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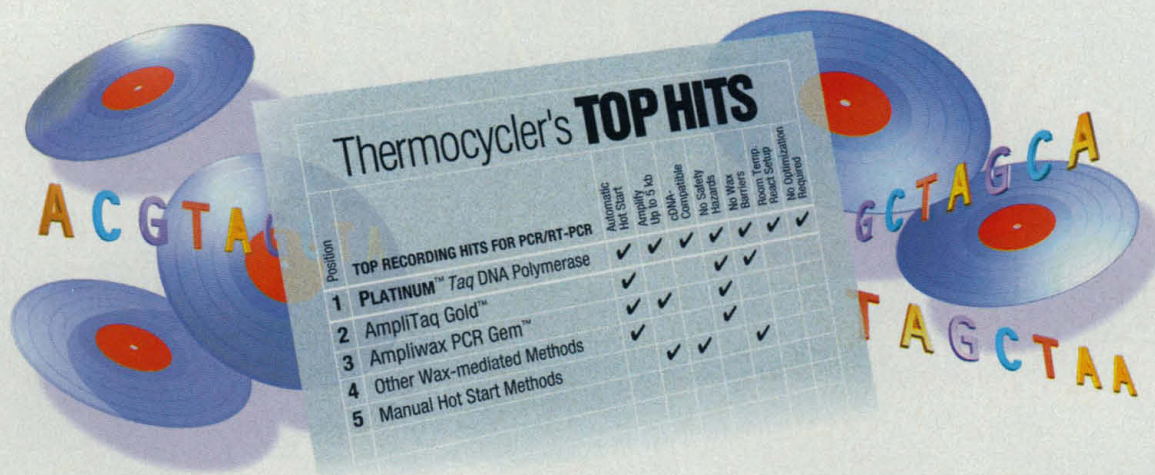
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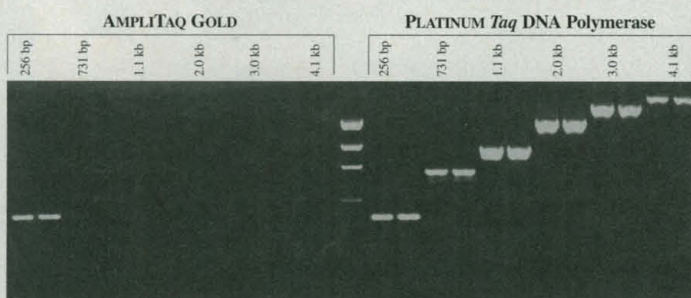
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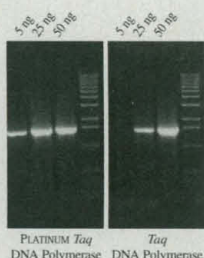


