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1 MARCH 1996
VOL. 271 • PAGES 1201–1332

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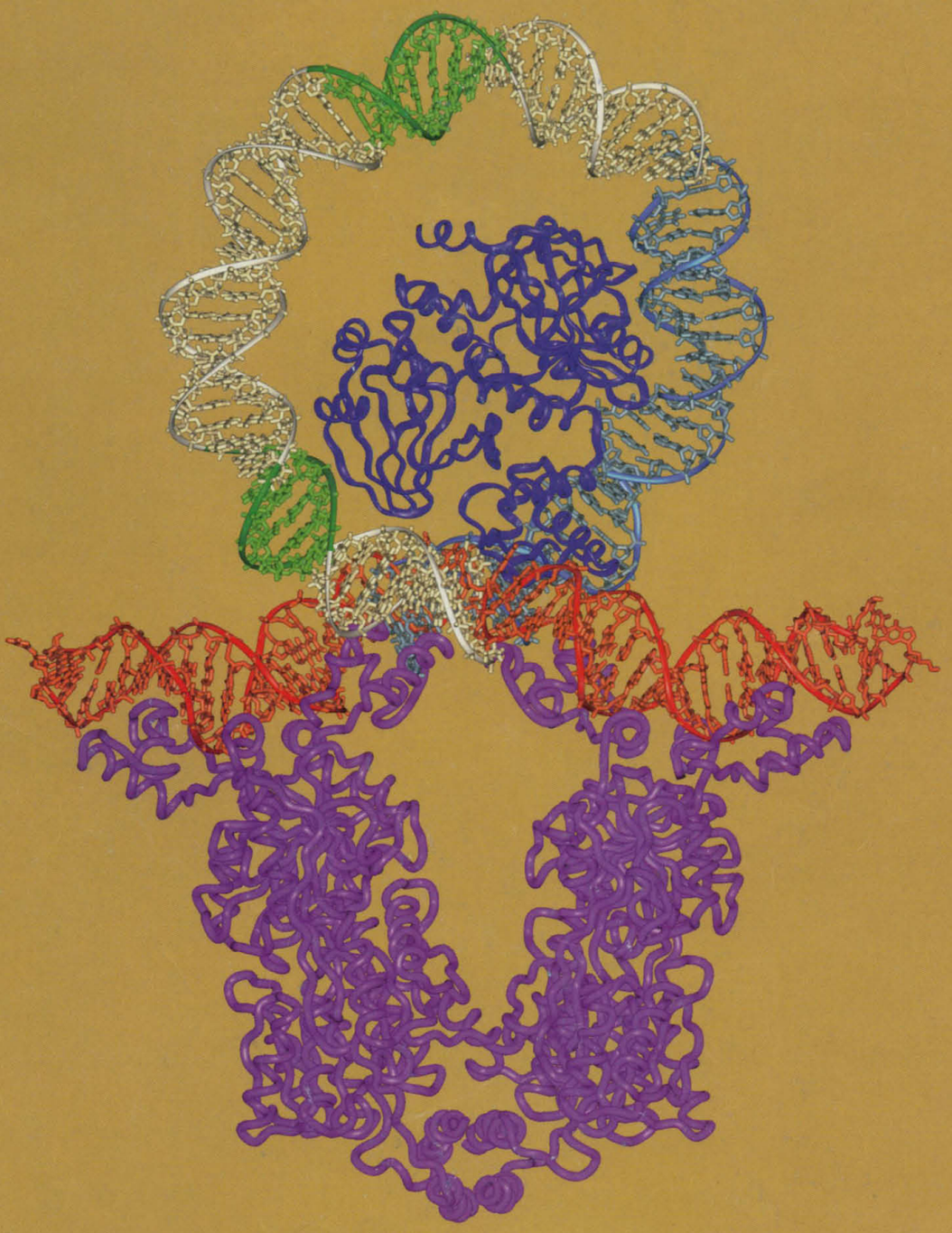

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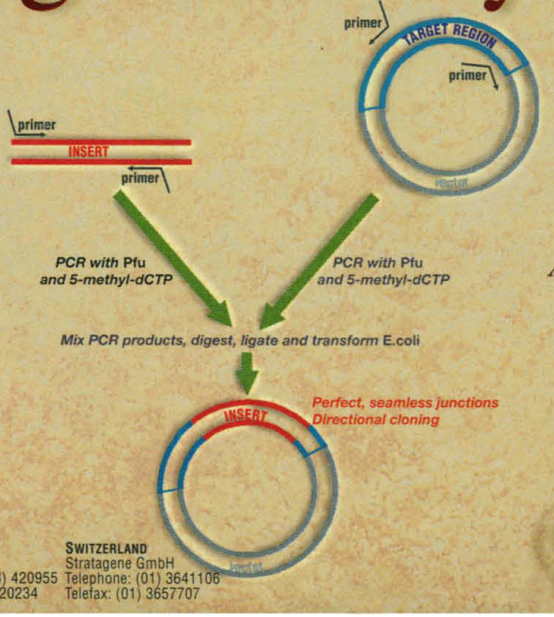

