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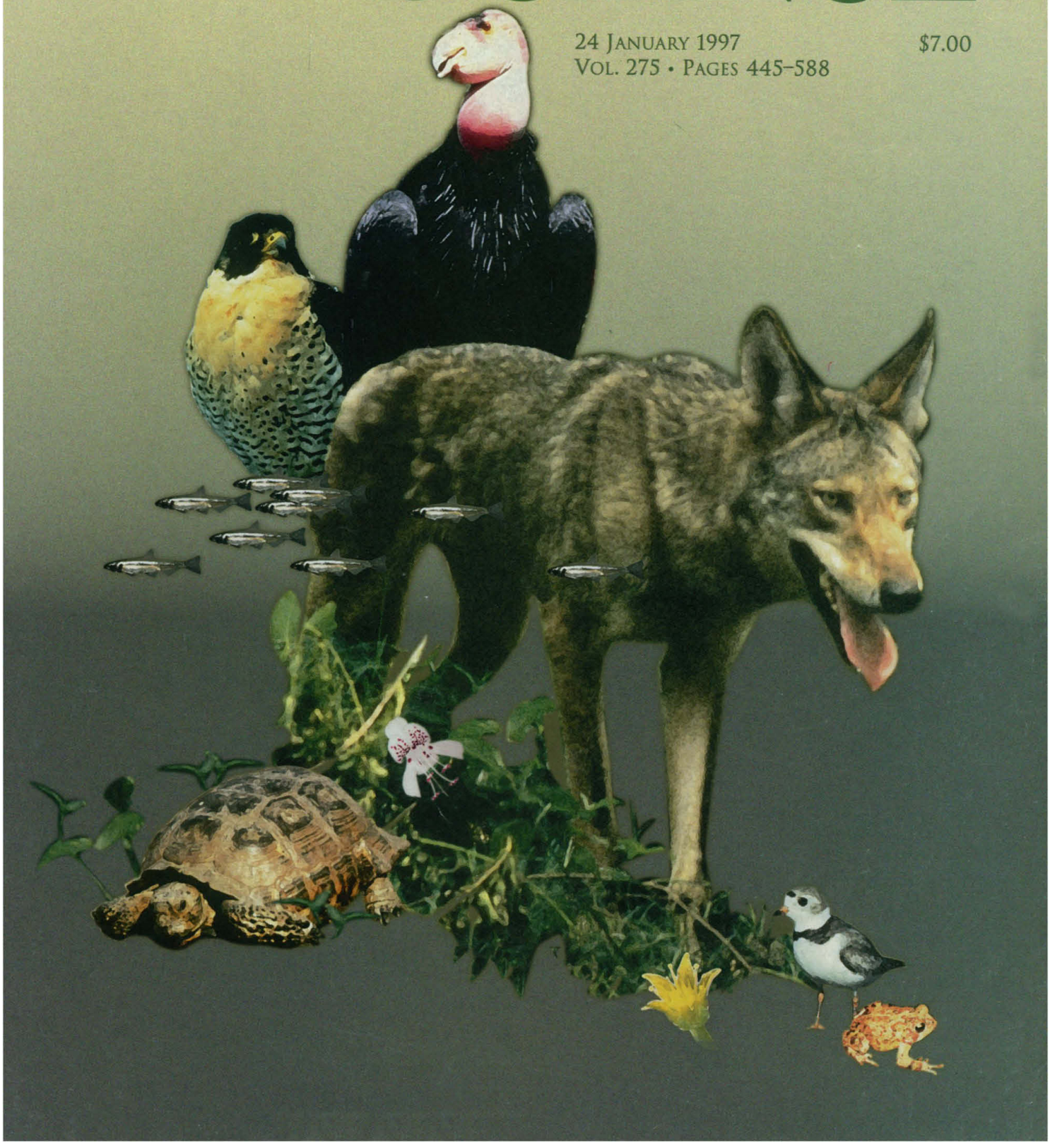

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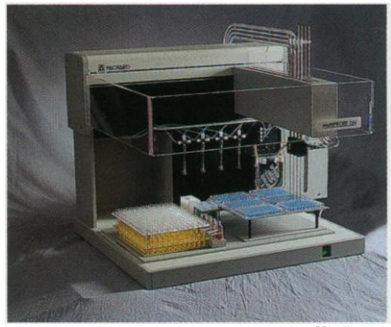

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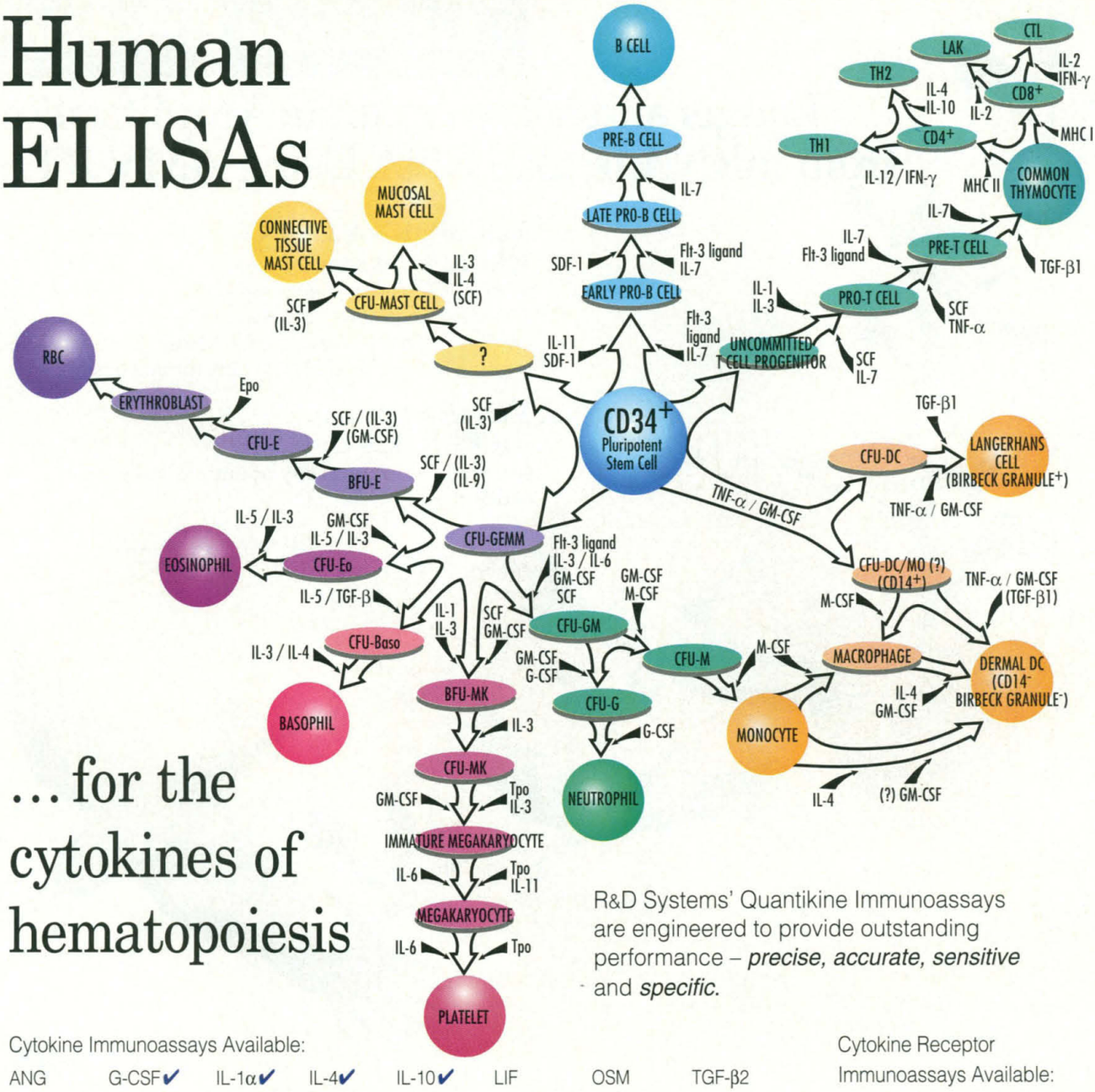