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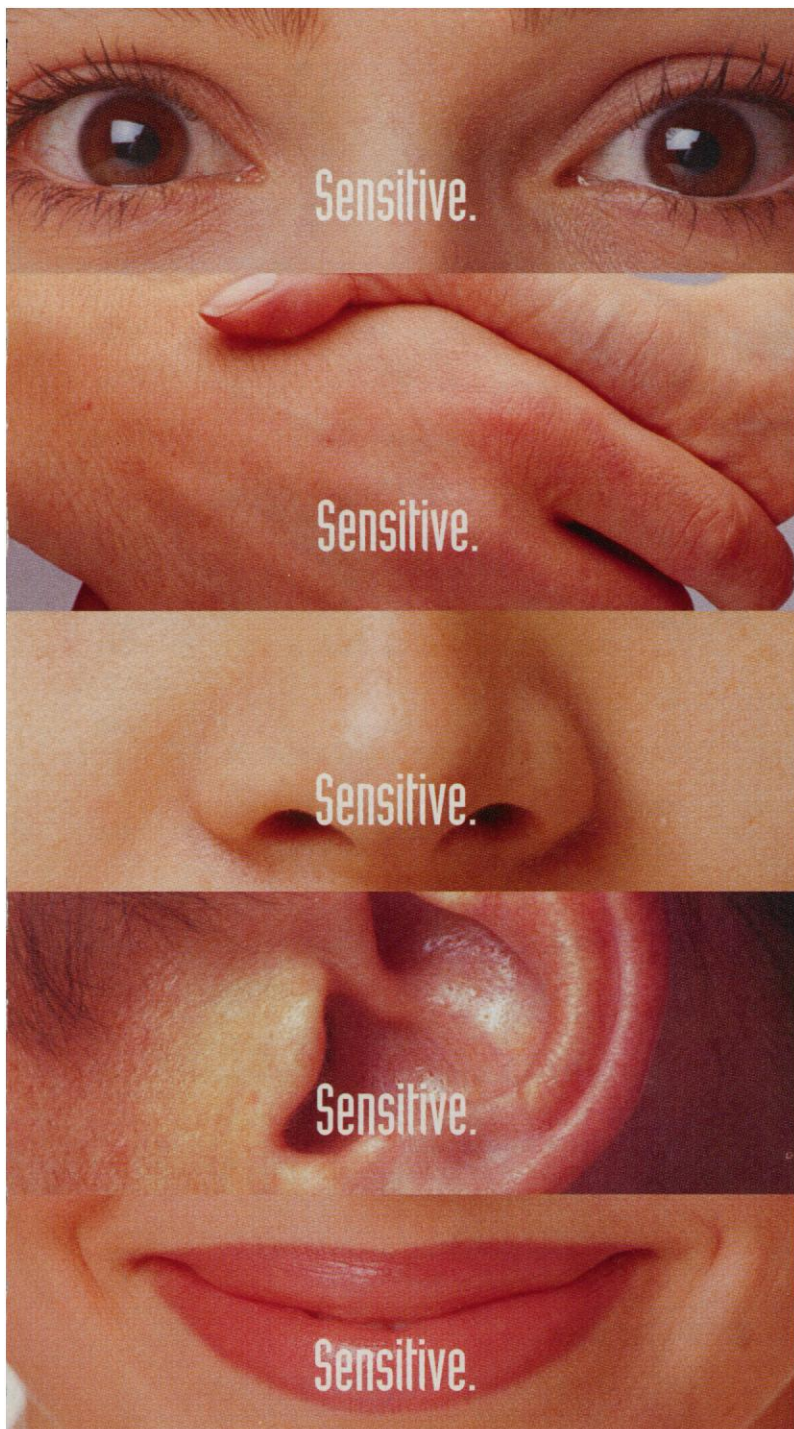
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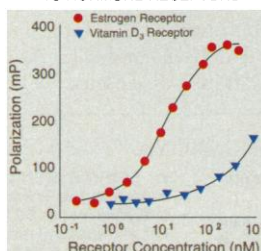
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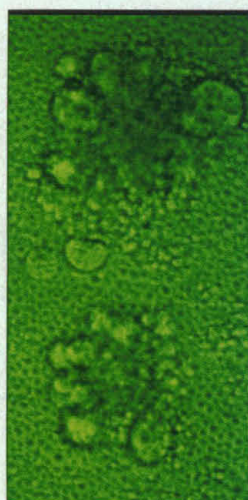
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COVER

The small (1 meter) Cretaceous theropod dinosaur *Sinosauropteryx* from Liaoning Province, China. Extraordinary preservation includes remnants of the abdominal region as well as an eye and curious filamentous structures along the back and tail. The shape of the abdomi-

