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c. A new way to clone *Taq*-generated PCR products in 5 minutes with ≥95% efficiency.

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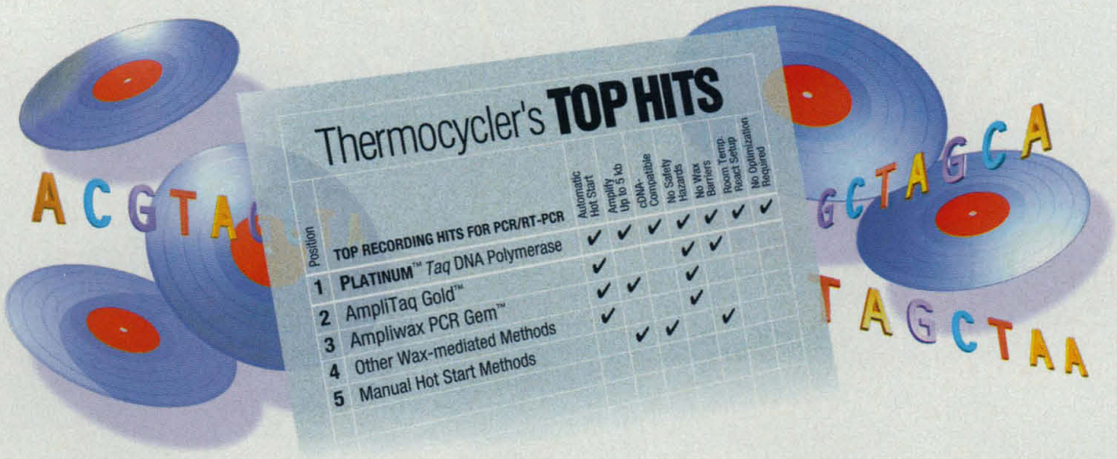

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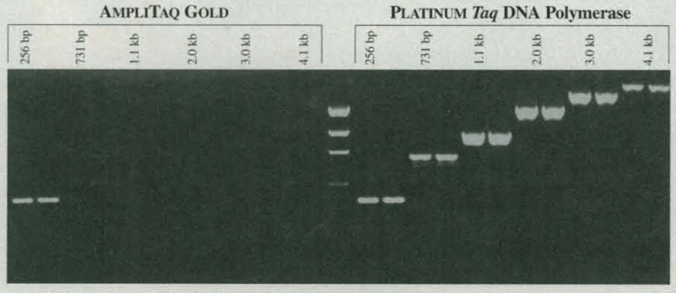

Automatic Hotstart setup at Room Temperature with 100 ng K562 Human DNA. Human betaglobin primers were used in 0.2 µM amounts. **PLATINUM *Taq* DNA Polymerase:** 1.5 mM $MgCl_2$, 0.2 mM dNTPs, 10X PCR buffer with PCR protocol–94°C, 1 min.; 94°C, 30 s; 55°C, 30 s; 72°C, 4 min 30 s. 35 Cycles of PCR performed. **AMPLITAQ GOLD™:** 2.5 mM $MgCl_2$ (as specified by PE), 0.2 mM dNTPs; 10X PCR buffer (PE); 2 units of AMPLITAQ GOLD. PCR protocol–PRE-INCUBATION 10 min @ 94°C prior to cycling; 94°C, 1 min; 94°C, 30 s; 55°C, 30 s; 72°C, 4 min 30 s; 35 Cycles of PCR performed.

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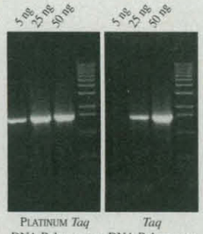

PLATINUM *Taq* DNA Polymerase | *Taq* DNA Polymerase

Improved Sensitivity in RT-PCR. Each: 1 unit enzyme; 1,572 bp HeLa cDNA fragment. Cycling: 94°C, 1 min; 35X (94°C, 15 s; 55°C, 30 s; 68°C, 2 min).

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- Chance of contamination from extra manipulations or additions is eliminated.

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Product	Cat. No.	Size
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	10966-026	250 units
	10966-034	500 units
PLATINUM *Taq* Antibody	10965-010	100 units
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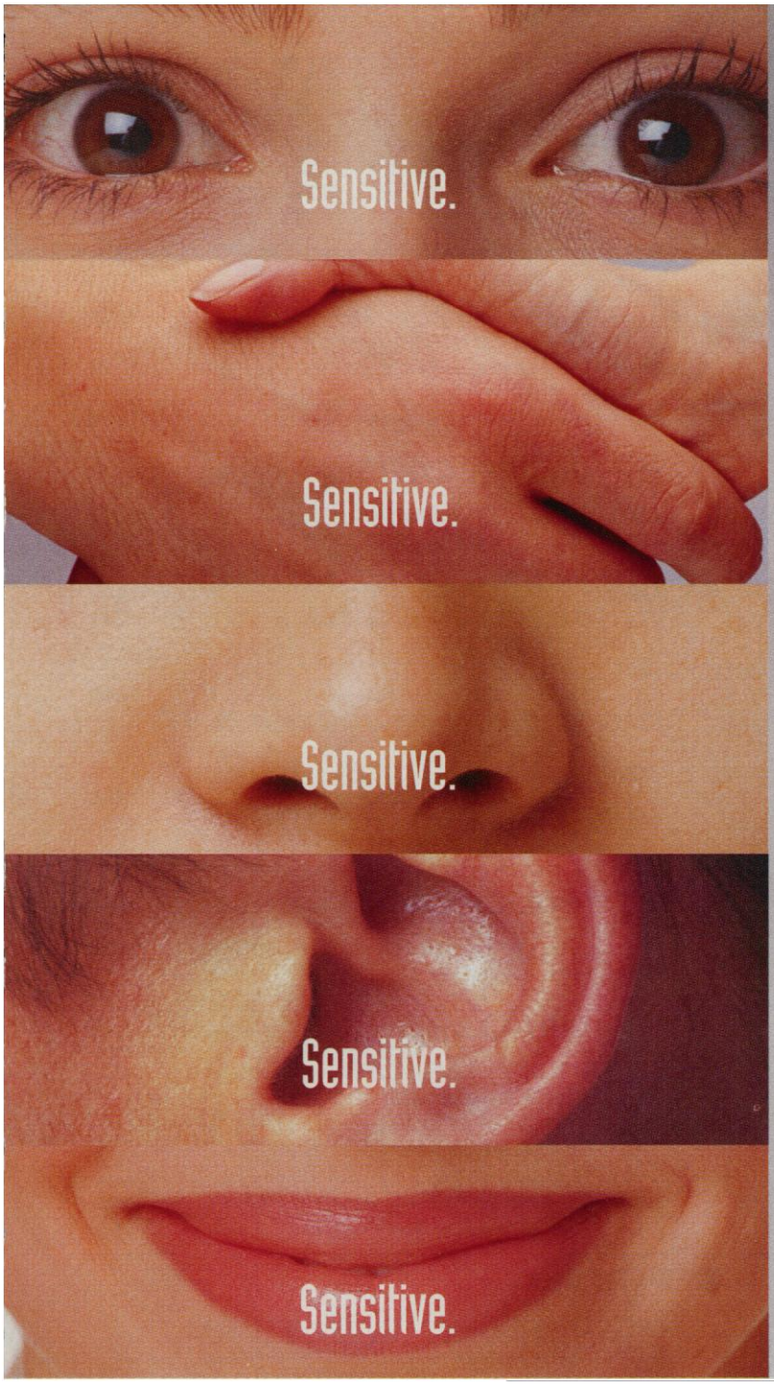