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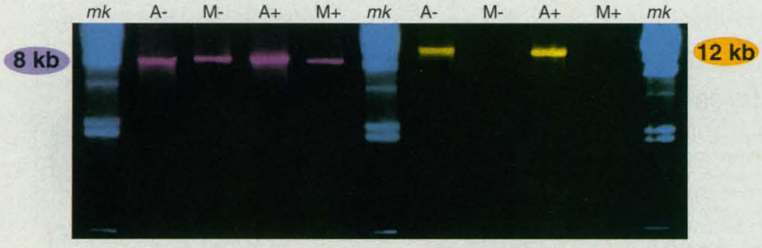
Comparison for Long RT-PCR: cDNA Amplification from Dystrophin mRNA



RT reactions were carried out under optimum conditions for each enzyme, AMV RTase and MMLV RTase, in duplicate. One sample from each pair was followed by RNase H treatment. Then using two different primer pairs for 8 kb and 12 kb amplification, PCR was performed with *TaKaRa LA Taq* for AMV RTase products and Long distance DNA polymerase for MMLV RTase products respectively. No full length cDNA of 12 kb was detected with MMLV RTase.

mk	λ *Hin*d III marker
A+	AMV RTase reaction followed by RNase H treatment
M+	MMLV RTase reaction followed by RNase H treatment
A-	AMV RTase reaction only prior to PCR
M-	MMLV RTase reaction only prior to PCR

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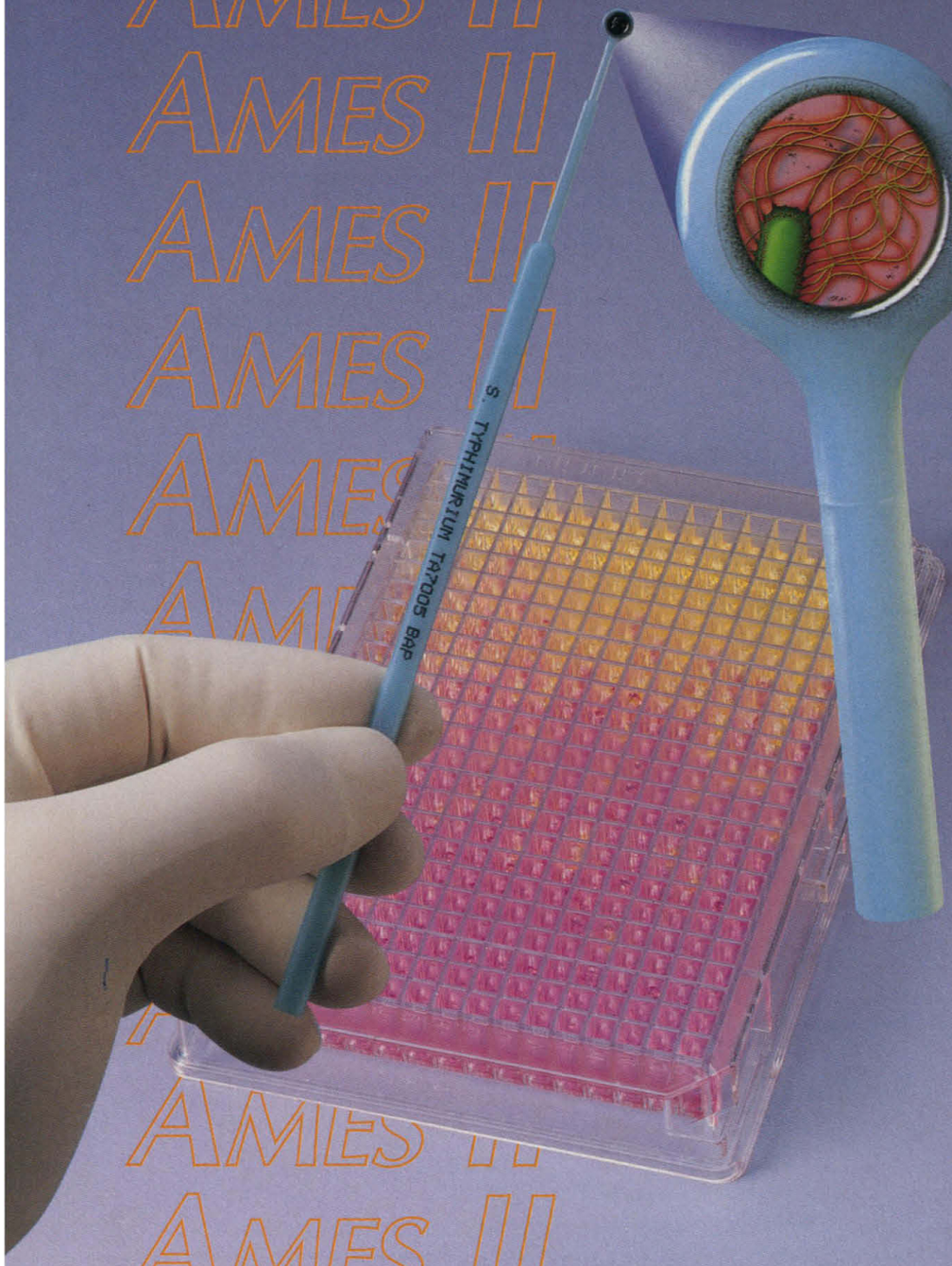