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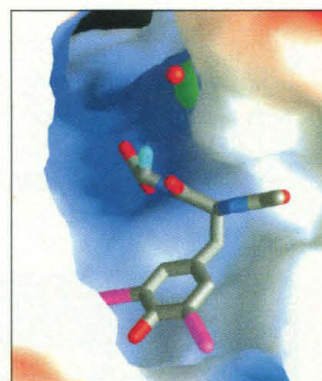
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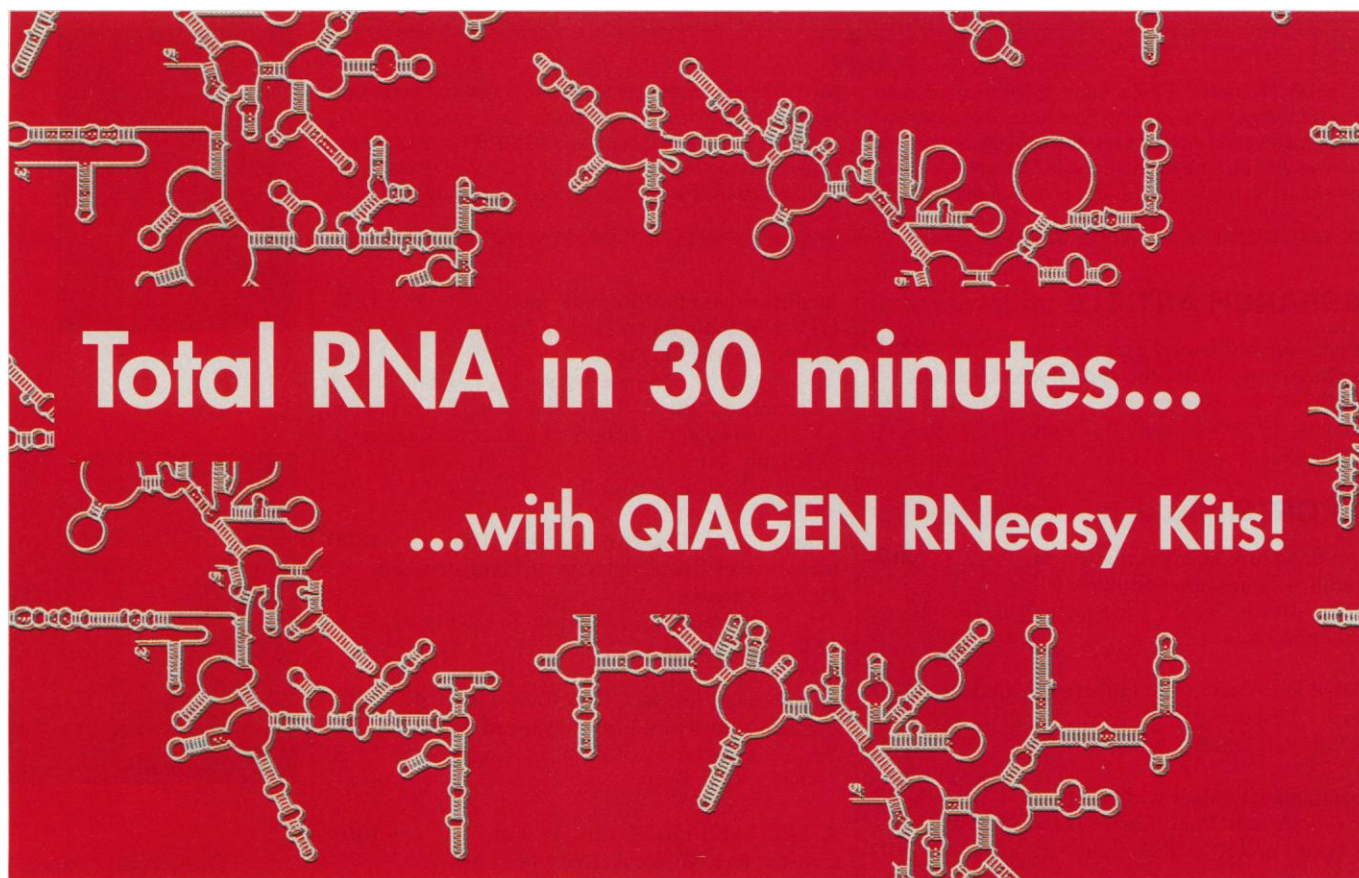
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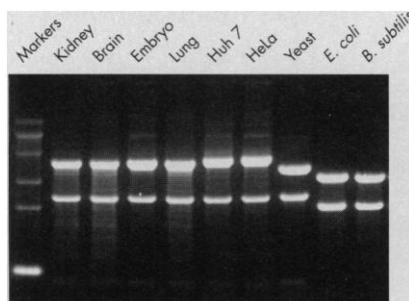
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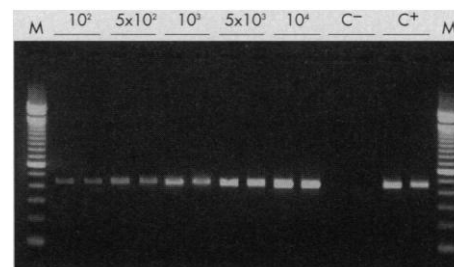


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THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Lung lineage

Reptiles and birds both possess bellowslike septate lungs, although the avian lung is highly modified to allow high rates of exchange of oxygen and carbon dioxide. Ruben *et al.* (p. 1267; see the cover and the news story by Gibbons, p. 1229) analyze lung geometry of theropods, thought by many to be the ancestors of birds, using several recently discovered fossils. The theropods possessed lungs analogous to those in crocodiles with a diaphragm driving the bellows, in contrast to those of most modern and early birds.

The proof is in the proofs

Albert Einstein and David Hilbert published the central elements of the general theory of relativity at almost the same time, and Hilbert in fact beat Einstein by 5 days in the submission dates of the manuscripts. Corry *et al.* (p. 1270) now provide archival evidence consisting of the proofs of Hilbert's paper, which show that at the time of submission, the manuscript did not in fact contain crucial parts of the theory, which were added later at proof stage. The evidence suggests that Einstein was the first to fully develop the theory, whereas Hilbert changed the proofs of his paper after seeing a copy of Einstein's paper.

