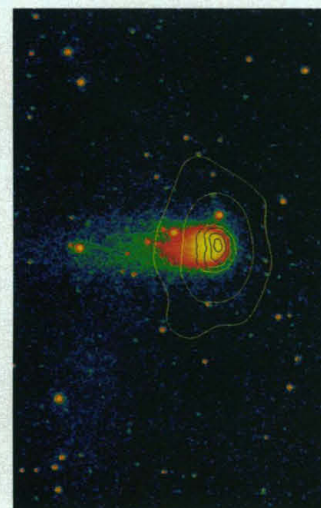
Crystal structure of the T cell receptor (TCR) (blue), showing its orientation bound to a major histocompatibility complex (MHC) molecule (red). The classic model (background, from *Immunobiology*, C. A. Janeway and P. Travers, Garland Press and Current Biology, London)

placed the TCR over the MHC groove, but in an unknown orientation. The TCR interacts with the MHC bound to a peptide antigen (yellow) through its hypervariable loops (red, blue, and yellow). See page 209 and the News story on page 176. [Image: M. Pique, K. C. Garcia, and I. A. Wilson]



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Hyakutake's
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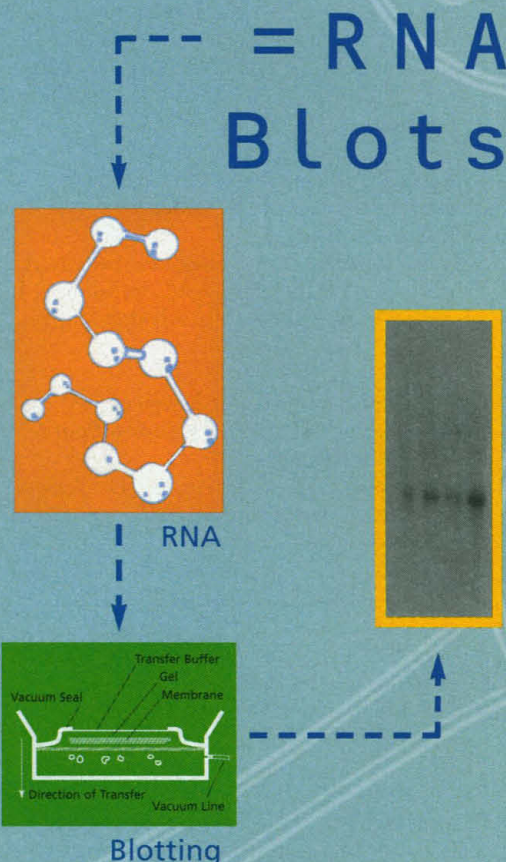
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Cometary x-rays

When comet Hyakutake made its close approach to Earth, perhaps the most unexpected observation was that of x-ray and ultraviolet emission detected by the Roentgen X-ray Satellite and the Rossi X-ray Timing Explorer. Lisse *et al.* (p. 205) suggest that the emission might be due to the interaction of the comet with the solar wind, the solar magnetic field, or both. Although the exact mechanism that produced these cometary x-rays remains unclear, the next cometary interloper into our solar system will likely be scrutinized in these higher frequency ranges.

Roots of the Urals

The Ural Mountains mark the collision of Asia and Europe that began about 300 million years ago during the assembly of the Pangea supercontinent. Unlike the sutures in the Appalachians or Alps, the suture created by this collision was preserved in the continental interior during the subsequent breakup of Pangea. Four reports (beginning on p. 220; see the news story by Kerr, p. 181) highlight results from an international seismic experiment to investigate the nature of this crustal suture at depth. The crust in the Urals may extend to depths of up to 60 kilometers and the mantle lithosphere (the region without melt) may extend to 150 kilometers.