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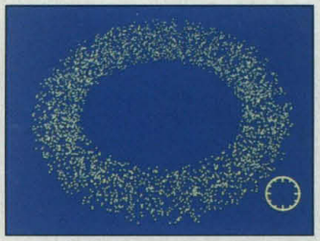

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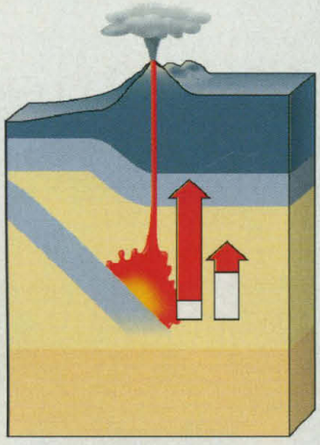
Dark visions

498 & 521
Crustal chronology



NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVES

ARTICLE

DEPARTMENTS

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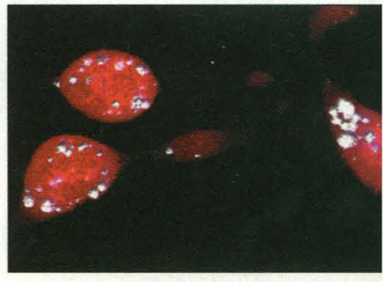
COVER

Ten endangered species. An analysis of the geographic distribution of endangered species in the United States revealed that most are concentrated in a few regions of the country. However, the "hot spots" of potential extinction for different species groups rarely overlap. See page 550 and the Perspective on page 499. [Photos: Scrub mint (*Dicerandra frutescens*, low center), Thomas Eisner; others, U.S. Fish and Wildlife Service. Collage: Preston Morrighan]

REPORTS

TECHNICAL COMMENTS



480 & 530

Fire photon torpedoes

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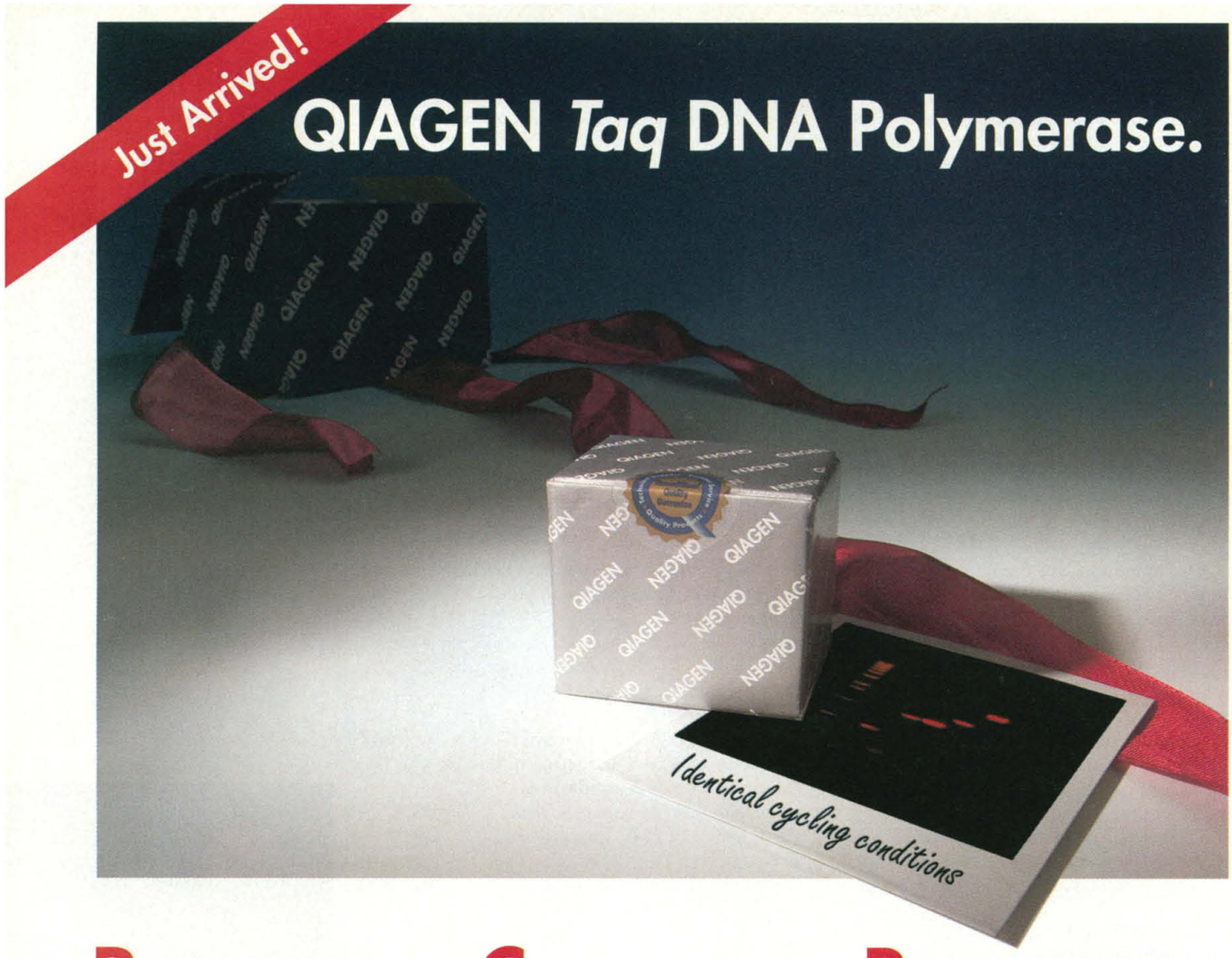
On the Web

Enhanced Perspective on endangered species by H. Ronald Pulliam and Bruce Babbitt, Secretary of the Interior
http://www.sciencemag.org/science/content/vol275/issue5299/499.htm



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¶The PCR process is covered by U.S. Patents 4,683,195 and 4,683,202 and foreign equivalents owned by Hoffmann-La Roche AG.