Icy clouds, warm Mars

Images of the martian surface show evidence for flowing water about 4 billion years ago. Unfortunately, no simple mechanism has been found to warm the surface of Mars enough to allow liquid water on the surface. Forget and Pierrehumbert (p. 1273; see the Perspective by Kasting, p. 1245) added the effects of icy carbon dioxide clouds to a one-dimensional climate model and found that they can warm the

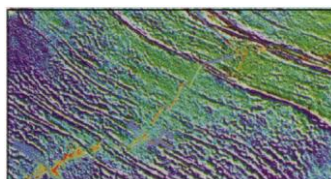
Observing climate oscillations

The climate system during the last glaciation was disrupted by abrupt events in which ice sheets discharged many icebergs that rafted sediment across the Atlantic. Bond *et al.* (p. 1257; see the Perspective by Oppo, p. 1244) have now recognized the same events throughout the Holocene, which has been thought to have been climatically stable. The pacing of the events in the Holocene is the same as during glacial times and indicate that the mechanism driving these climate oscillations is robust through the major climate change.

martian surface enough to allow the flow of water. The importance of including icy clouds to warm the surface of any planet may extend the habitable zone (region where liquid water, considered a primary constituent for life, exists) around a sunlike star from about 1.3 to more than 2.4 times the distance of Earth to the sun.

Covering the spread

The nature of faulting and magmatism along the mid-ocean ridges and their geometry changes dramatically with spreading rate. A geophysical survey by Géli *et al.* (p. 1281) of a region of the



Pacific-Antarctic Ridge system, where the spreading rate varies greatly over a short distance, reveals how changes in plate motion over the last 30 million years produced a V-shaped structure on the sea floor and led to reorganization of the local spreading system.

Making a muscle

Growth factors inhibit differentiation of myoblasts into muscle cells, but the intracellular signaling pathways by which they do so have not been established. Bennett and Tonks (p. 1288) found that activation of mito-

gen-activated protein kinases (MAPKs) was required in order for mitogens to inhibit transcription of muscle-specific genes. However, the role of MAPKs did not end there. Later in myogenesis (when muscle cells fuse to form multinucleated myotubes), the activation of MAPKs was required for myotube formation even if normal transcription of muscle-specific genes had occurred. Thus, MAPK signaling pathways appear to mediate both negative and positive control of distinct stages during muscle cell differentiation.

Staying young

In times of stress—when there is little food or water—the nematode *Caenorhabditis elegans* becomes a dauer, a metabolically inactive state akin to mammalian hibernation. Lin *et al.* (p. 1319) have now cloned *daf-16*, one member of the signal transduction pathway that acts continually to keep the animal from becoming a dauer. DAF-16 is a member of the HNF-3/forkhead family, another member of which participates in insulin's signal transduction pathway in mammals. When mutated, *daf-16* prolongs the life of *C. elegans*, suggesting a link between longevity and insulin signaling.

HIV persistence

Highly active antiretroviral therapy (HAART), a cocktail of protease inhibitors and reverse transcriptase inhibitors, has been successful in some patients in-


fected with the human immunodeficiency (HIV) virus in reducing the viral burden in the blood to undetectable levels. However, viral reservoirs could allow very low levels of ongoing viral replication or be a source of new problems once therapy is ended. In separate studies, Finzi *et al.* (p. 1295) and Wong *et al.* (p. 1291; see the news story by Balter, p. 1227) determined that latently infected, quiescent T cells from patients on HAART for as long as 30 months contain virus that could be induced in vitro to an actively replicating state. The viruses recovered showed little to no molecular evidence of evolution to drug resistance.

Deafness gene

A study of an extended family in Costa Rica who suffer from a nonsyndromic form of deafness that begins at about age 10 by Lynch *et al.* (p. 1315; see the news story by Pennisi, p. 1223) indicates an association of this form of deafness with the presence of a truncation in a gene, *DFNA1*, that is a member of a family of genes found in the fruit fly and yeast. In these other organisms, the gene is involved in cytokinesis and the establishment of cell polarity. The normal form of the protein in humans may be involved in actin polymerization in hair cells of the cochlea of the human ear.

Staff of life

The beginnings of agriculture lie in the Fertile Crescent. Heun *et al.* (p. 1312; see the Perspective by Diamond, p. 1243) have used DNA fingerprinting to identify which of the wild relatives of emmer wheat were most likely to have been the first domesticated. The results point to wild populations in the mountains of what is now southeastern Turkey. The site may yield clues into the earliest agricultural settlements.