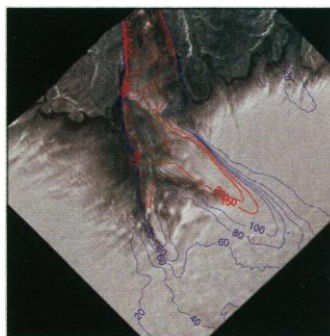
Surging ahead

Knowledge of the variability in the discharge of the large Greenland and Antarctic ice sheets is critical for evaluating their stability. Rapid transient

Role of cholesterol in development

Cholesterol has yet another essential role in biology. Porter *et al.* (p. 255; see the Perspective by Martin, p. 203) show that it is attached to the Hedgehog (Hh) proteins, which are key regulators of pattern formation, during embryogenesis. The Hh precursor undergoes autoproteolysis to form an amino-terminal domain (Hh-N) that has Hh signaling activity and a carboxyl-terminal (Hh-C) domain. During this process, Hh-C mediates the attachment of cholesterol to Hh-N. This cholesterol tag minimizes diffusion of the Hh-N signal and may control its short-range versus long-range effects in embryonic development.

increases in the speed (surges) of small glaciers have been identified for some time, but the variability in the recent discharge of the larger ice sheets has been uncertain. Joughin *et*



al. (p. 228) now show, using satellite radar interferometry observations, that the speed of an outlet glacier of the Greenland Ice Sheet, the Ryder Glacier, increased abruptly by a factor of 3 near the end of 1995.

Ultrashort x-ray pulses

Although x-ray methods can provide very high structural resolution, it has been difficult to generate ultrashort x-ray pulses, and high-resolution dynamical studies (on the order of 100 femtoseconds, or roughly one molecular vibration) have generally been limited to optical spectroscopy. Schoenlein *et al.* (p. 236) have demonstrated

the production of 300-femtosecond x-rays with a wavelength of 0.4 angstroms. They scattered intense infrared laser pulses off a beam of highly relativistic electrons in an accelerator. In a Perspective, Eisenberger and Suckewer (p. 201) discuss how these results relate to other approaches for generating short x-ray pulses.

TCR structure, alone and with MHC

The interaction of the α and β chains of the T cell receptor (TCR) with peptides bound by the major histocompatibility complex (MHC) governs the recognition of foreign antigens by T cells. Previous structural studies of the β chain and part of the α chain showed that these molecules resemble immunoglobulins, but crystals revealing the interactions within the intact $\alpha\beta$ receptor have been difficult to obtain. Garcia *et al.* (p. 209; see cover and the news story by Service, p. 176) overexpressed a fully glycosylated form of a particular $\alpha\beta$ TCR, TCR 2C. The high-resolution structure of this receptor resembles that of an antibody except for the constant (C) domain of the α chain (C α) and the interactions between C α and C β . An analysis at lower

resolution of crystals of this receptor with the MHC molecule H-2K^b shows how different TCR domains are positioned relative to the MHC peptide binding groove.

Means to a chromosome end

Telomeres, the structures at the ends of chromosomes, must be maintained by the telomerase enzyme during cycles of cell division or else the telomeres gradually shorten, which leads to aging of the cells. Nugent *et al.* (p. 249) identified yeast mutants that exhibited the telomerase-defect phenotype. One of the responsible genes, *EST4* (*EST*, ever shorter telomeres), is actually an allele of *CDC13*, which has been previously implicated in telomere function. The authors show that the *CDC13* protein binds to single-stranded telomere DNA and has two functions: one is to protect the end of the chromosome from degradation and the other is to mediate access of telomerase to the chromosome terminus.

Budding caveolae

The role of caveolae (membrane invaginations on the plasma membrane of mammalian cells) in membrane traffic and the mechanism by which caveolae promote the internalization of a variety of extracellular ligands have been controversial. Schnitzer *et al.* (p. 239) now show that caveolae are released from isolated plasma membranes *in vitro* and from the plasma membranes of permeabilized cells in the presence of guanosine triphosphate and cytosol.