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THIS WEEK IN SCIENCE

edited by BROOKS HANSON

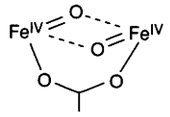
Mantle duet

Two reports probe the dynamics of the phase transition at a depth of about 660 kilometers separating the upper and lower mantle. Wang *et al.* (p. 510) suggest that the transformation of olivine in the upper mantle to magnesiowüstite and perovskite, which characterize the lower mantle, is blocked at temperatures below about 1000 kelvin. This result may provide estimates of temperatures in subducted slabs. Funamori *et al.* (p. 513) examined the transformation of garnet, which is the host of most of the aluminum in the upper mantle, to perovskite. Their data suggest that perovskite is also the host for aluminum in the lower mantle.

■

Iron oxide core

While chemists try to find more economical ways to convert natural gas to liquid fuels, the bacterial enzyme methane monooxygenase converts 1 billion



tons of this greenhouse gas to methanol each year. Shu *et al.* (p. 515) present spectroscopic evidence that the key oxidizing species is an $Fe_2(\mu\text{-}O)_2$ core that forms a diamond structure.

■

What's next in climate models

Successful weather forecasting and climate simulation depend on the parameterization of land-atmosphere interactions in atmospheric general circulation models. In recent years, much progress has been made toward a realistic representation of the energy, water, and carbon exchange between biosphere and atmosphere, aided by improved data from field experiments and satellite studies. Sellers *et al.* (p. 502) review the progress from the early, first-generation models to modern, sophisticated third-generation models, and present an outlook on the future of climate modeling and especially modeling climate change.

■

Tracing early crust

When continental crust forms from the mantle, the composition of the remaining mantle changes. One key trace element ratio for inferring the amount of crust that has formed is the niobium/uranium ratio because continental crust sequesters U more strongly than it does Nb. Sylvester *et al.* (p. 521) measured this ratio in 2.7-billion-year-old volcanic rocks in Australia to infer the amount of crust that formed early in Earth's history. One interpretation of the data is that large amounts of crust had formed by this time, as also discussed by Hofmann in a Perspective on p. 498.

■

Impotent immunocytes

Mittrücker *et al.* (p. 540) show that mice deficient in the transcription factor IRF4 (formerly known as LSIRF) have difficulty in mounting both humoral and cell-mediated immune responses: serum immunoglobulin levels are low and antitumor responses are lacking. The precise nature of the defect is unclear but it affects both T and B cells. Lymphocytes appear to develop normally in young animals but continue to accumulate in lymphoid organs, causing lymphadenopathy, while failing to be activated upon challenge. These findings, which would not have been predicted from previous studies of IRF4, may provide a new opportunity to study the thorny problem of lymphocyte homeostasis.

Control of cell division

The transcription factor NF-κB regulates genes that participate in the cellular response to stress and infection, generation of certain cancers, and control of HIV gene expression. Perkins *et al.* (p. 523) show how activation of NF-κB may be coupled to control of the cell division cycle. NF-κB associates with a transcriptional co-activator called p300; p300 in turn interacts with cyclin–cyclin-dependent kinase (CDK) complexes that regulate progression through the cell cycle. Inhibition of cyclin-CDK activity increased NF-κB–dependent gene expression. The interactions of proteins in these complexes apparently provides coupling of transcriptional regulation to control of the cell cycle.

■

Tumor therapy: The clot thickens

Tumors must have an adequate blood supply to sustain their growth, and strategies aimed at interrupting this blood supply are being explored as possible cancer therapies. Huang *et al.* (p. 547; see News story on p. 482) have used antibody technology to target a shortened form of tissue factor, a protein that helps initiate blood clot formation, to tumor blood vessels. Treatment of tumor-bearing mice with the targeted tissue factor produced clots in the tumor blood vessels, and the resultant blockage caused complete regression of the tumors in over one-third of the mice.

■

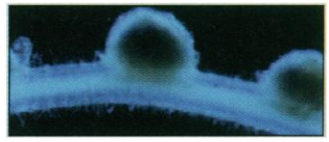
Still life in action

During development, axons extend from the neuronal cell body to the target, where the axon terminal changes to form synapses. Sone *et al.* (p. 543) screened *Drosophila* for mutations in which this process is defective. Mutations of the Still life protein showed abnormal motor activity, as well as defects, in both axon extension and synapse development. The *still life* gene encodes a guanine nucleotide exchange factor that is localized in the synaptic terminals, where it affects the actin cytoskeleton.

■

A beneficial infection

The symbiotic interaction between rhizobia and legumes begins with an infection of plant by bacterium. Some of those infections go on to develop into the nodules that are critical for nitrogen fixation. Penmetsa and Cook (p. 527) have identified a mutation that limits the abil-



ity of a plant to control the persistence of rhizobial infections but evidently does not affect susceptibility to initial infection. Plants carrying the mutation, *sickle*, are defective in the perception of ethylene and generate an excessive number of nodules.