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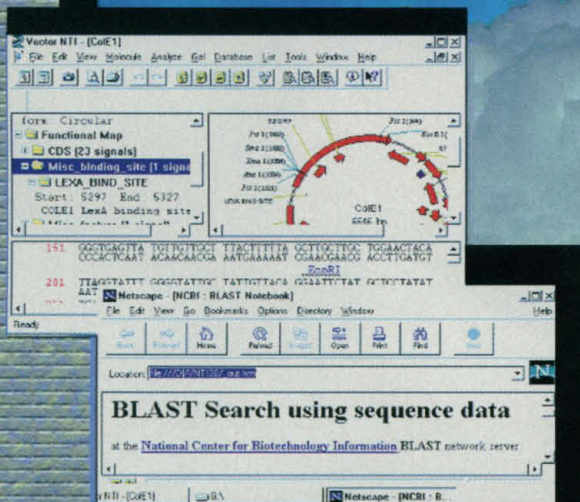
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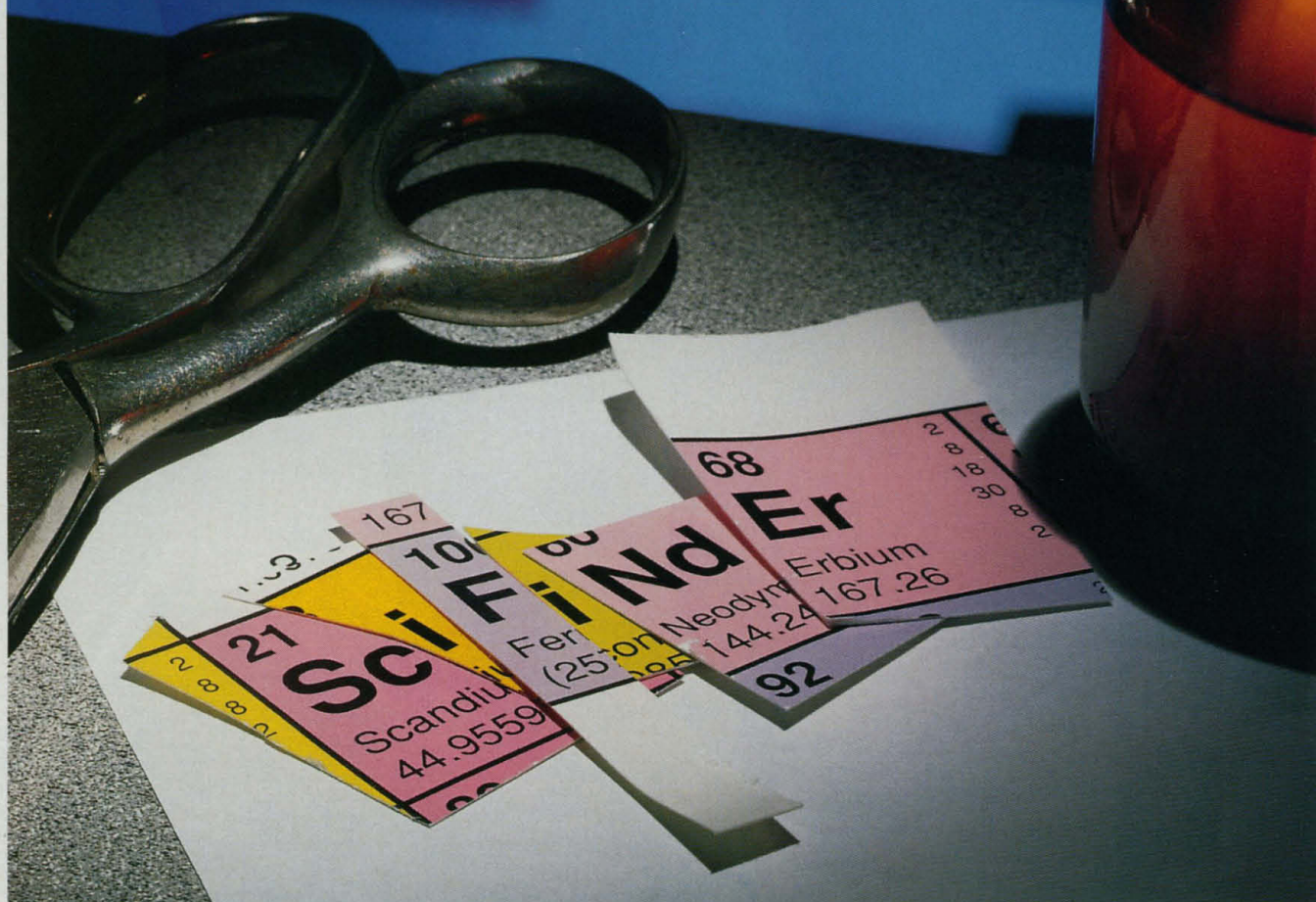
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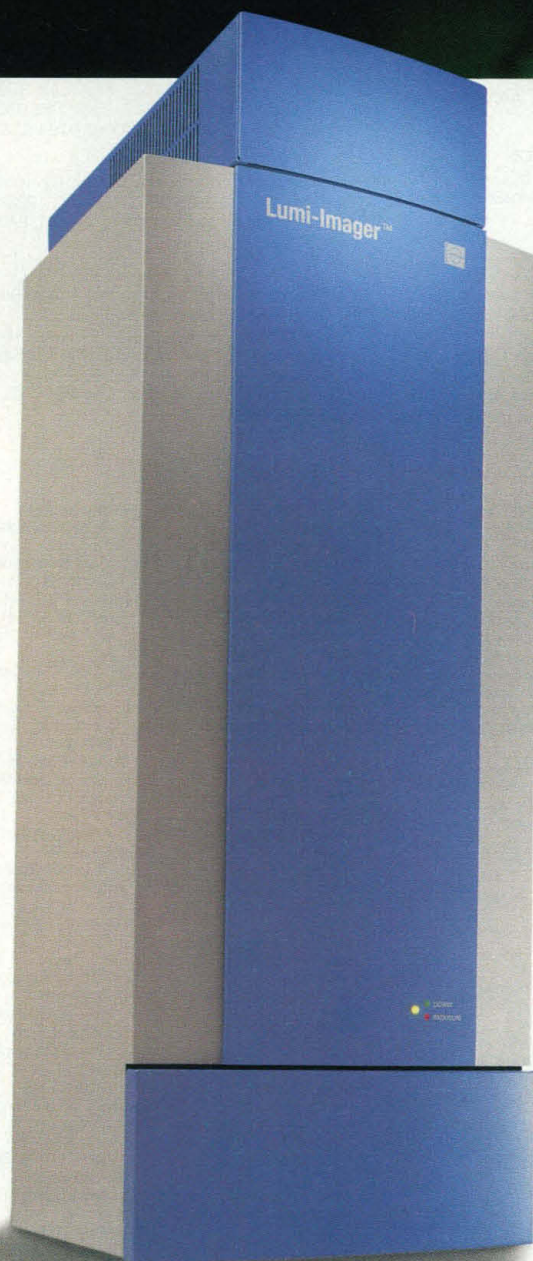
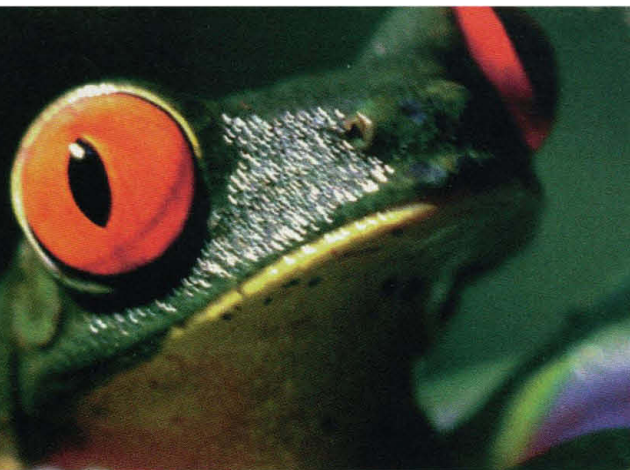
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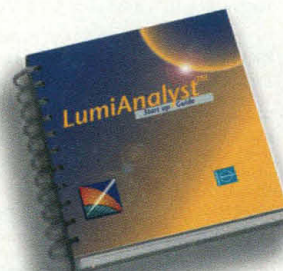