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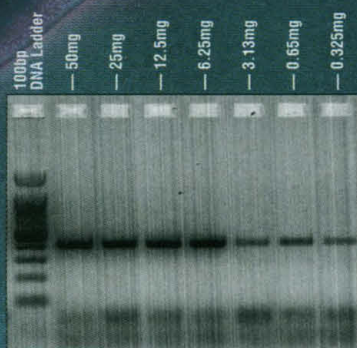
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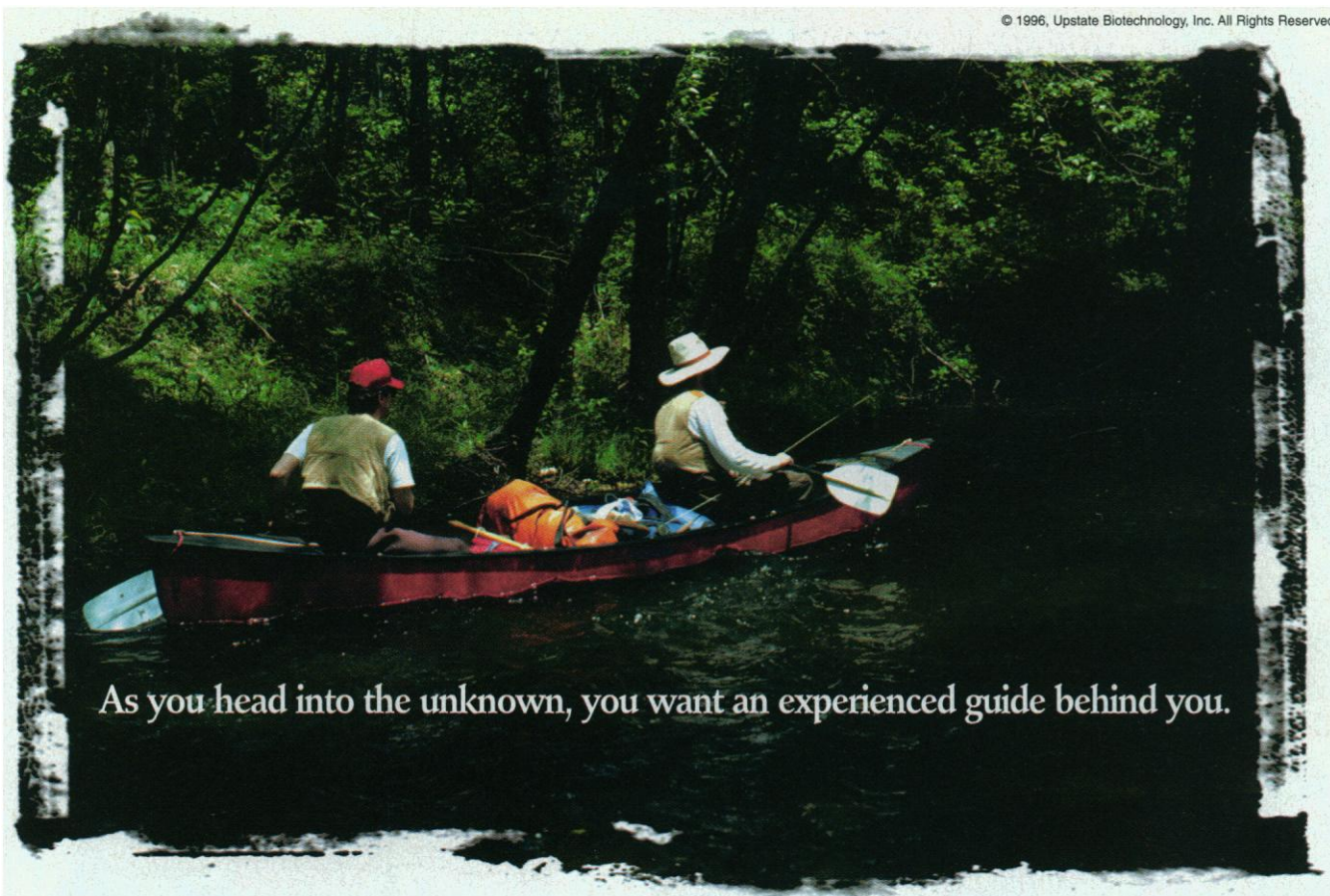
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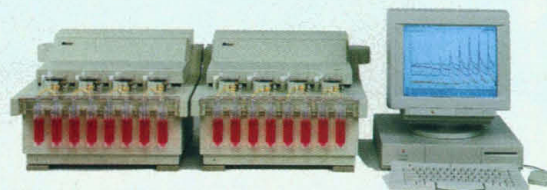
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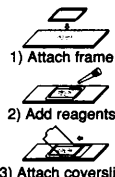
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Slide/Self-Seal
Cross Section:

