



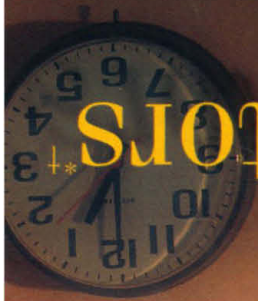
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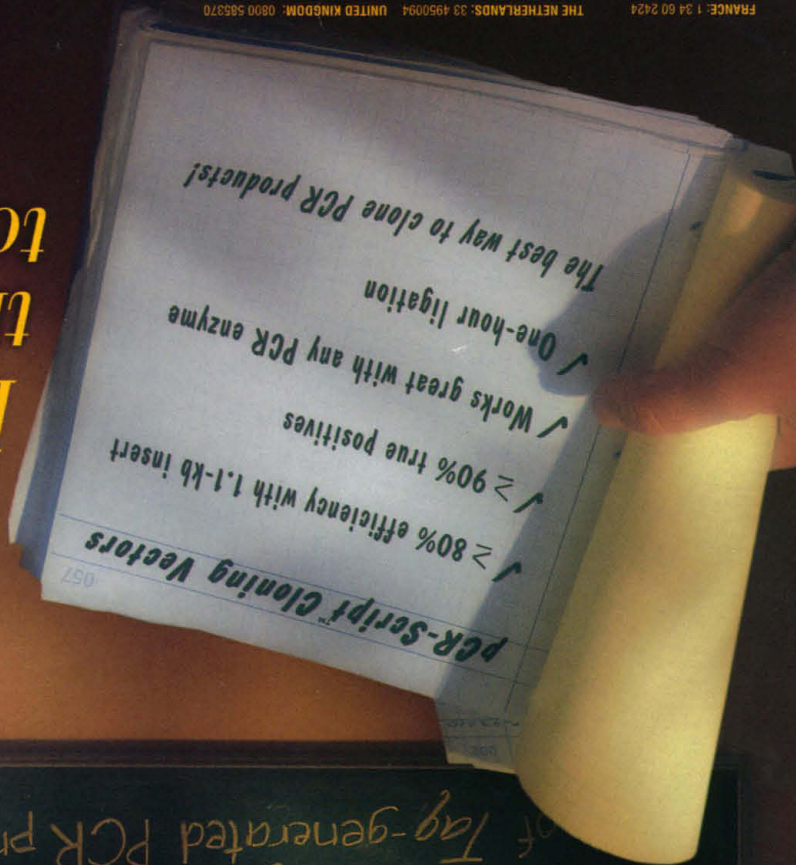