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Padgett, K.A., and Sorge, J.A. (1996) *Gene* 168: 31-35
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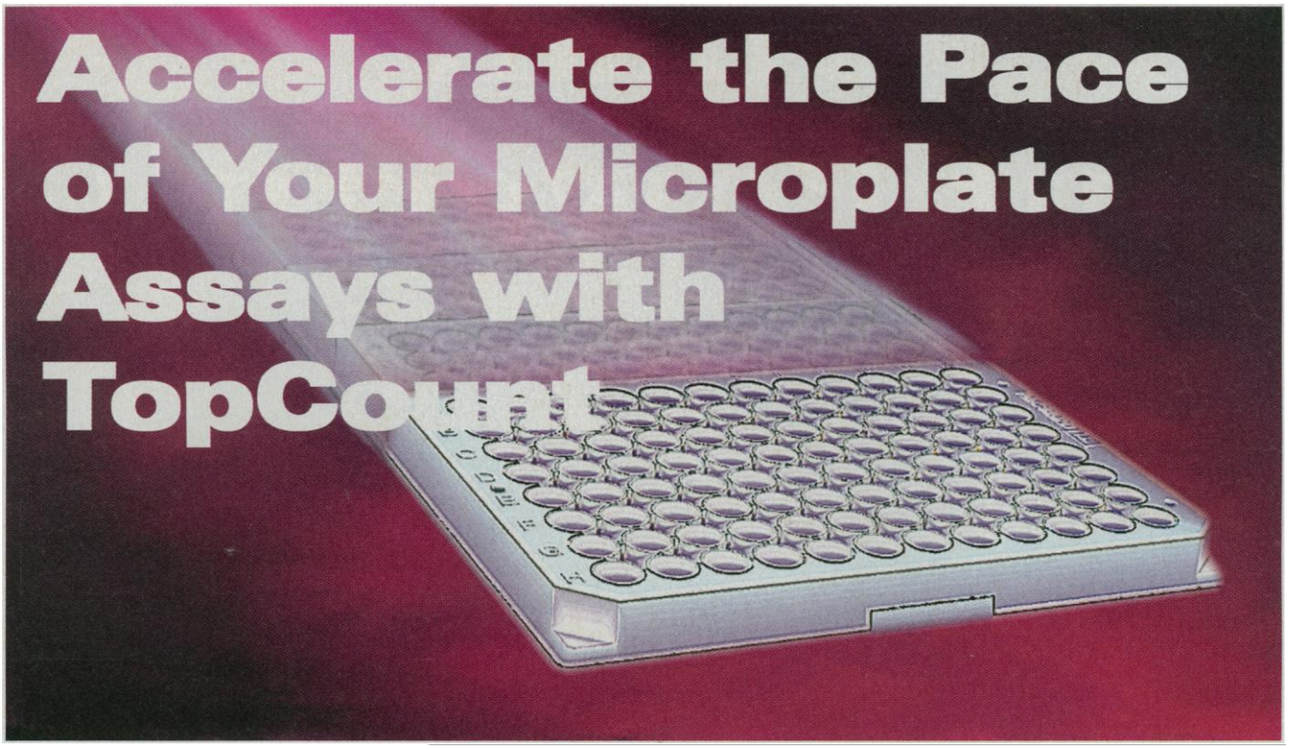