As first assembled

After a few cycles

After 30 cycles

tion around the periphery creates a clot-like seal. This vapor barrier limits subsequent evaporation and amplification proceeds readily. After cycling, the cover glass is removed by soaking the slide for a few minutes in aqueous solution.

This technique allows the use of ordinary slides and cover glasses, large areas of the slide can be utilized, cover glasses are easily removed without leaving residue, and the stuff works well with archival slides. Best of all, it's easy.

¹Bagasra, Omar *et al.*, *NEJM* (326) 1385-1391; 1992

²Embretson, Janet *et al.*, *Nature* (362) 359-362; 1993

³Hindkjaer, J *et al.*, *Chromosome Res* (3) 41-44; 1995

FOR A DETAILED PROTOCOL

Bagasra, Omar *et al.*, “In-Situ PCR and Hybridization to Detect Low-Abundance Nucleic Acid Targets,” *Current Protocols in Molecular Biology*, Sec. 14.8.1-14.8.23; 1995

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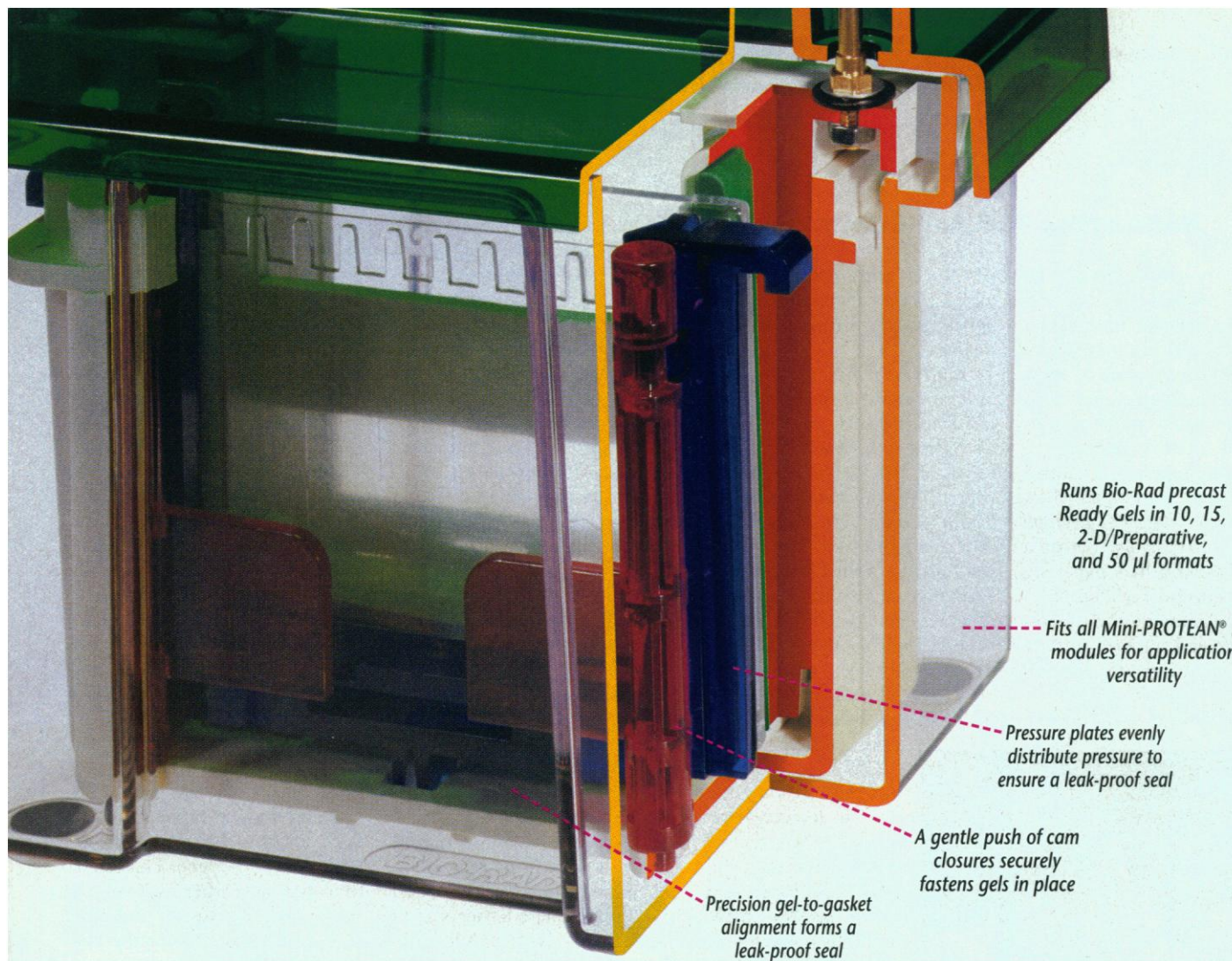
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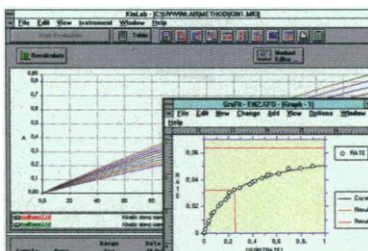