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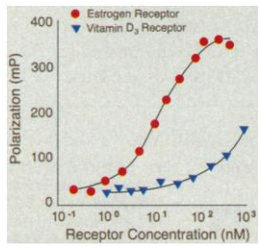

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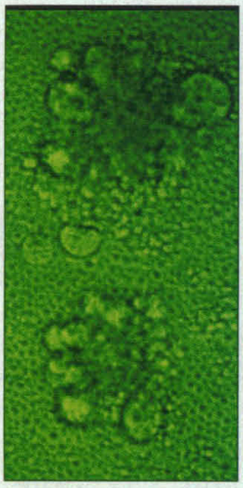
1223 & 1315
Silent mutations



1227, 1291 & 1295
HIV's sanctuary

NEWS & COMMENT

RESEARCH NEWS

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DEPARTMENTS

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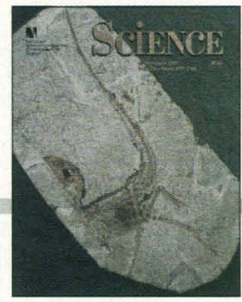
COVER

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 abdominal cavity is consistent with diaphragm-assisted lung ventilation in theropod dinosaurs. See page 1267 and the related News story on page 1229. [Photo: Courtesy of Donald L. Wolberg, project director, The Academy of Natural Sciences; photographer, David Bubier]

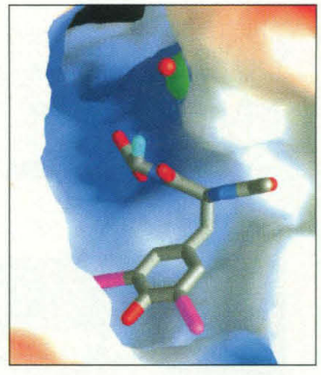


RESEARCH ARTICLE

REPORTS

TECHNICAL COMMENTS

1251
The Arctic comes out of the cold



1300
The end of neuropeptides

◩ Indicates accompanying feature

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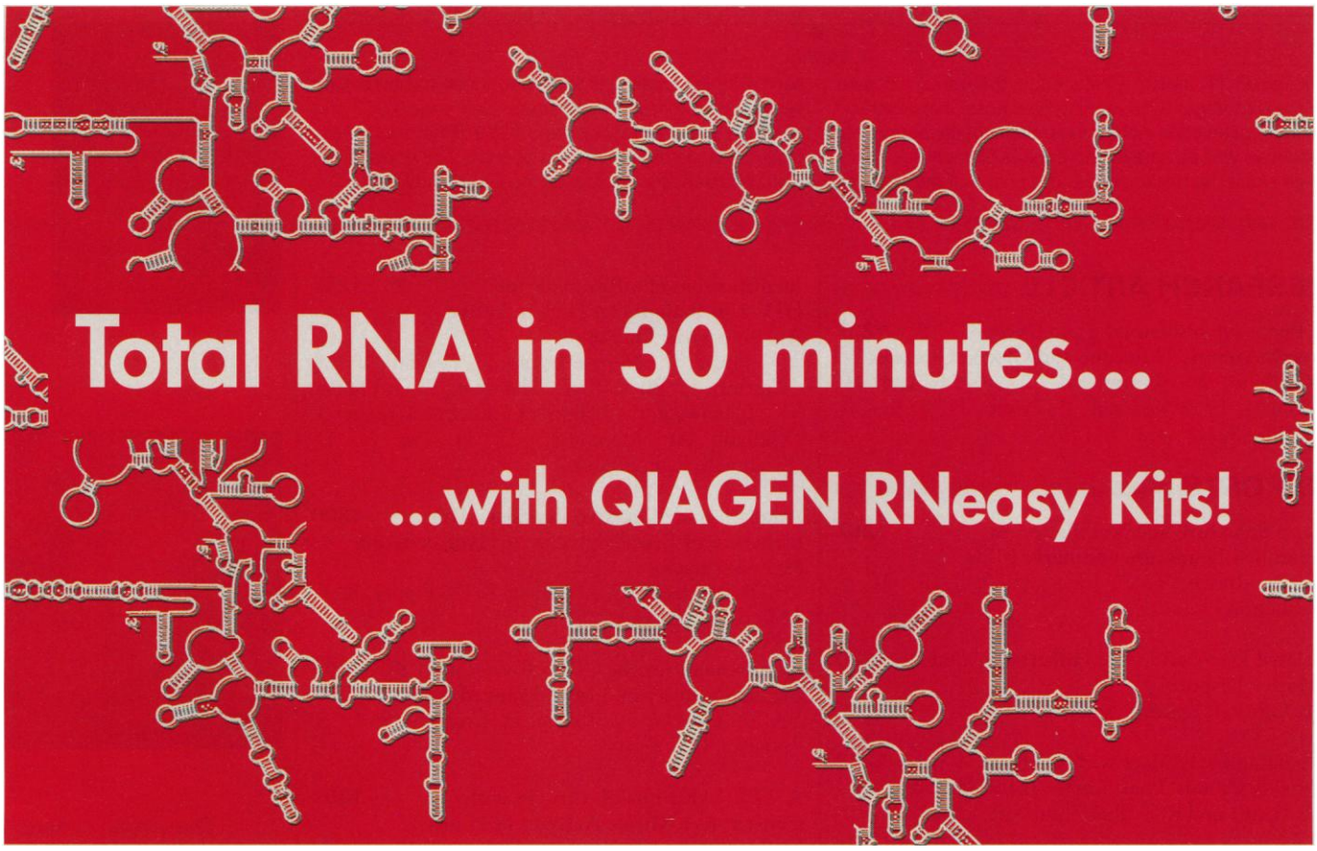