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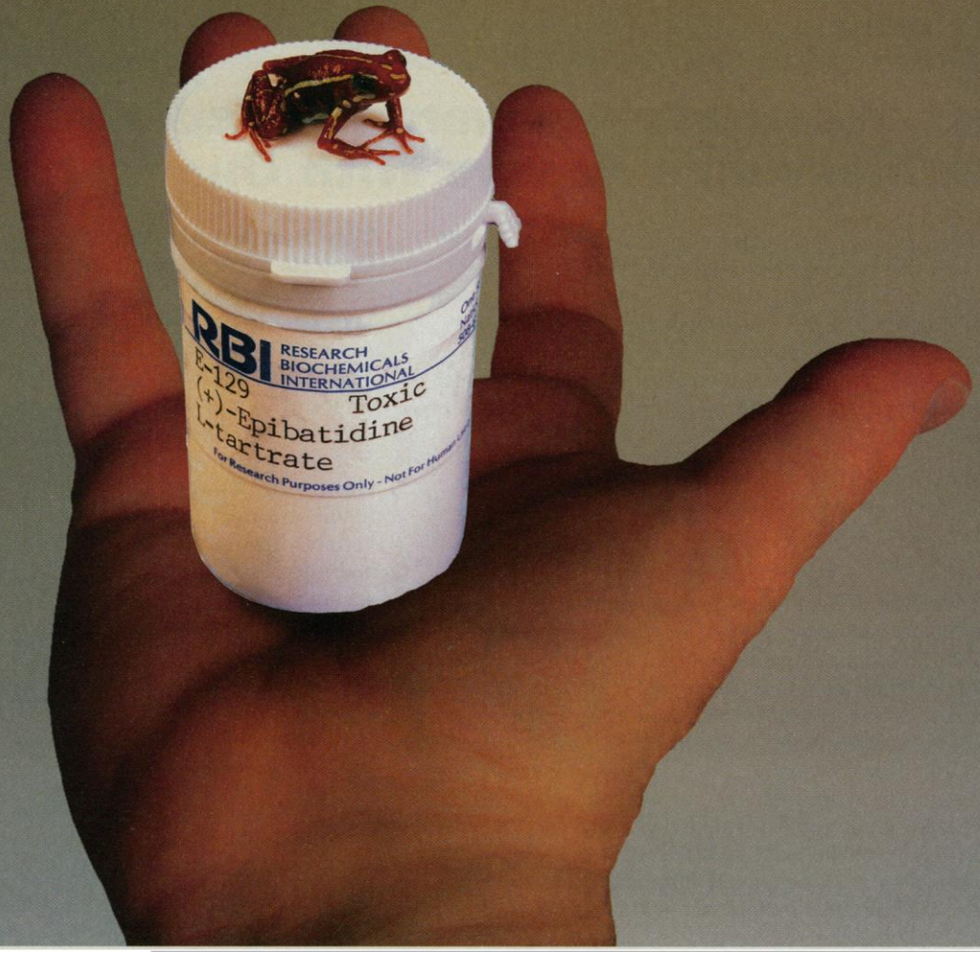

Photo: *Epipedobates tricolor* courtesy of G. Grall, National Aquarium of Baltimore

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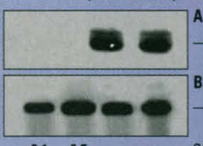
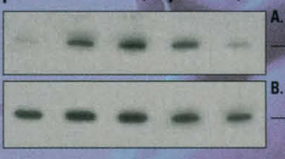
c-Jun (Ser63)



Western Blot of c-Jun expressed from *E. coli* or JEG cells using **A.** phospho-c-Jun or **B.** control c-Jun antibodies.

p38 MAPK (Tyr182)



Western Blot of cell extracts from SK-N-MC cells treated with Anisomycin using **A.** phospho-p38 MAPK or **B.** control-p38 MAPK antibodies.

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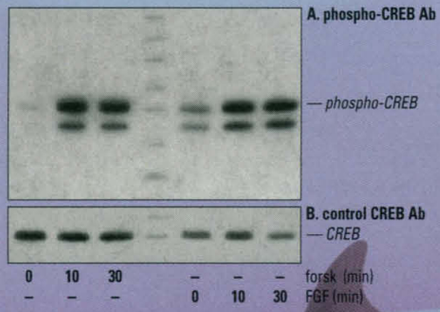
CREB (Ser133)

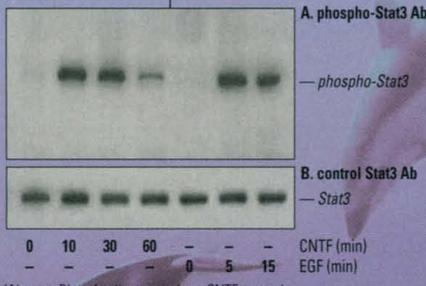
SK-N-MC cells



Western Blot of cell extracts from SK-N-MC cells treated with forskolin and FGF using **A.** phospho-CREB or **B.** control CREB antibodies.

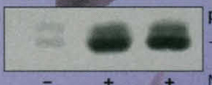
Stat3 (Tyr705)

SK-N-MC cells | A431 cells



Western Blot of cell extracts from CNTF treated SK-N-MC cells and EGF treated A431 cells using **A.** phospho-Stat3 or **B.** control Stat3 antibodies.