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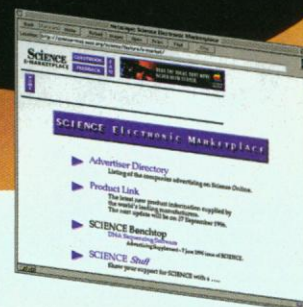
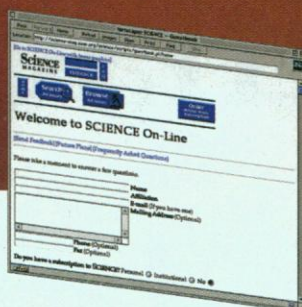
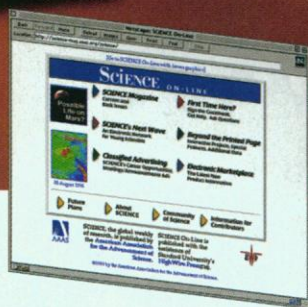
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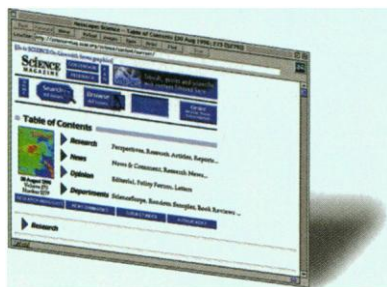
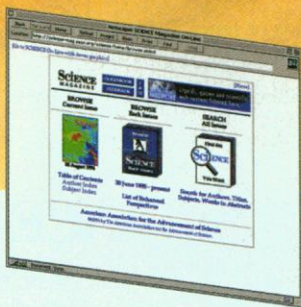