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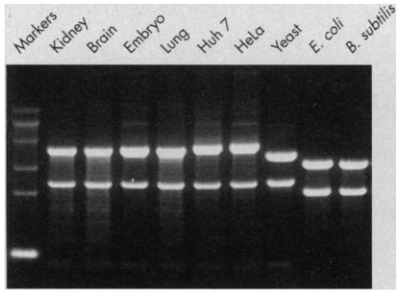
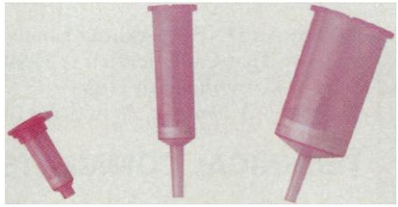


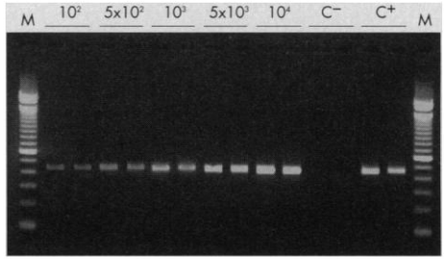
Formaldehyde agarose gel of total RNA isolated with the RNeasy Maxi Kit from the indicated sources. All tissues were from mouse.

RNeasy Spin Columns



Mini 100 µg RNA | **Midi** 1 mg RNA | **Maxi** 6 mg RNA

RT-PCR of RNA from ≥100 cells



RT-PCR amplification of total RNA. RNA was isolated with the RNeasy Mini Kit from the indicated numbers of HeLa cells.

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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

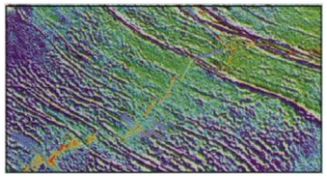
Images of the martian surface show evidence for flowing water about 4 billion years ago. Unfortunately, no simple mechanism has been found to warm the surface of Mars enough to allow liquid water on the surface. Forget and Pierrehumbert (p. 1273; see the Perspective by Kasting, p. 1245) added the effects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

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.

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 mitogen-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 infected 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 einhorn 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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DNA micrographs are courtesy of Michael W. Davidson, director of the Optical Microscopy Division of the National High Magnetic Field Laboratory, a joint venture of The Florida State University, the University of Florida, and Los Alamos National Laboratory.

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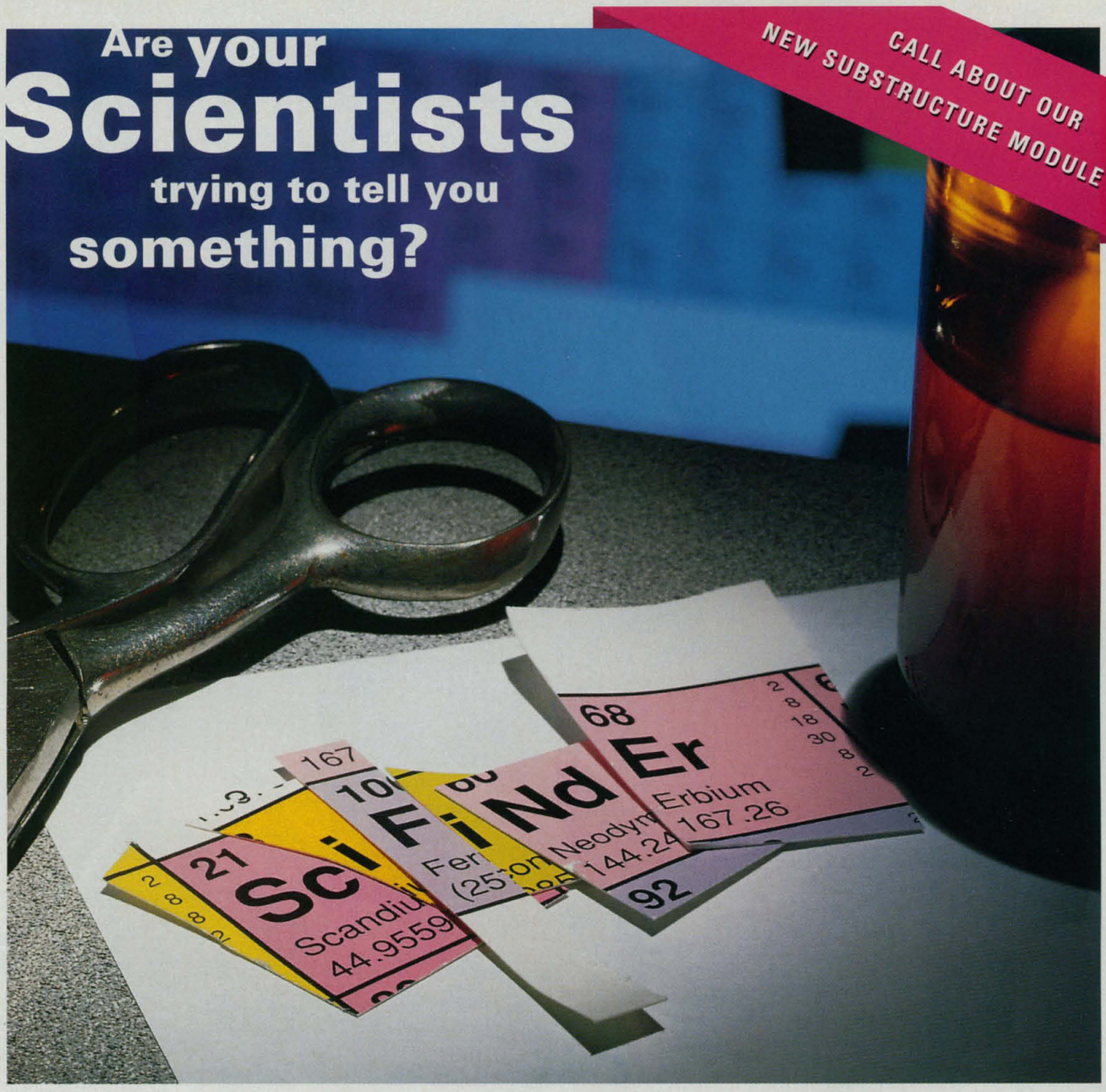