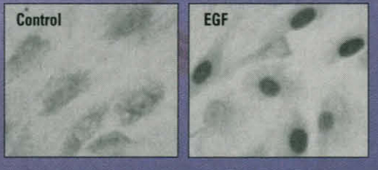
SEK1/MKK4 (Thr223)



Western Blot of cell extracts from 293 cells treated with NaCl and Sodium Vanadate using phospho-SEK1 antibody.

p44/p42 MAPK (Tyr204)

NIH 3T3 Cells



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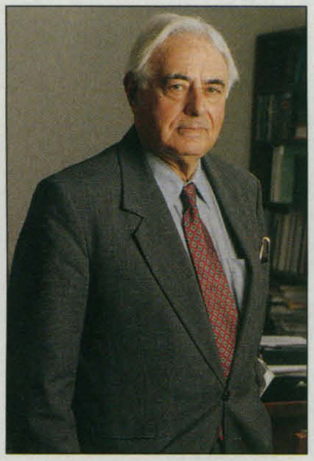
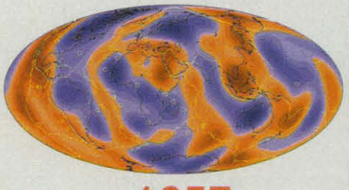


1222
NAE president under fire



1257
Expanded tomography of the Earth's interior

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVES

RESEARCH ARTICLE

REPORTS

DEPARTMENTS

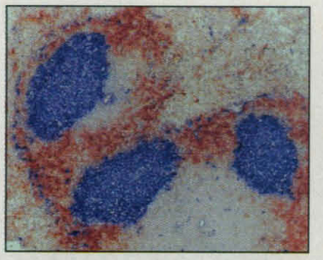
COVER

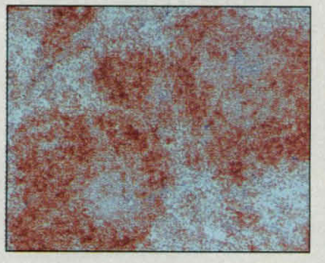
Model of the 93–base pair loop that forms to repress the transcription of the *Escherichia coli lac* operon structural genes. The *lac* repressor tetramer (violet ribbon) binds two operators (red), and the catabolite activator protein (purple ribbon) binds to a separate DNA site (blue). The *lac* promoter regions are highlighted in green. See page 1247 and the related Perspective on page 1245. [Image created with Biosym Insight II]

TECHNICAL COMMENTS

1289

Look, no germinal centers





◩ Indicates accompanying feature

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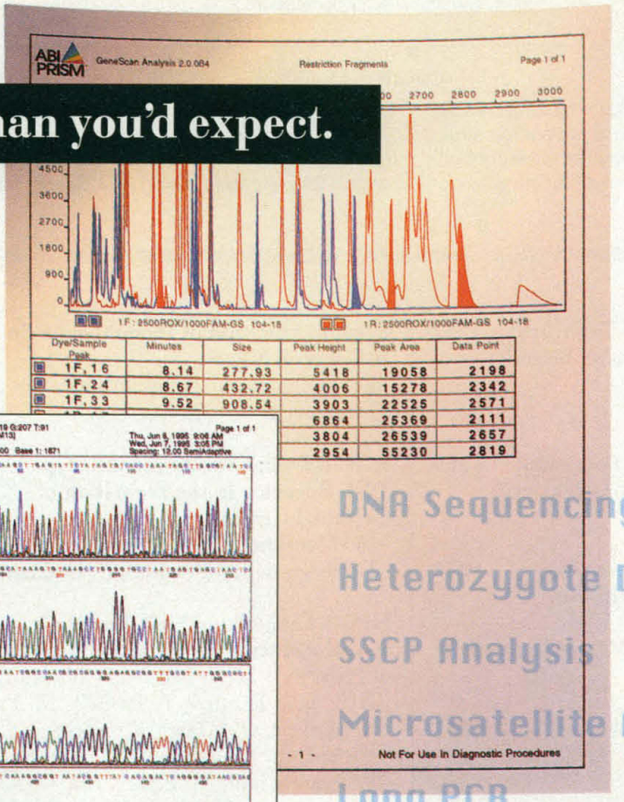

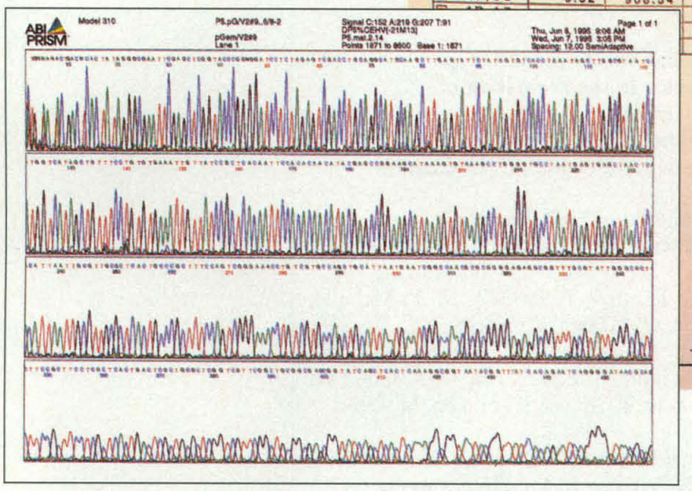

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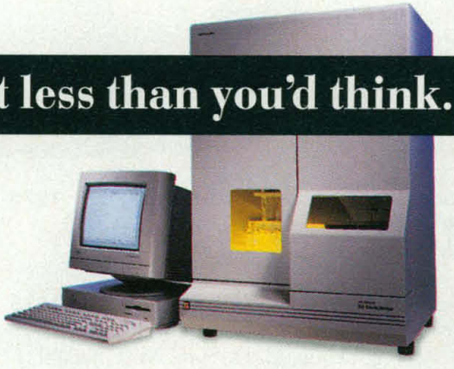