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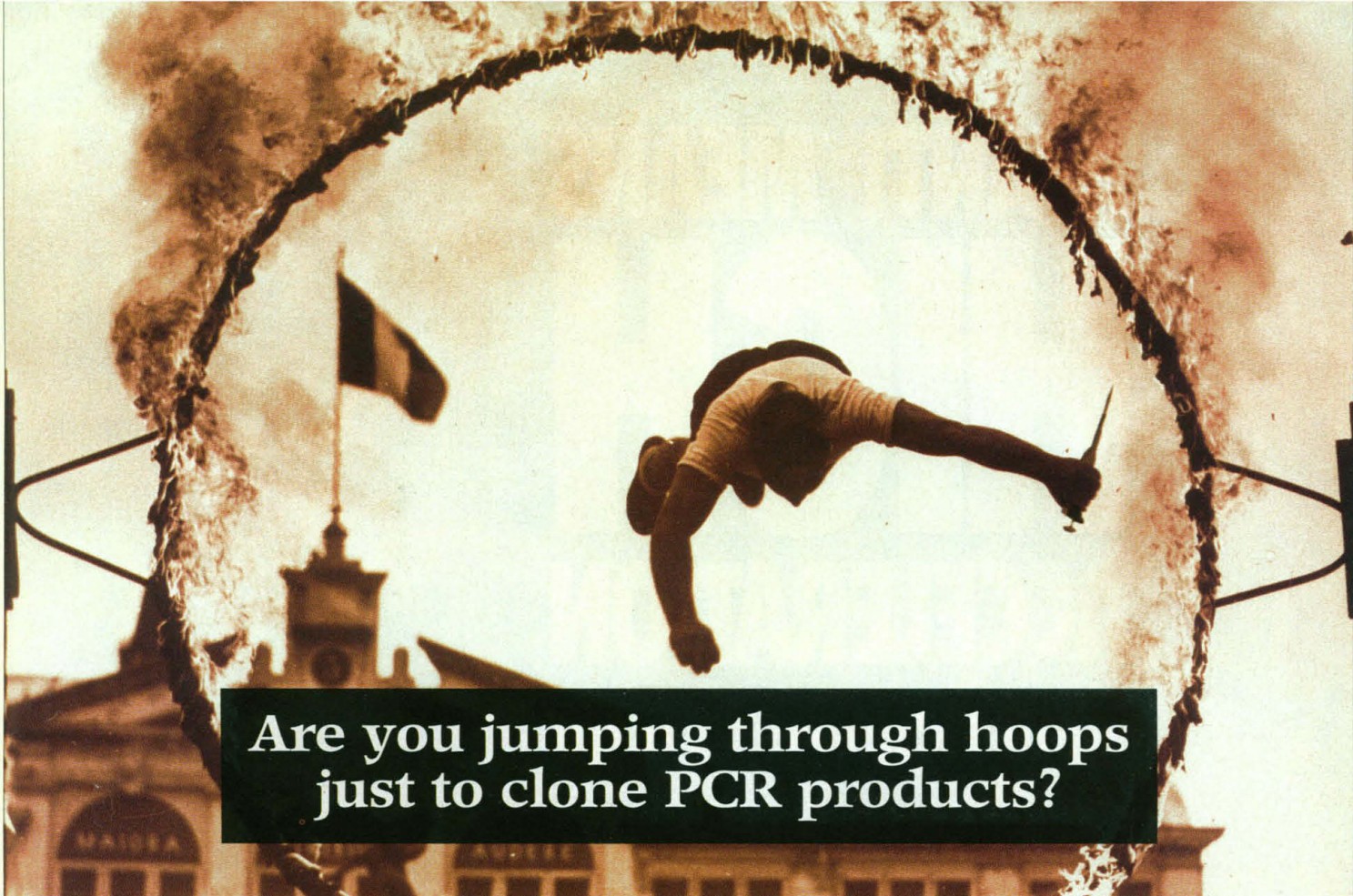
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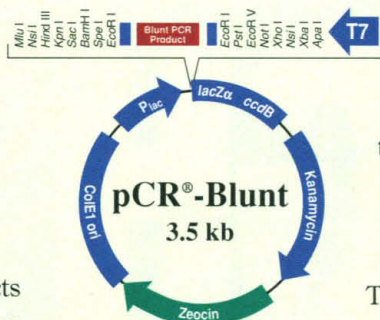
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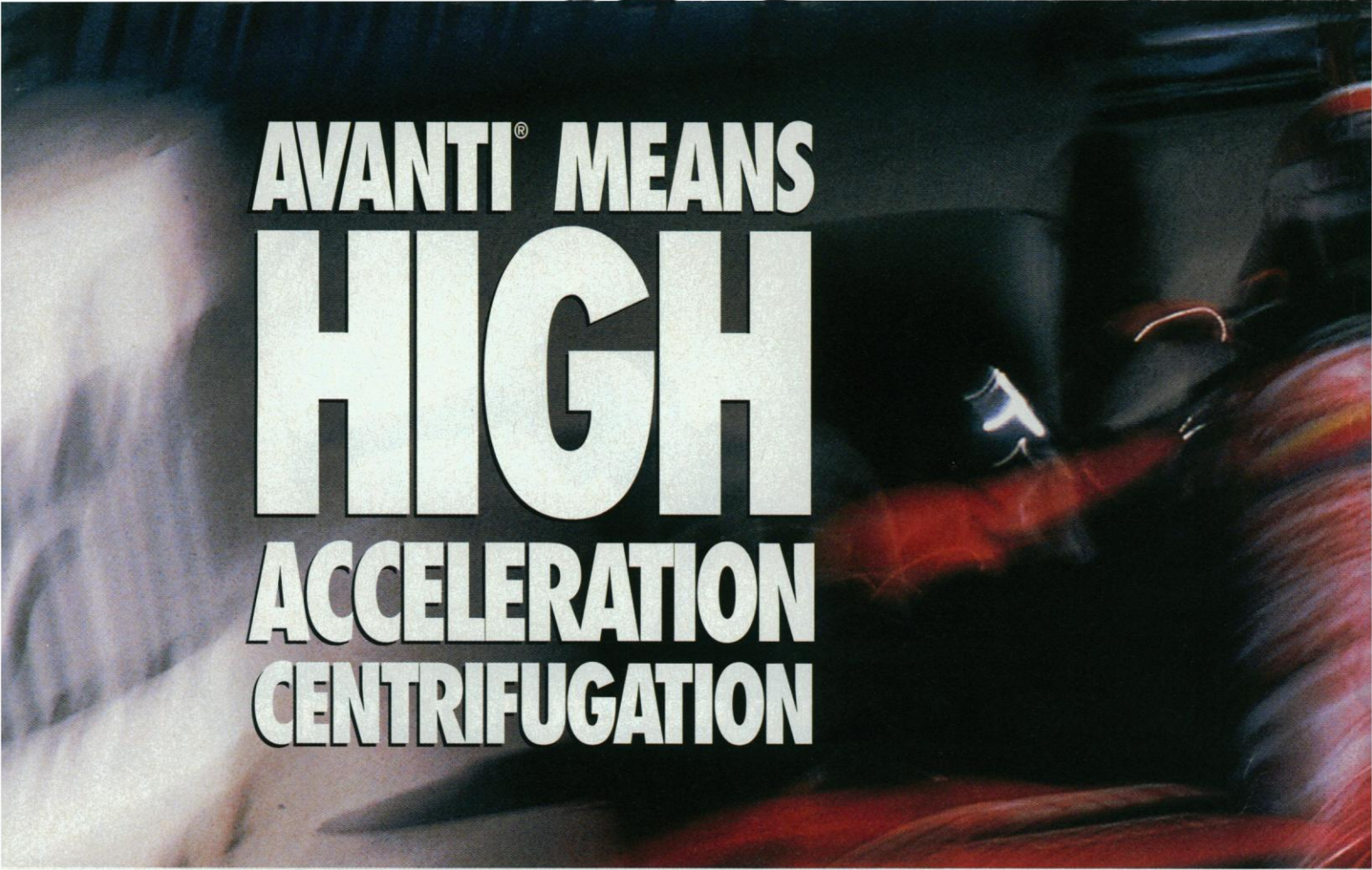