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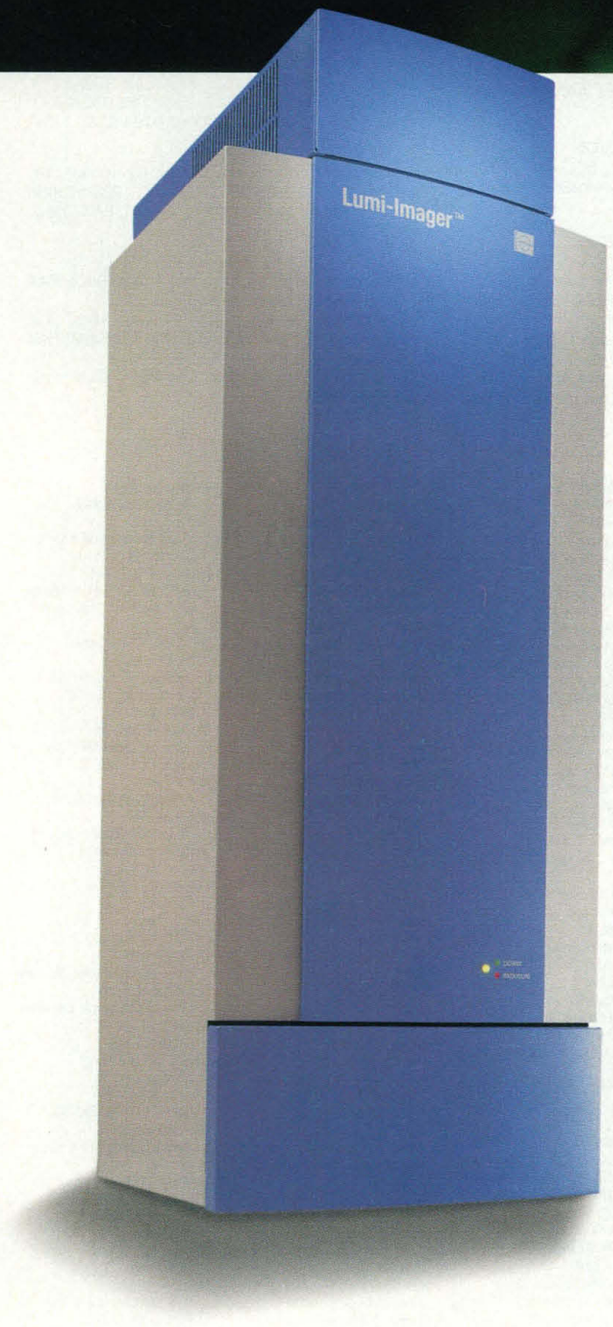

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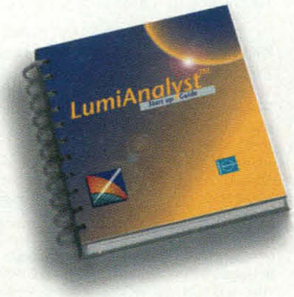