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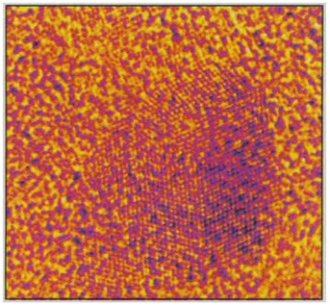
THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Diamonds by decay

Nanometer-sized diamonds have been found in uranium-rich, coal-like deposits from Russia. Daulton and Ozima (p. 1260) used high-resolution transmission electron microscopy to uncover these 2-billion-year-old diamonds, which probably formed as a result of irradiation



of carbonaceous material due to the radioactive decay of uranium. Although radiation appears to be the most plausible mechanism for these very old, very small diamonds, it cannot be the sole mechanism responsible for the formation of carbonados, which contain a higher volume of typically larger diamonds.

■

Not kept at bay

Buried beneath the southern terminus of the Chesapeake Bay is an impact structure that may have produced the strewn field of glassy, aerodynamically shaped objects called tektites that are distributed from the Atlantic Ocean as far west as Texas. By using a gravity anomaly map and drill core samples from this complex crater, Koeberl *et al.* (p. 1263) have correlated the size, age, and composition of the crater with the areal extent, age, and composition of some North American tektites, indicating that they came from the Chesapeake Bay impact structure about 35 million years ago.

Conformational shifts in *lac* repressor binding

An important model for gene regulation is the lactose operon in *Escherichia coli*. The lactose operon repressor binds to operator DNA when lactose is absent and prevents the transcription of several structural *lac* genes. Lewis *et al.* (p. 1247; see the cover and the Perspective by Matthews, p. 1245) present three crystal structures of this protein, the protein bound to a 21–base pair operator, and the protein bound to an inducer molecule. Comparison of these structures provides insights into the conformational changes in the protein that accompany the steps in gene regulation.

Silicates in the round

Silicate molecular sieves with nanometer-sized pores can be synthesized by incorporating a surfactant template molecule that acts as a scaffold but that normally must be retained to preserve the structure. Tanev and Pinnavaia (p. 1267) report a one-step synthetic method for creating mesoporous materials. They cross-linked a neutral silicon alkoxide precursor in the interlayer region of a multilayered vesicle. This process produces a porous, multiwalled silicate that retains the vesicle shape and that allows the template to be removed. The material has high thermal stability and has sorption properties similar to those of pillared clays.

■

Origins and timing

Analysis of mammalian origins of DNA replication has been complicated by observations that initiation can be confined to specific regions, as in the dihydrofolate reductase (DHFR) locus, or can occur at many sites, as when damaged nuclei or bare DNA are assayed. Wu and Gilbert (p. 1270) found that both may be true. When nuclei are extracted from CHO cells early in the G_1 phase of the cell cycle, induced initiation of replication within the DHFR locus is nonspecific. However, when the nuclei are allowed to pass further into the G_1 phase, induced replication initiation becomes confined to a specific site in the DHFR locus.

■

Anergy and kinases

When the T cell antigen receptor is stimulated in the absence of costimulatory signals, instead of becoming activated, the cell becomes unresponsive to antigen. Such anergic cells cannot synthesize interleukin-2 (IL-2), a growth factor. Li *et al.* (p. 1272) show that ERK and JNK pathways are blocked in anergic T cells, even though these enzymes could still be activated and other pathways are still intact. Fields *et al.* (p. 1276) show that the activation of Ras, which is necessary for the ERK/JNK pathway, is blocked in anergic T cells (see the news story by Williams, p. 1234).

■

The role of H2-M

In vivo studies have suggested that the nonclassical major histocompatibility complex (MHC) molecules, DM in humans and H2-M in mice, play an important role in antigen presentation, but a full understanding requires in vivo analysis. Fung-Leung *et al.* (p. 1278) describe the phenotype of mice lacking H2-M. As predicted, most of the expressed MHC class II molecules bind the peptide known as CLIP (H2-M is thought to remove CLIP, allowing a range of antigenic peptides to be bound). Interestingly, $CD4^+$ cells can be positively selected in the thymus of the mutant mice, and peripheral T cells, although fewer in number than in wild-type mice, respond very strongly to wild-type, syngeneic antigen-presenting cells.