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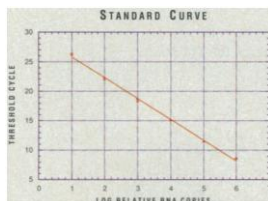
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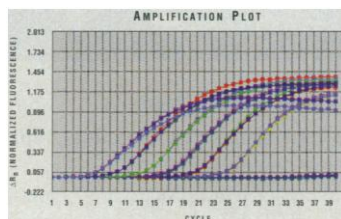
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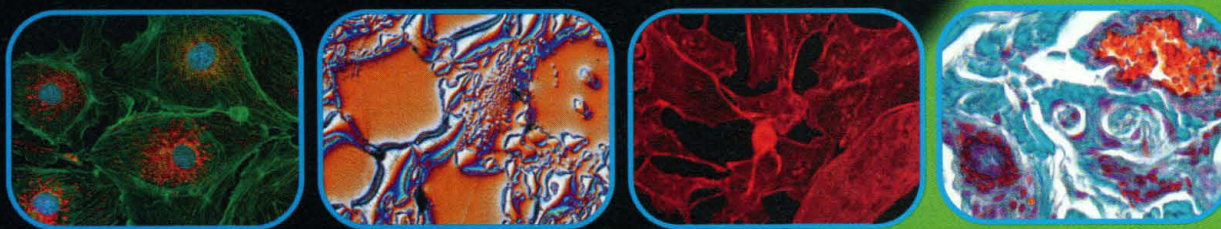