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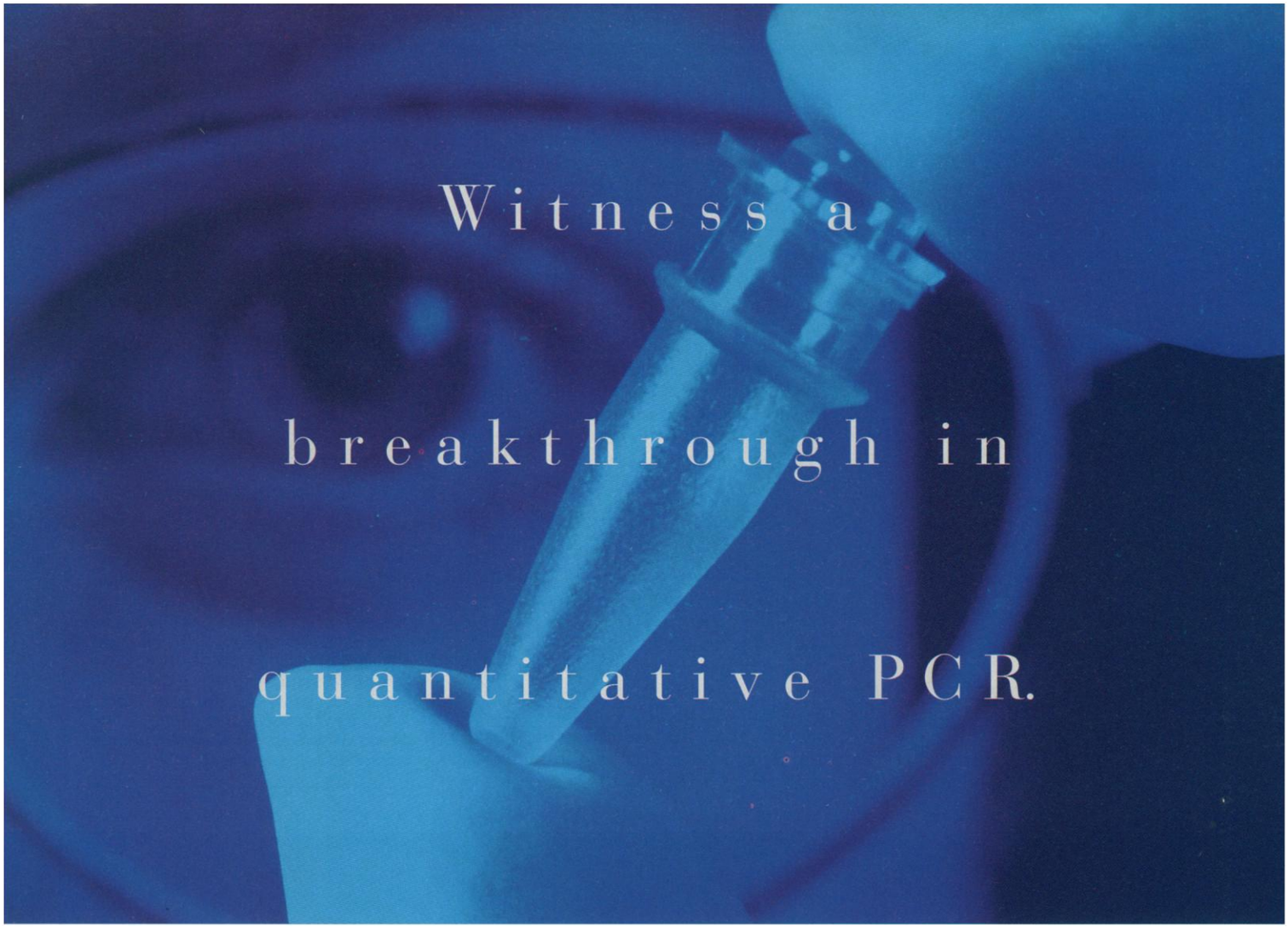
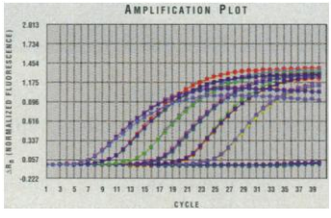
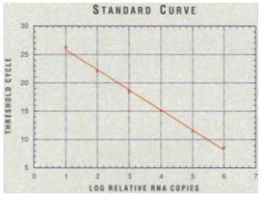


Setting a new standard: Data from serial dilutions of samples with known starting copy number are used to generate a standard curve for the determination of starting copy number in unknown samples.





The ABI PRISM 7700 system calculates the standard curve using the cycle where the amplification plot crosses a defined fluorescence threshold (C_T). This provides at least five orders of magnitude of linear dynamic range.

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PE Applied Biosystems PCR reagents are developed and manufactured by Roche Molecular Systems, Inc., Branchburg, New Jersey, U.S.A.

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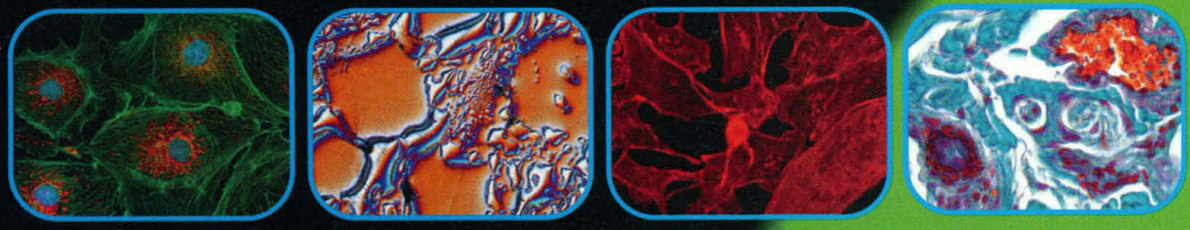

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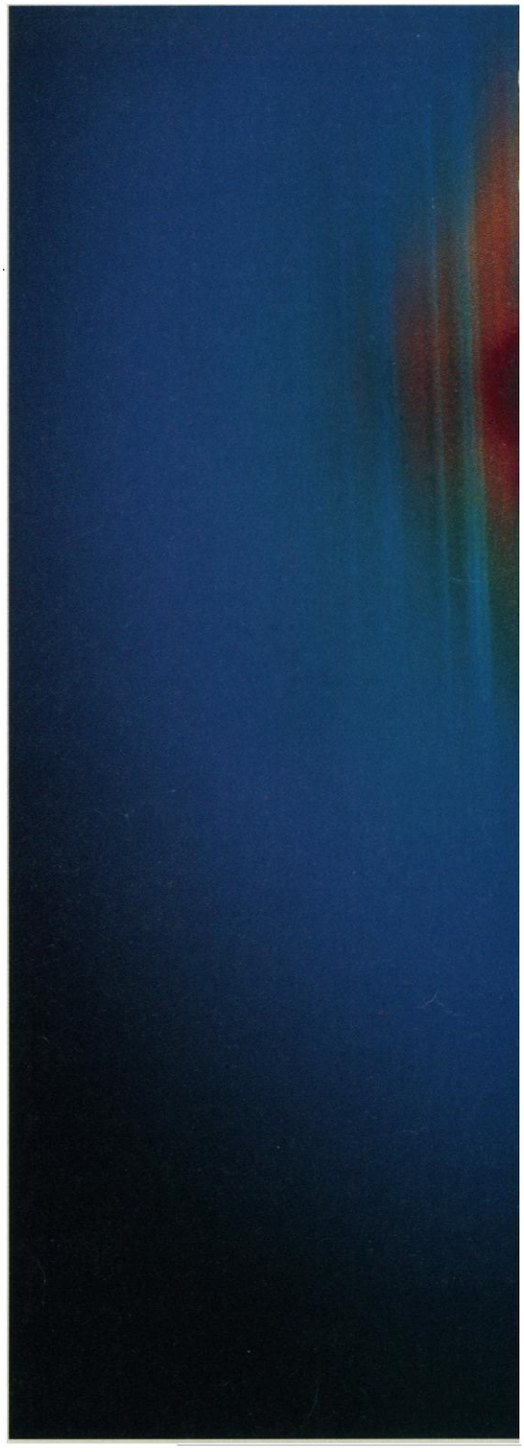
ONE OF THE MOST POWERFUL NEW FORCES IN MEDICINE MAY BE A GENTLE RED LIGHT.