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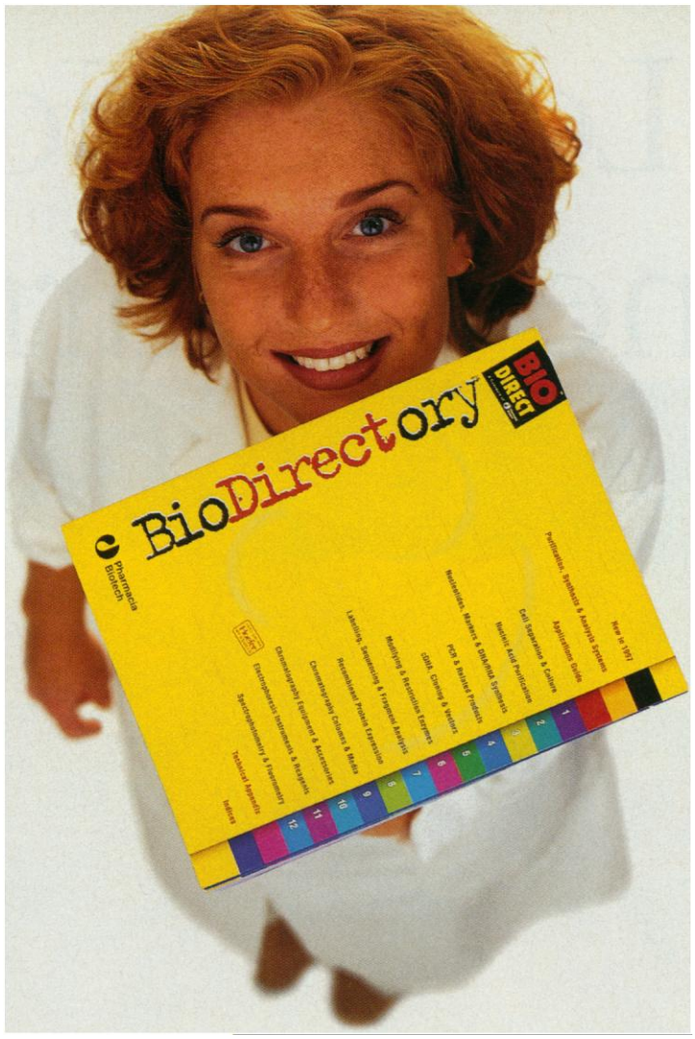

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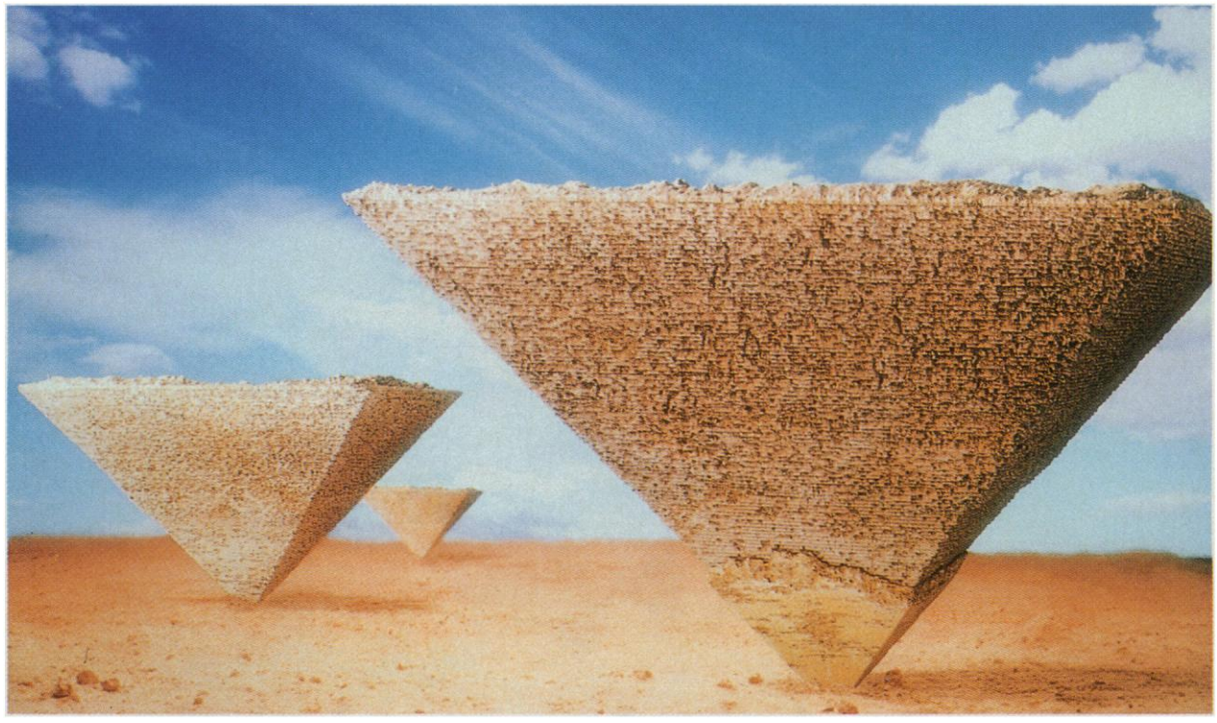

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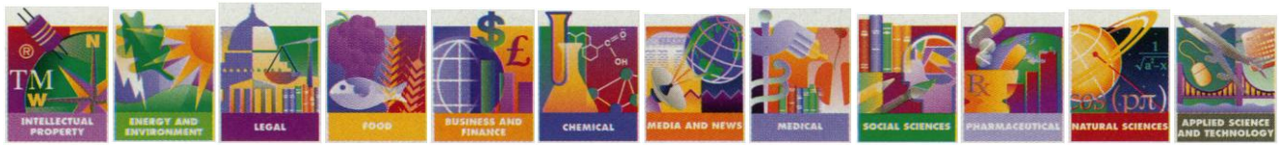