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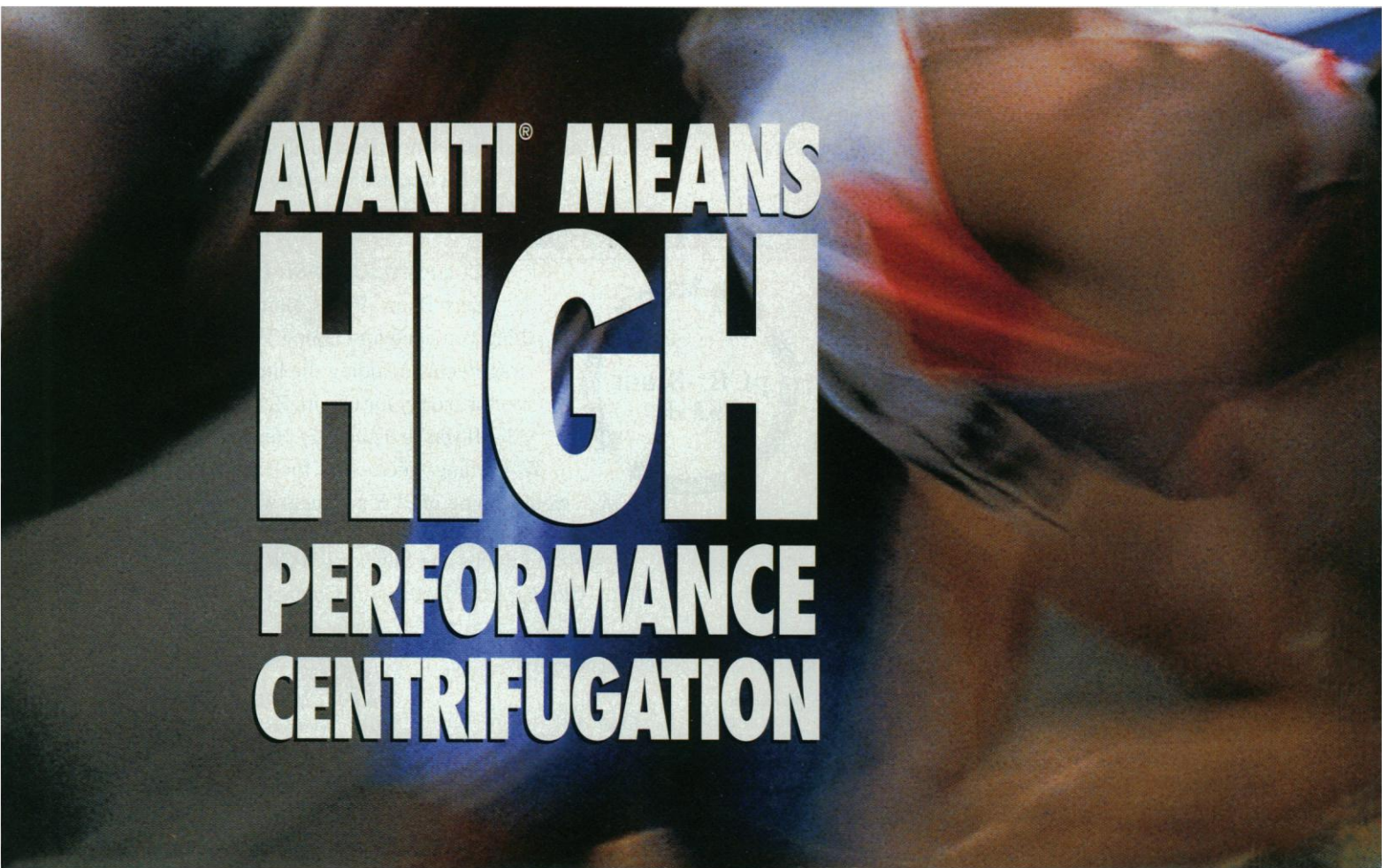
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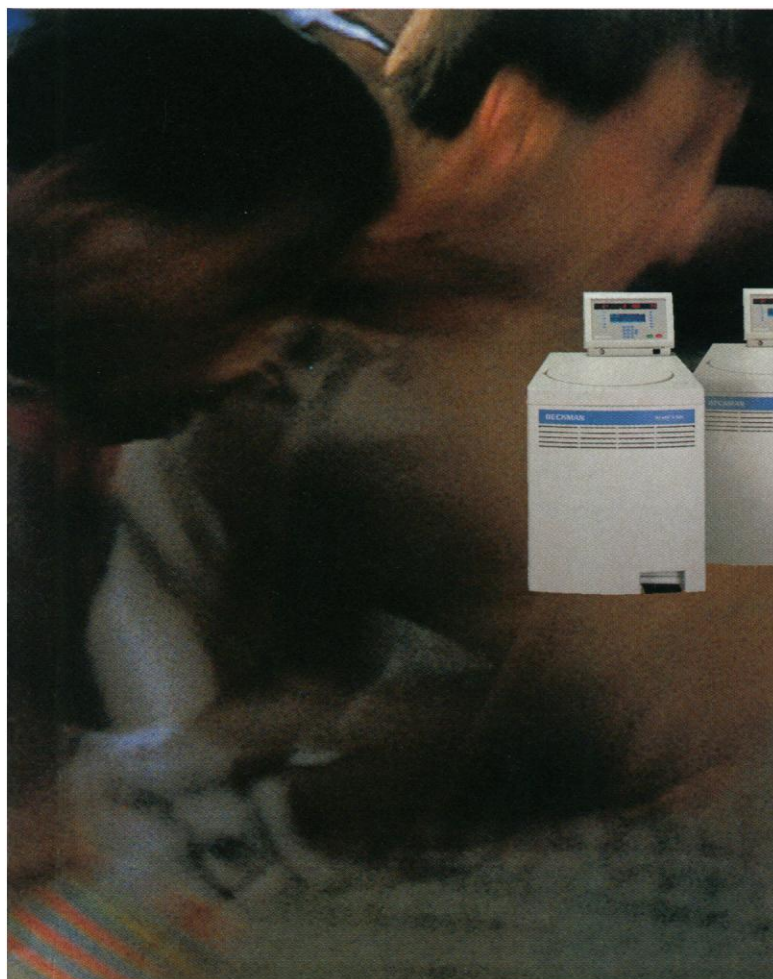
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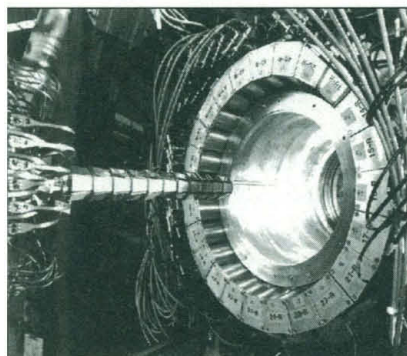
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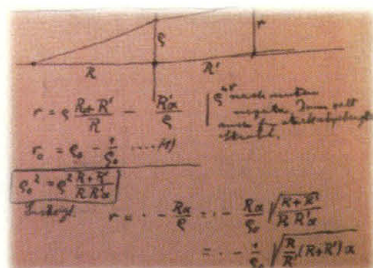
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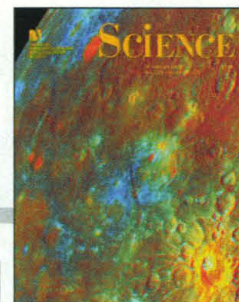
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COVER