■

Cultured mutants

Somatic hypermutation, the controlled introduction of large numbers of point mutations into immunoglobulin V region genes, is the extraordinary strategy of the immune system to produce antibodies of higher affinity. Understanding of the process has been hampered by the inability to develop a system that works in vitro. Now Källberg *et al.* (p. 1285) describe such a system, which involves delivery of signals to B cells from activated T helper 2 cells in combination with ligation of the antigen receptor.

■

Synapse strength

Long-term potentiation and long-term depression in the brain increase and decrease the strength of synaptic contacts between neurons and are thought to be important in learning and memory. Their physiological basis has been the subject of much controversy. Oliet *et al.* (p. 1294) show that the size of the "quanta"—the response to unitary packets of neurotransmitters—at potentiated and depressed synapses increases and decreases along with the levels of a class of neurotransmitter receptors. Mechanistically, the two processes appear to be functional inverses of one another.

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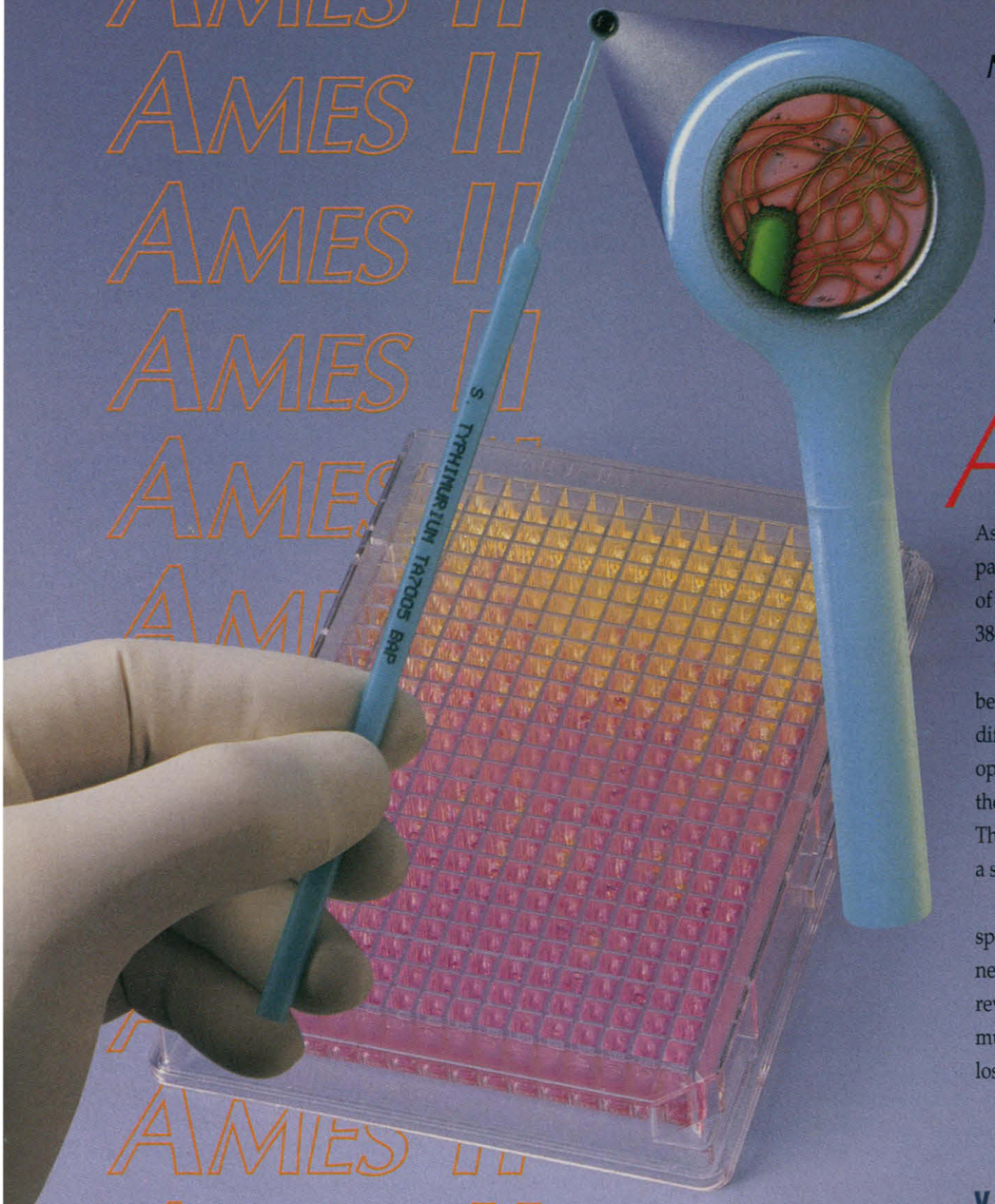

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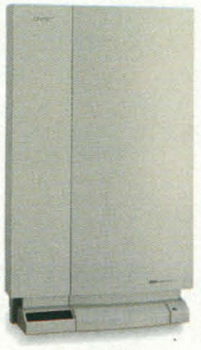
*CEPRAP, Univ. of California-Davis. 1260bp with 98.8% accuracy. Base calls were made automatically with no editing or operator intervention.