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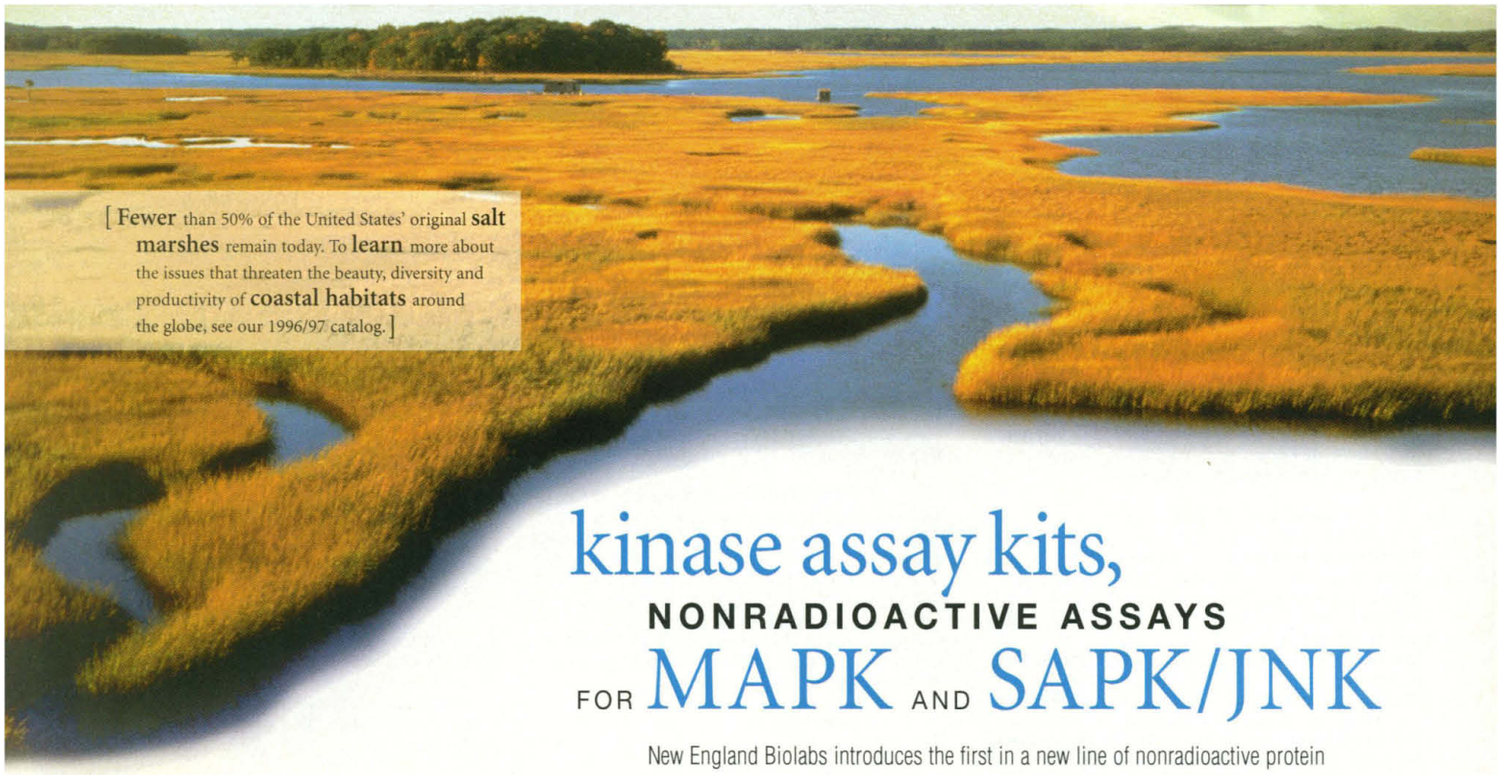

[Fewer than 50% of the United States' original **salt marshes** remain today. To **learn** more about the issues that threaten the beauty, diversity and productivity of **coastal habitats** around the globe, see our 1996/97 catalog.]

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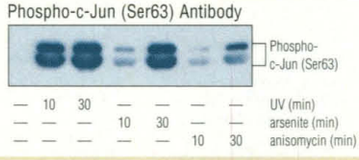
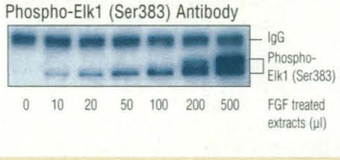
Analysis Using: SAPK/JNK assay kit



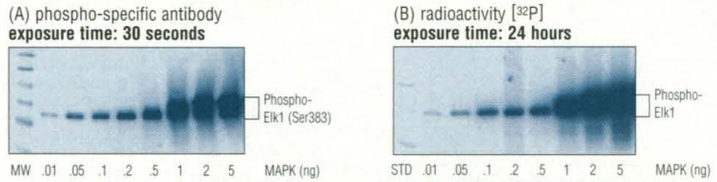
SAPK/JNK activity in extracts of treated SK-N-MC cells was analyzed by c-Jun "pull down"/kinase assay. Phosphorylation of c-Jun at Ser63 was visualized by immunoblotting with phospho-c-Jun (Ser63) antibody.

MAPK assay kit



MAP Kinase activity in extracts of FGF-treated SK-N-MC cells was analyzed by phospho-MAPK antibody IP/Kinase assay using Elk1 as a substrate. Phosphorylation of Elk1 at Ser383 was visualized by immunoblotting with phospho-Elk1 (Ser383) antibody.

Sensitivity Comparison: phospho-specific antibody vs. radioactivity



MAPK-induced phosphorylation of Elk1 was measured by quantitative immunoblotting with phospho-specific Elk1 (Ser383) antibody (A) and compared to direct measurement of phosphate incorporation using [γ32P]-ATP (B). MW = NEB's Biotinylated Protein Marker, Cat. No. 7710.

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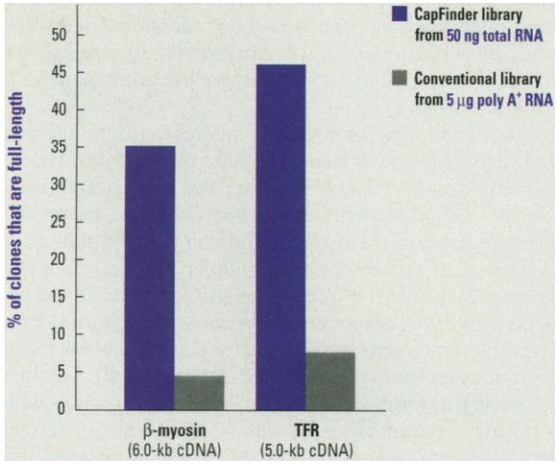

Figure 1. CapFinder cDNA libraries contain a higher percentage of full-length β-myosin and transferrin receptor (TFR) clones than are found in conventional cDNA libraries. CapFinder and conventional libraries were constructed in λgt11 using 50 ng of human skeletal muscle total RNA and 5 µg of poly A+ RNA, respectively. For both genes, the percentage of clones having the full-length sequence was inferred from the ratio of plaques that hybridized with the 5'-end cDNA probe to the number that hybridized with the 3'-end probe on duplicate filters.