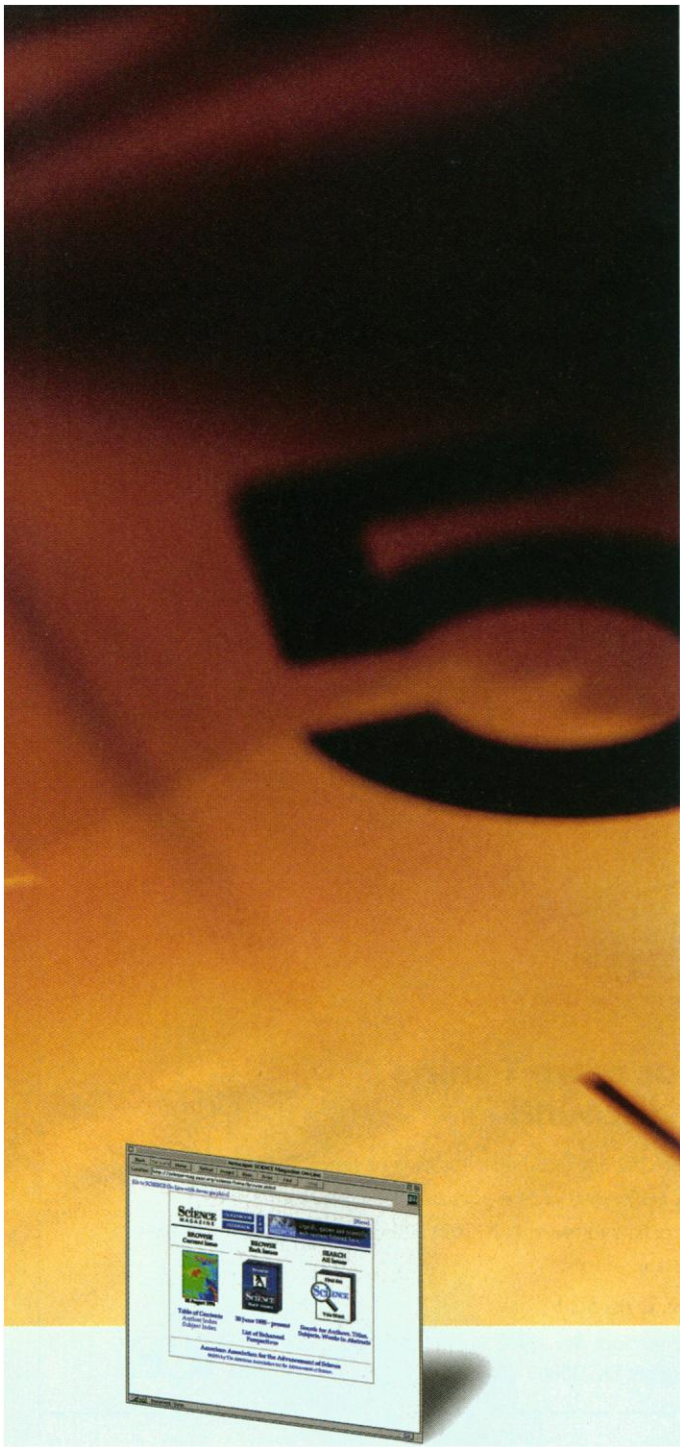
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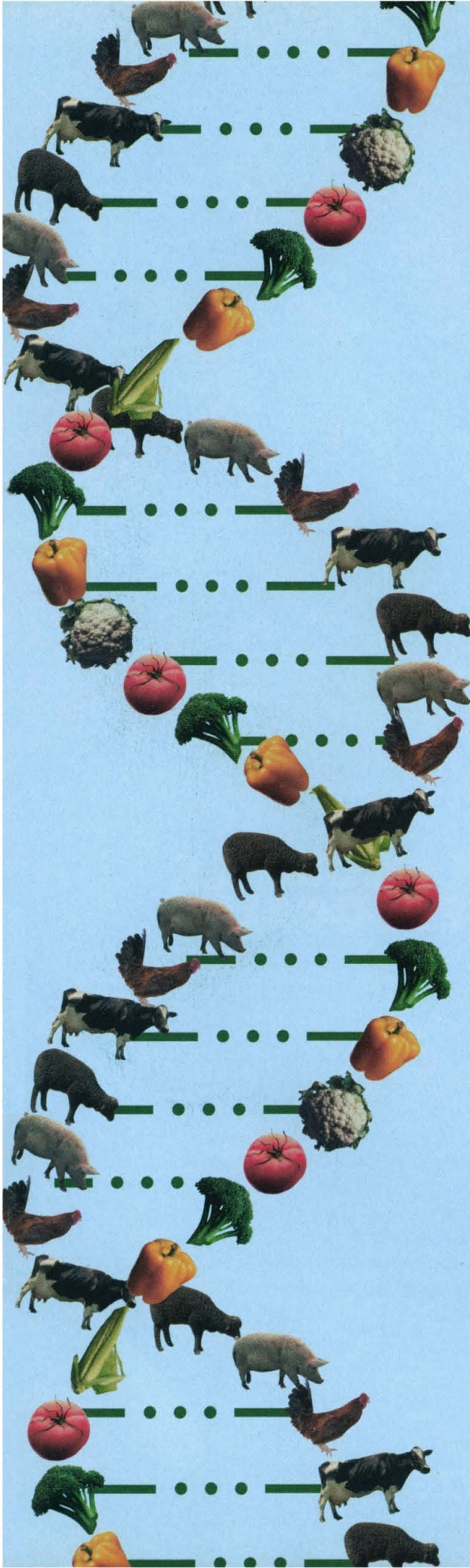
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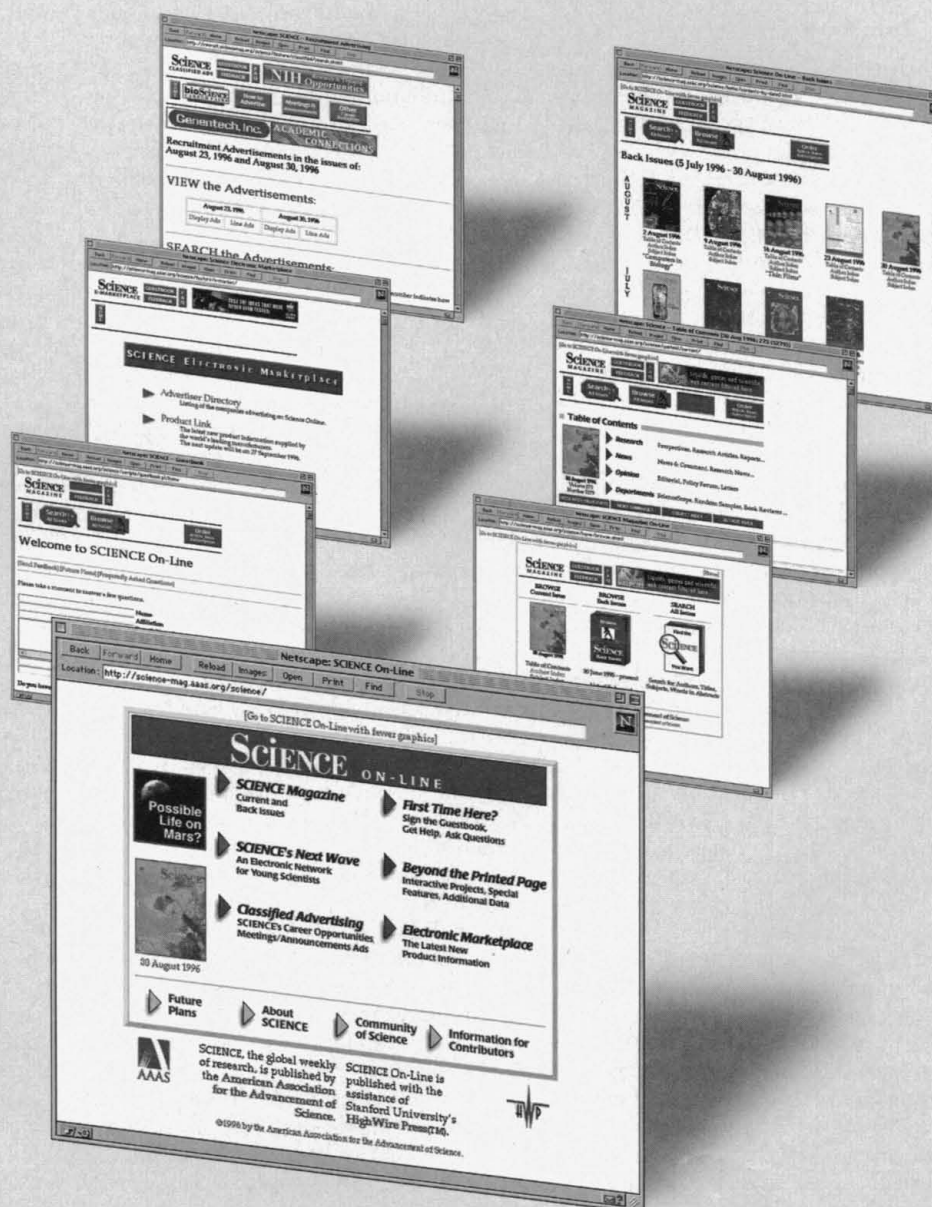
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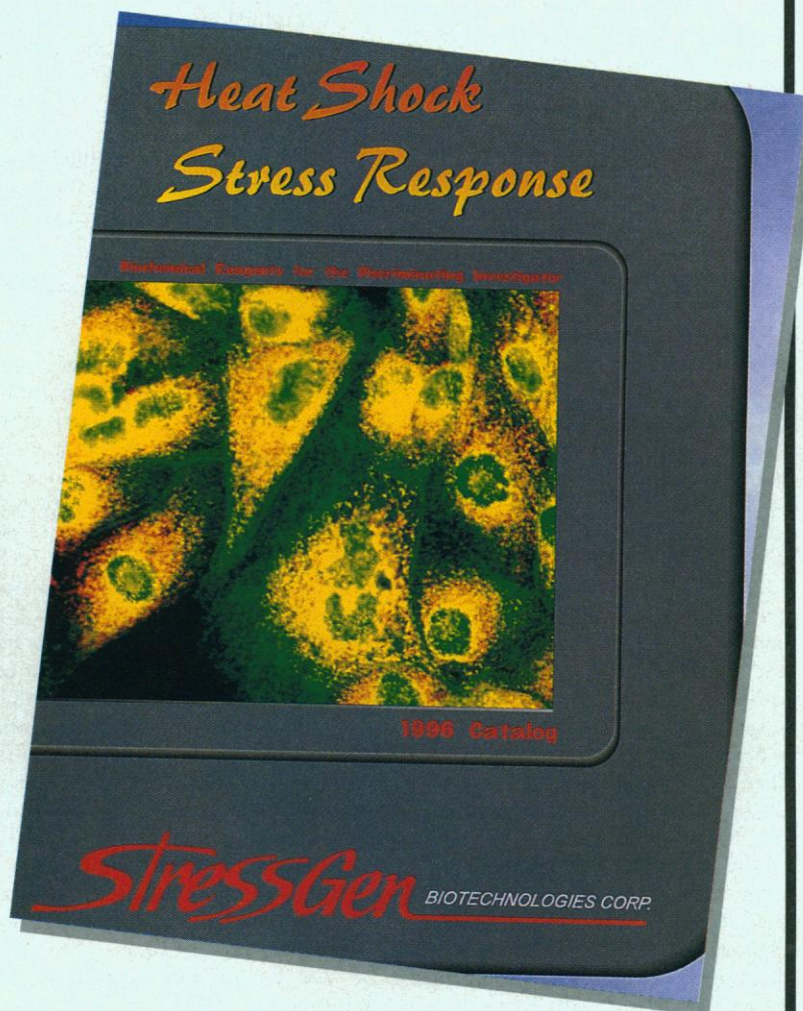
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