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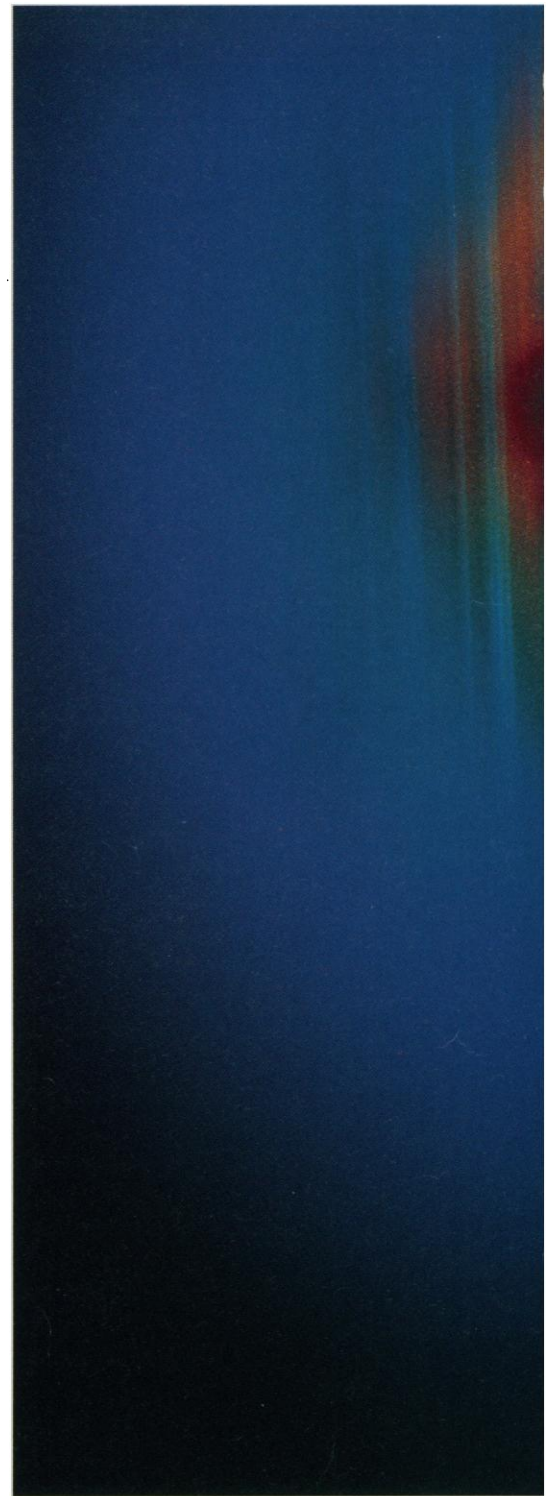
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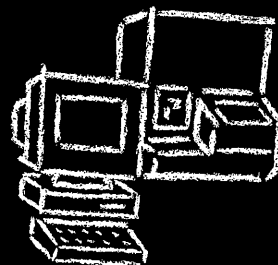
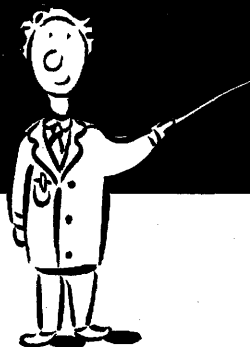
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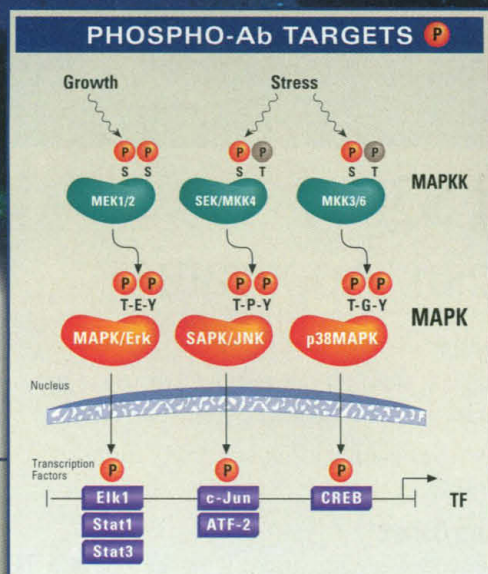
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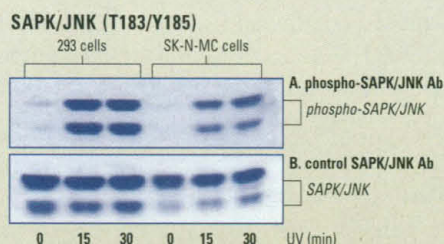
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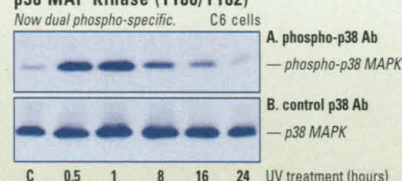