For generations, we've been conditioned that effectiveness is a function of power. One only has to look at patent-medicine pain relievers: Powerful! Stronger! Extra-strength!

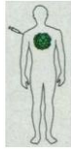
But what if efficacy were to be defined by how gentle the treatment was? In fact, what if we could create a reaction between two separate elements – each virtually innocuous by itself, until one was "switched on" by the other – in a highly precise manner?

This is the vision of PhotoPoint,™ a revolutionary new medical procedure being developed by Miravant, comprised of our proprietary light devices and patented photoselective drugs.

It offers the possibility of highly selective, controlled destruction of diseased or target cells, with minimal invasiveness and side effects. In fact, most of the applications being developed are handled on an outpatient basis.

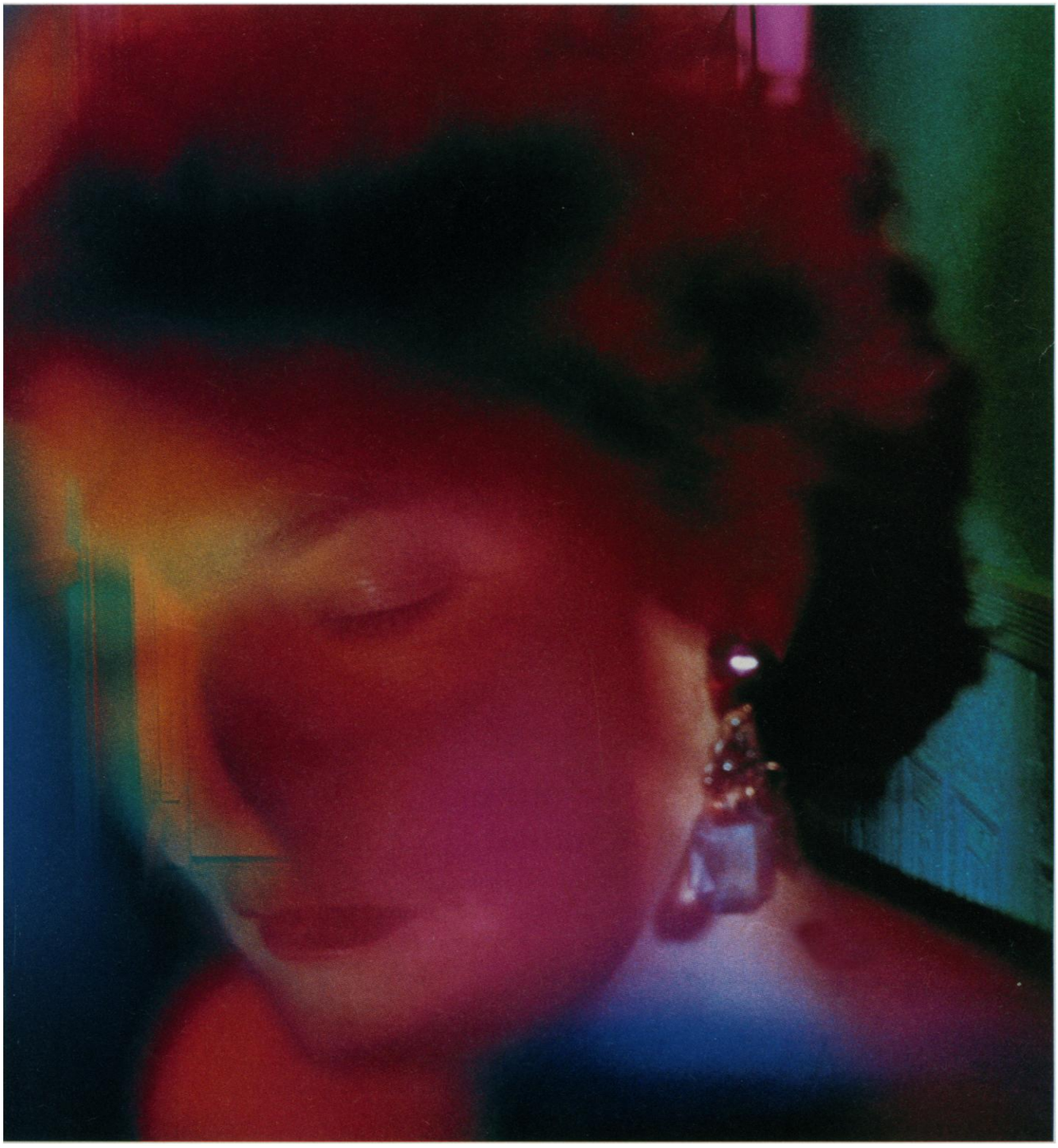
And as potential treatments ranging from cancer to eye disease move through clinical trials, we ultimately create a new class of medicine in which less is more.

PhotoPoint has potential to selectively target a range of abnormal tissues in the body, such as diseases like cancer or retinal abnormalities.



In clinical studies, the PhotoPoint drug is injected and is subsequently retained by target cells. It remains inactive until exposed to a specific wavelength of non-thermal red light.

Light is directed at the target area. A small diode-based system generates the light, and special devices deliver it within the body or on its surface.



Targeted cells are destroyed by an interaction between the drug and the light, with minimal known side effects. PhotoPoint, now in clinical trials, is being developed as an outpatient procedure.

Learn more about PhotoPoint™ and Miravant (Nasdaq: MRVT) at www.miravant.com, or call toll-free at 888-685-6788. The company's products require U.S. Food and Drug Administration approval before marketing.