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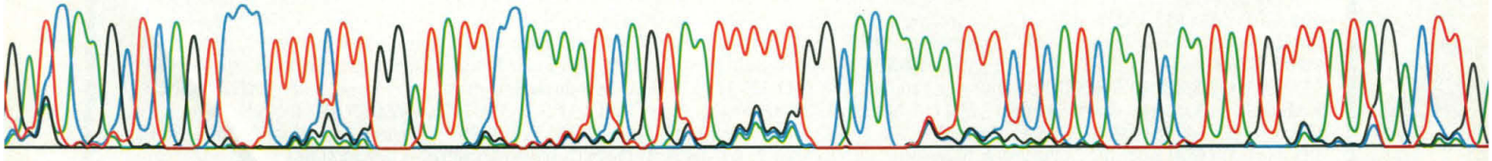

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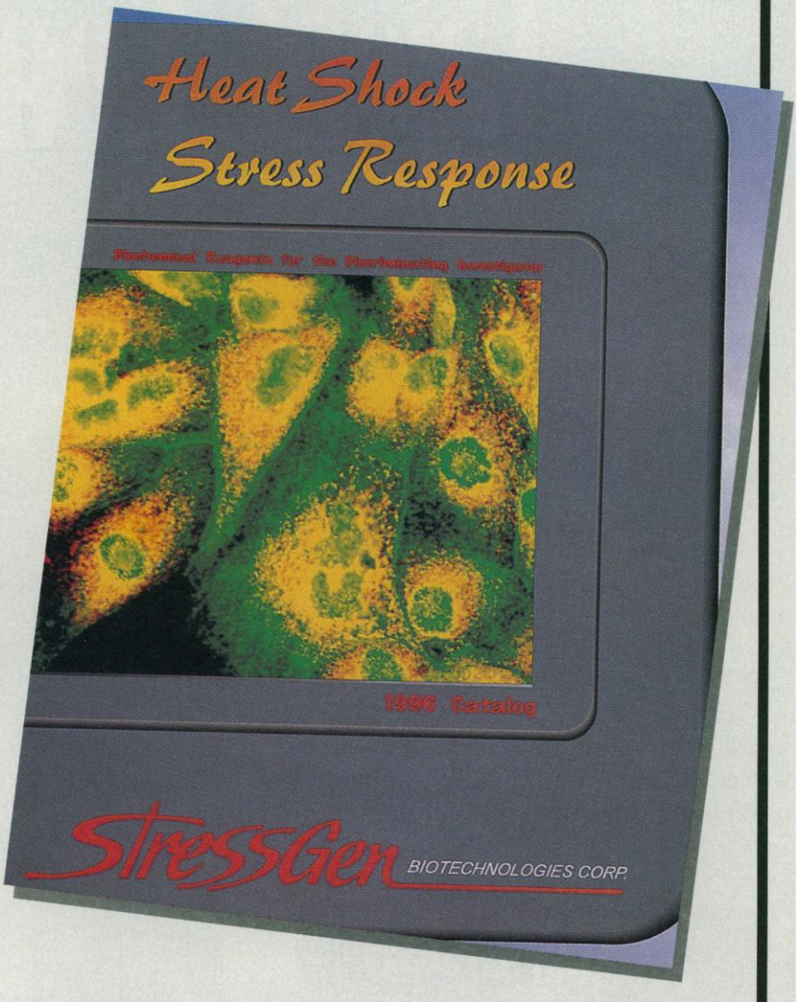