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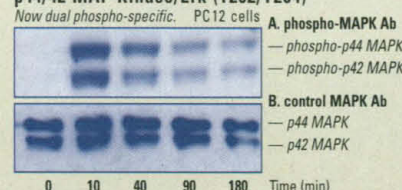
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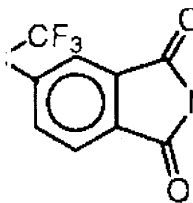
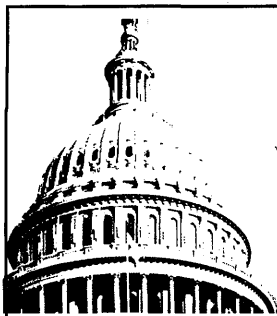
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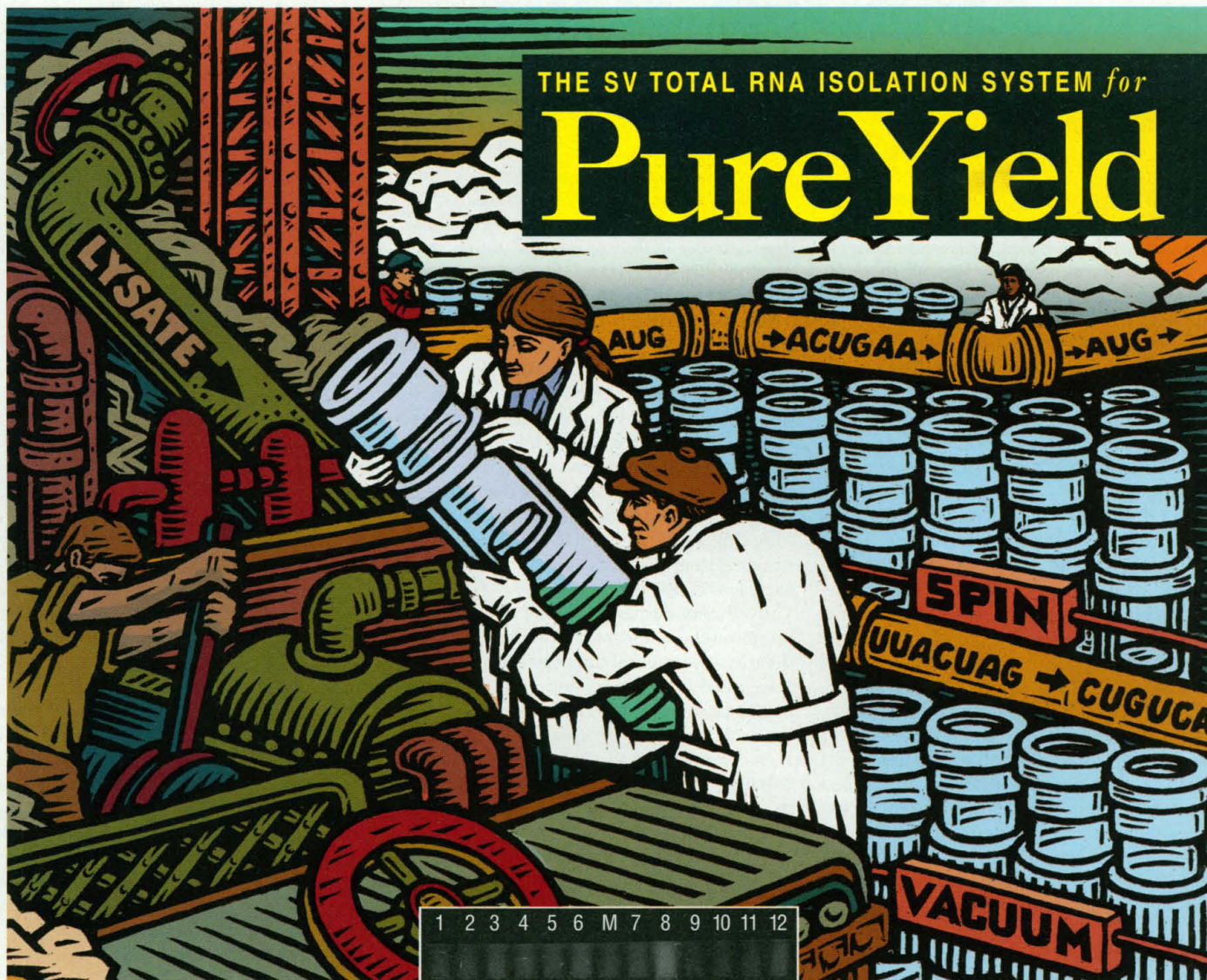
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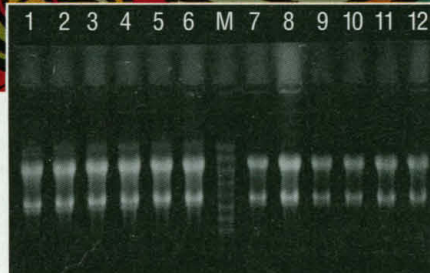


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