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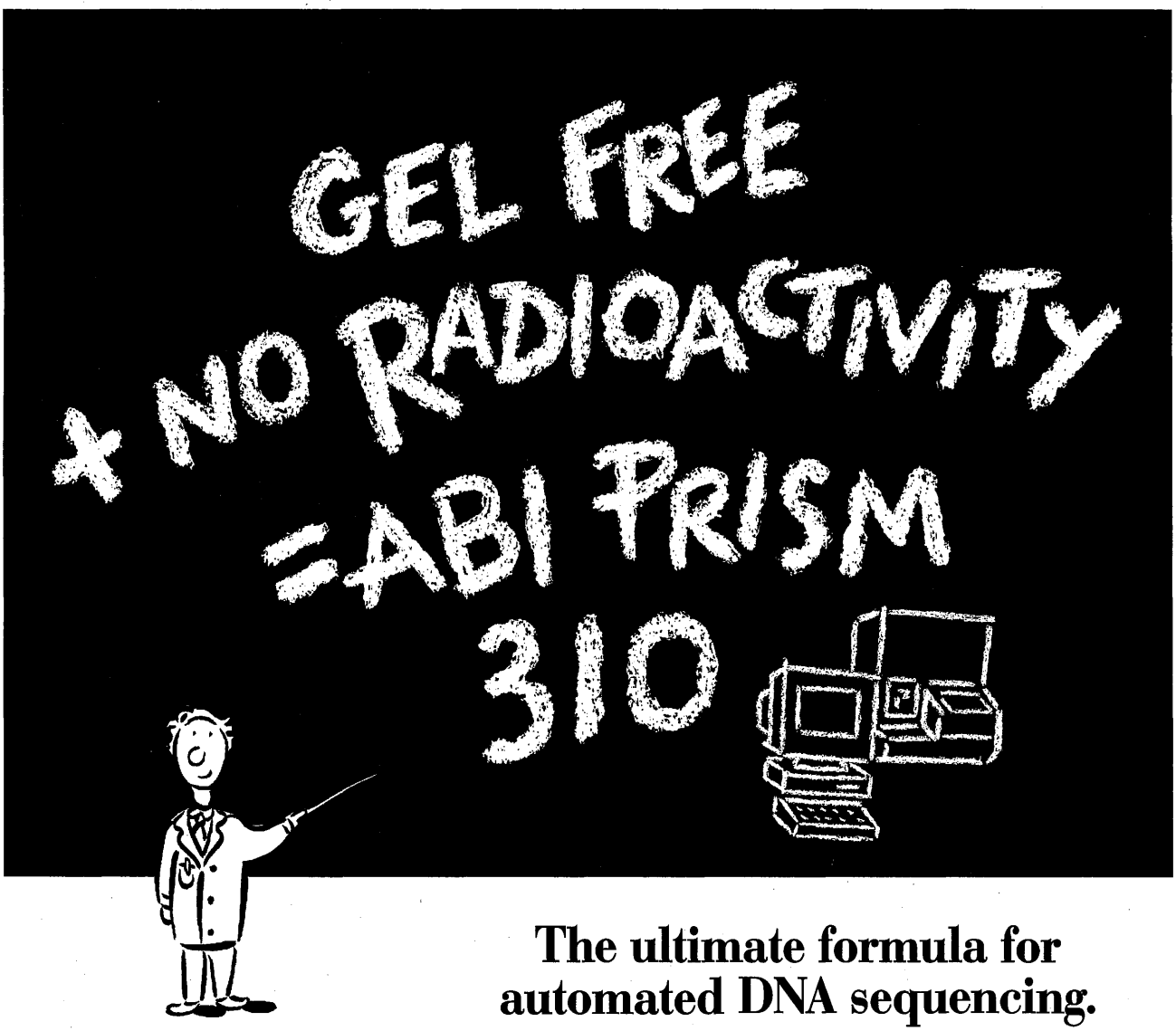

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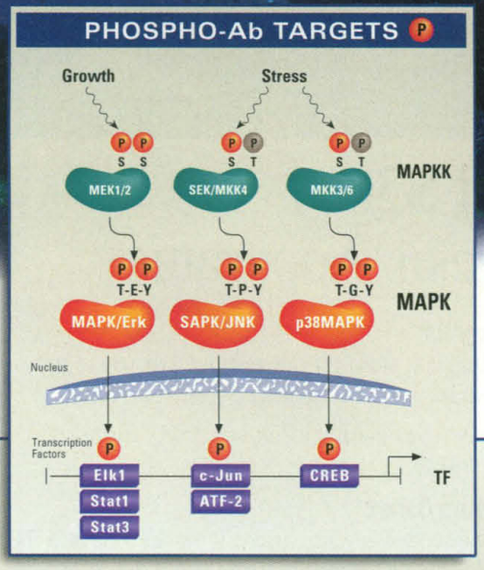

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	SEK1 (T223)	# 9151
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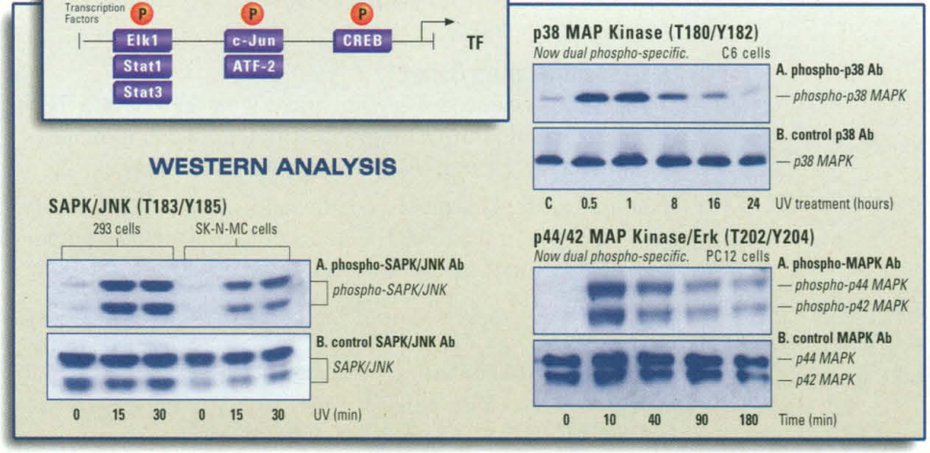

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- Optional cooling base allows higher voltage, saving a third of the electrophoresis time.