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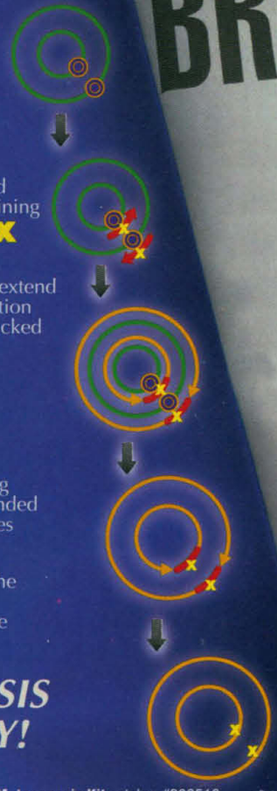

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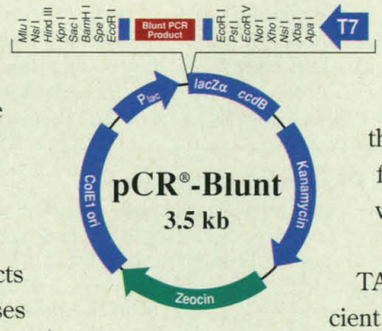

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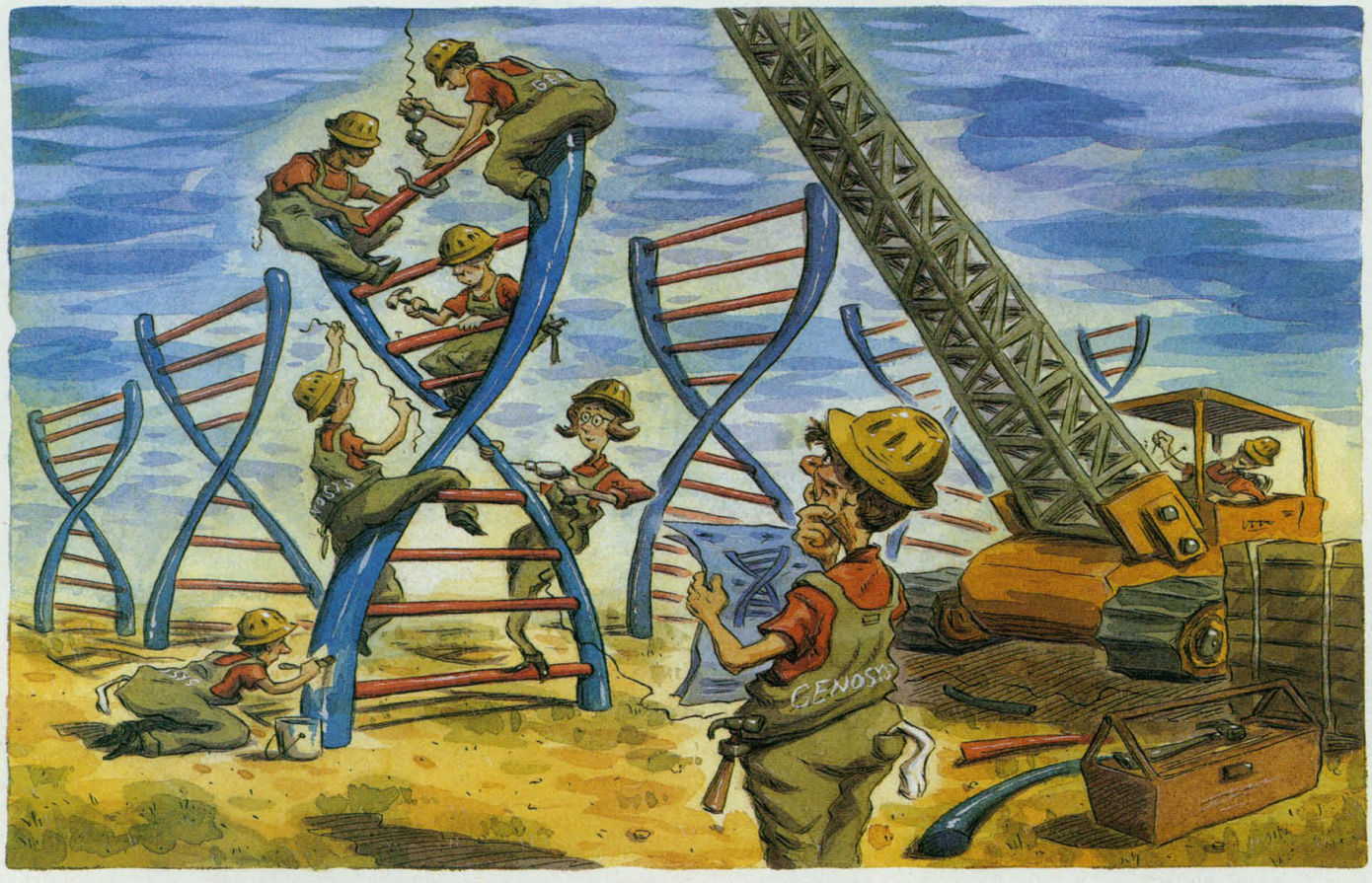

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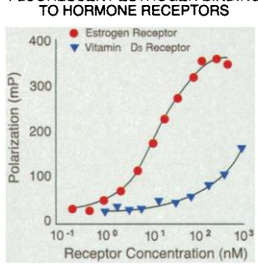

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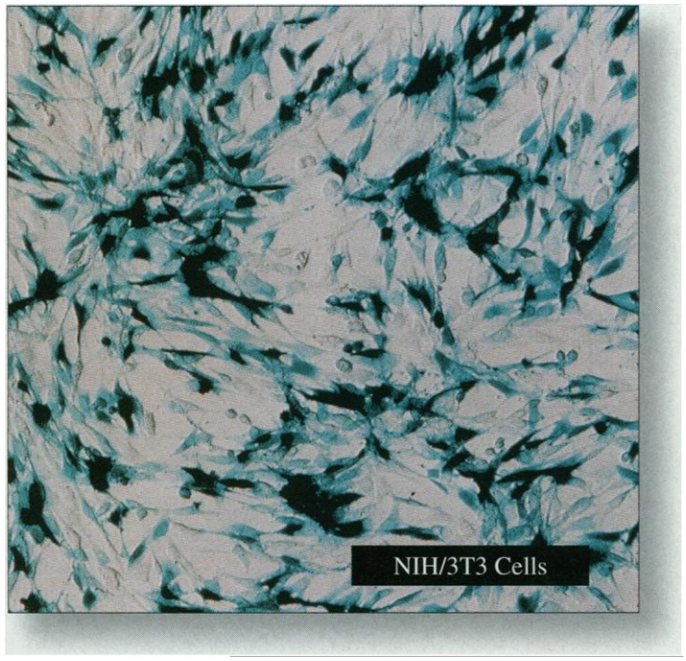