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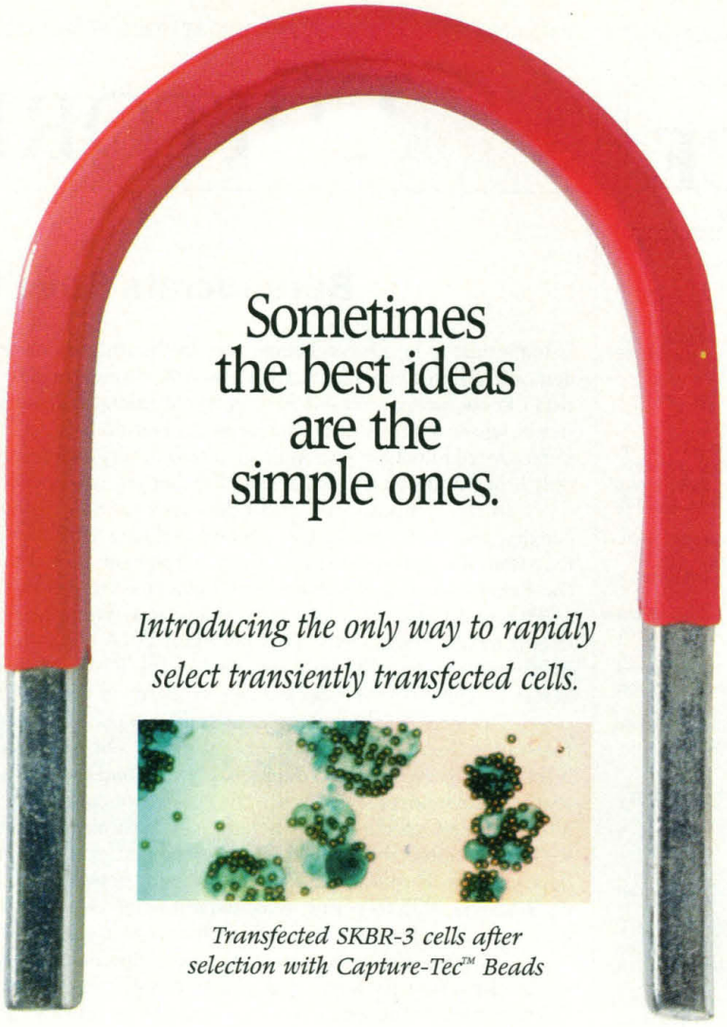

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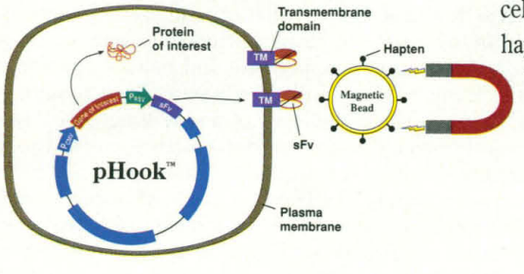

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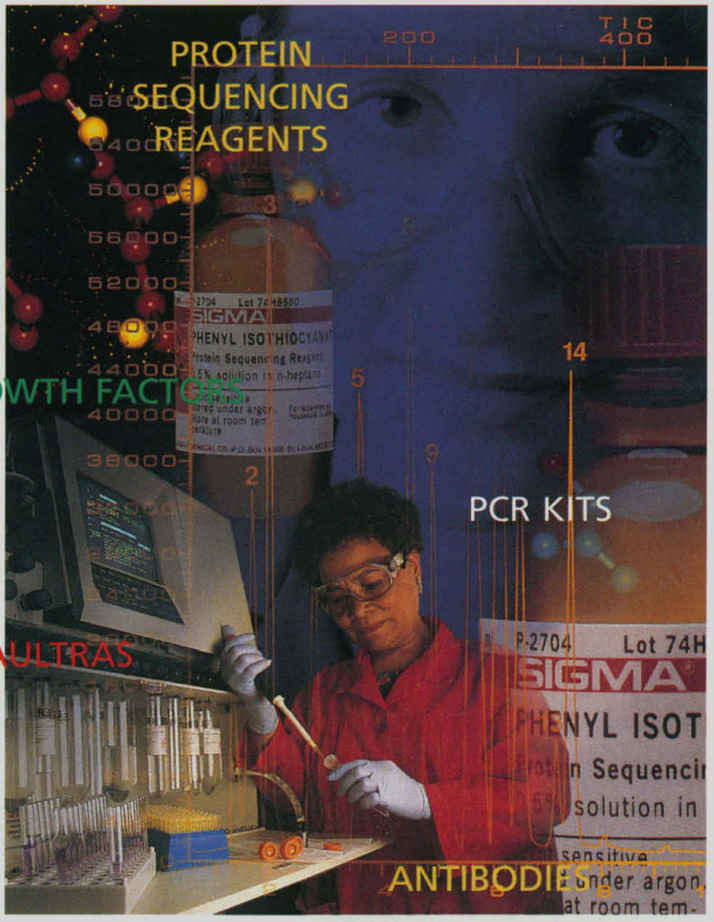

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IN MOLECULAR BIOLOGY 1996

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Call for entries

You must be a recent Ph.D. graduate (awarded between 1 January and 31 December 1995) working in molecular biology. Submissions must be in the form of a 1000 word essay, in either English, French, German, Spanish, Japanese or Chinese (Mandarin), on your thesis, highlighting the significance of its contribution and overall implications in the field. The winning essay will be published in *Science*.

Closing date for entries is 31 May 1996.

The prizes will be presented in Stockholm, Sweden, during December 1996.

Full details and the required entry form can be requested from the administrator, at the address below, or via *Science's* homepage (http://www.aaas.org/science/prize.htm).

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