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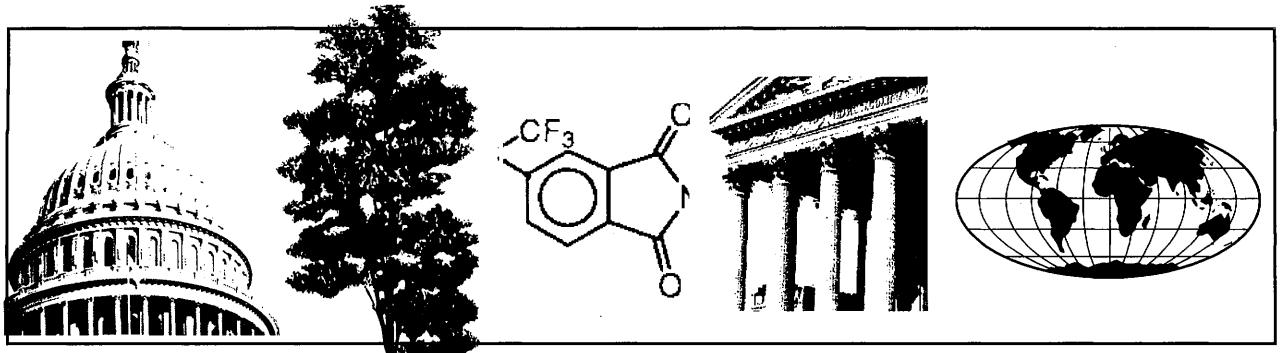

1998-99

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Application deadline: January 15, 1998

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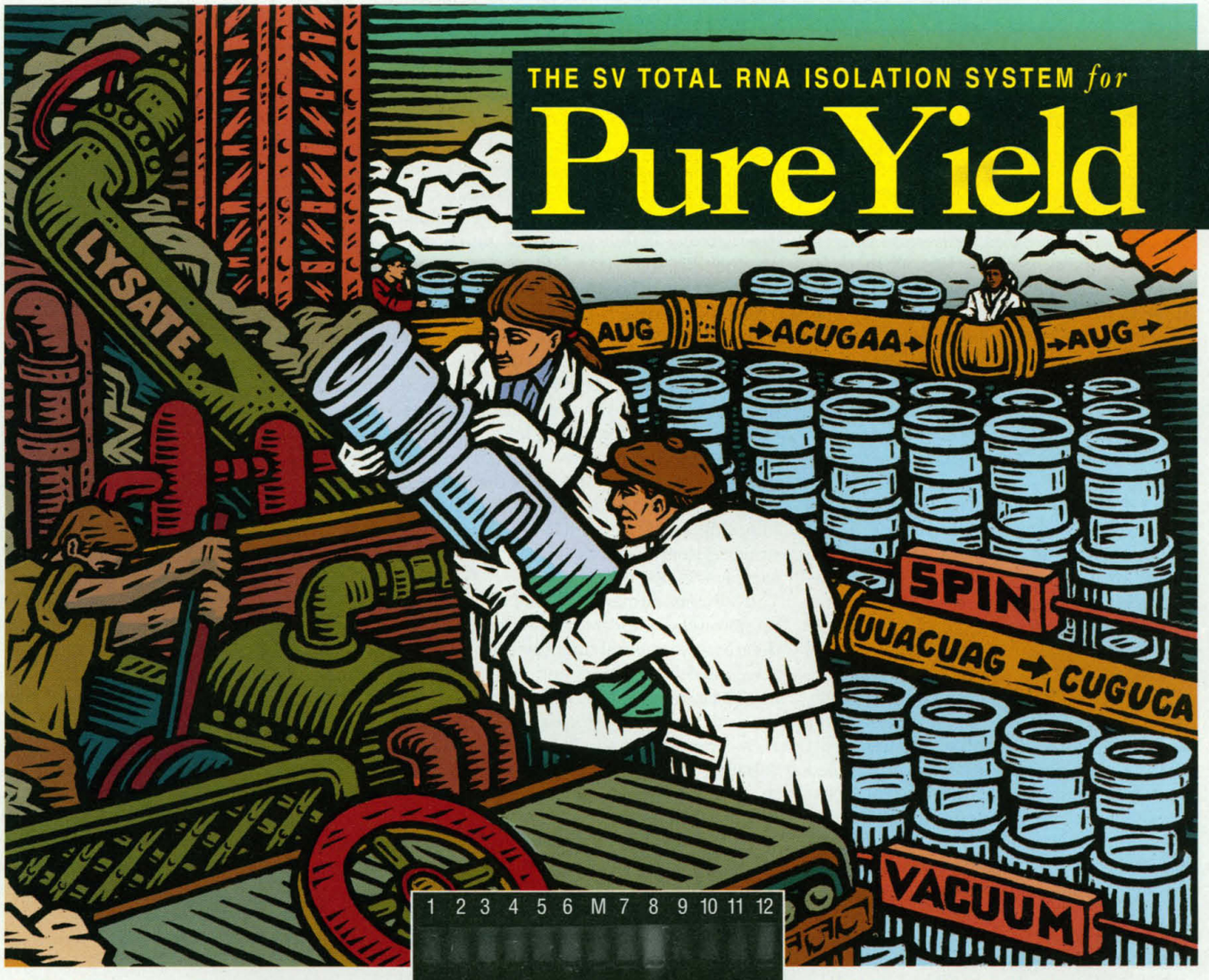

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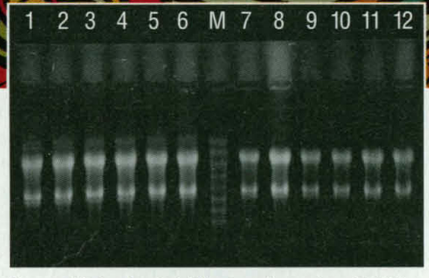

Formaldehyde Gel Electrophoresis of RNA. RNA was isolated from 30mg liver tissue using Promega's system (Lanes 1-6) and a competitor's system (Lanes 7-12). Promega's system yielded an average of 100µg consistently. The competitor's system yielded an average of 70µg with wide variability. (M = marker lane)

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- **Works with blood, tissue and cells**
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India 11 684 6565
Indonesia 21 489 1718
▲ Japan 03 3669 7981
Korea (02) 478 5911
Malaysia 3 718 3600
New Zealand 9 570 3200
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