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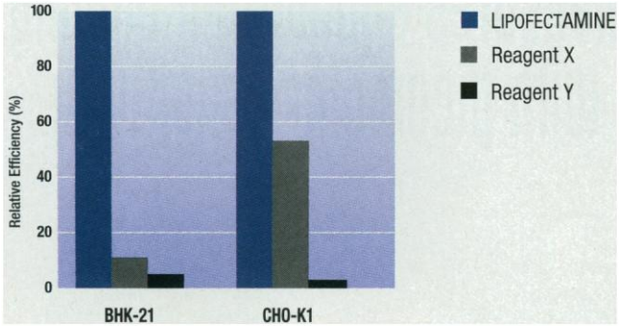

FIGURE 1. *Relative transfection efficiencies of LIPOFECTAMINE Reagent and two cationic lipid reagents from other suppliers. The amount of reagent and DNA were optimized according to manufacturers' recommended conditions. Peak activities are shown normalized relative to LIPOFECTAMINE Reagent.*

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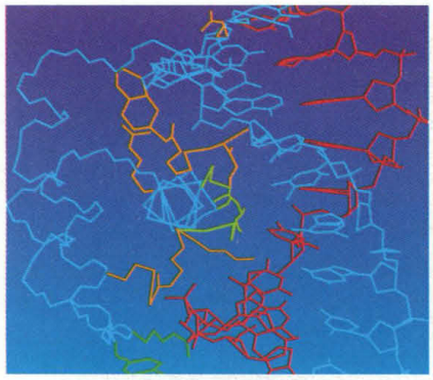

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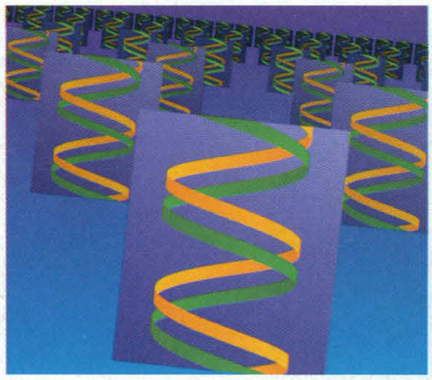

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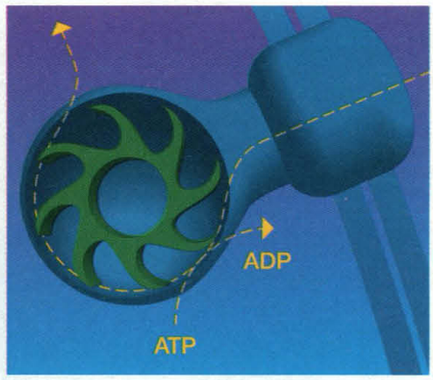

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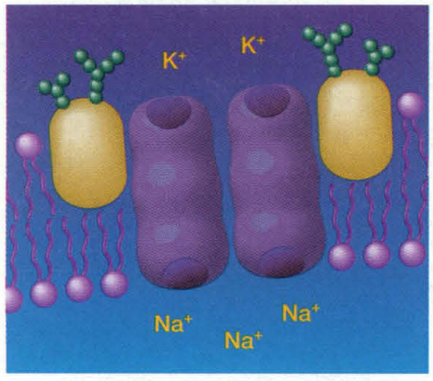

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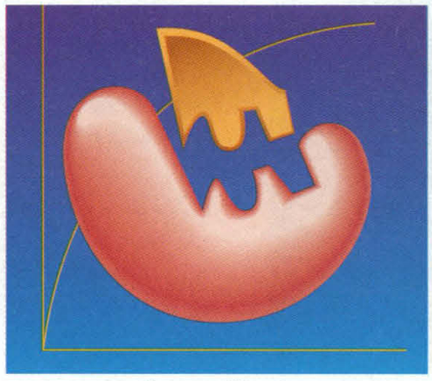

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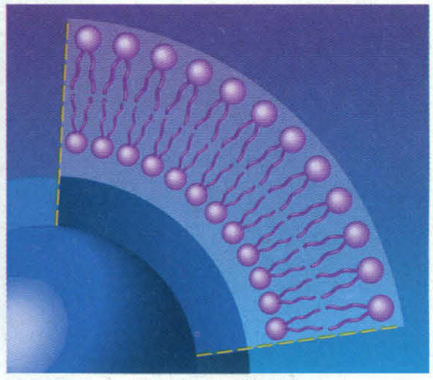

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Invitation to Nominate for the "Ameritec Prize"

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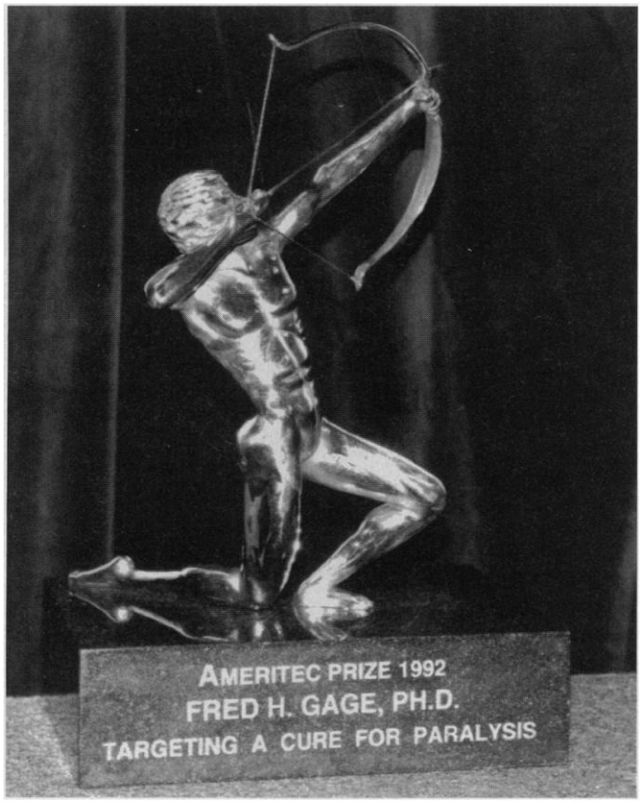

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The Prize is awarded annually and is composed of three parts:

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