Recalibration and mosaicking of Mariner 10 images, acquired in 1974, have allowed the identification of distinct geologic units on the surface of Mercury. Color trends inferred to be dominantly controlled by variations in iron content, opaque mineral abundance, and

regolith maturity were used to identify volcanically emplaced material, which is indicative of complex differentiation of the interior as has occurred on the other terrestrial planets and the moon. See page 197. [Image: M. S. Robinson and P. G. Lucey]



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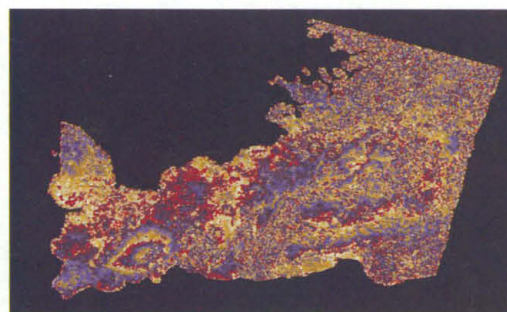
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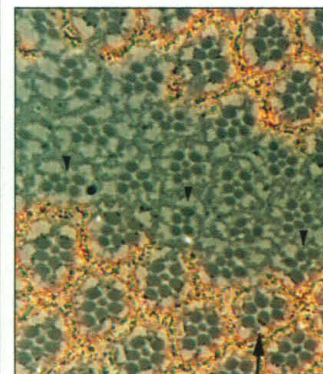
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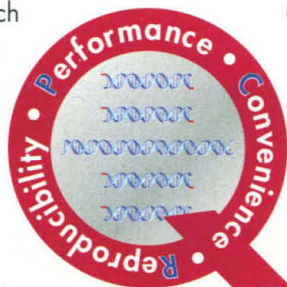
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THIS WEEK IN SCIENCE

edited by BROOKS HANSON

Climate crystal ball?

Recent research has indicated that ocean temperatures and other properties of the North Atlantic region vary on a decadal scale. These results suggest that long-term climate in this region may be predictable if the origins of the patterns can be understood. Griffies and Bryan (p. 181) used a global climate model to examine the long-term response of the ocean to short-term fluctuations in atmospheric forcing. The results suggest that predictability of the Atlantic climate depends in part on variations in high-latitude ocean temperatures.

More from Mariner

Mariner 10, the only satellite to visit Mercury, mapped about one-half of the surface. Robinson and Lucey (p. 197) recalibrated the Mariner 10 images to produce images that include more of the ultraviolet to visible color spectral data. They interpret the variations in the colors using correlations derived from more detailed maps of the moon. They infer that the plains deposits on Mercury are derived from volcanism and suggest that the smallest terrestrial planet in our solar system may have undergone differentiation.

Rift in action

A mid-ocean rift system is exposed in Iceland and thus can be easily observed with geodetic instruments. Vadon and Sigmondsson (p. 193) used satellite radar interferometry to observe the deformation associated with rifting and volcanism from 1992 to 1995 where the ridge comes onshore in southwest Iceland. The results show

that the plate boundary subsided during this period when spreading was not fully compensated by inflow of new magma.

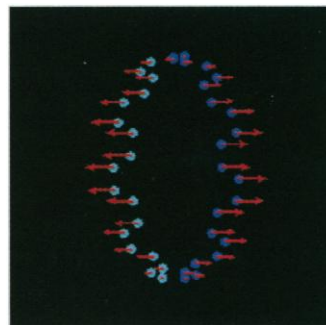
Relativity revisited

Massive astrophysical objects can bend light, a phenomenon known as gravitational lensing. Einstein published a short communication on this phenomenon in *Science* in 1936, but earlier derivations by others are also known. Now, Renn *et al.* (p. 184) have unearthed Einstein's research notes on gravitational lensing that date back to 1912, 3 years before he put the finishing touches on his theory of general relativity. Einstein finally published the work 24 years later at the urging of an amateur scientist.

Nanotubes and quantum effects

Electronic effects that arise from the confinement of electrons along a quantum wire have been observed from single wall carbon nanotubes (SWNTs). Rao *et al.* (p. 187) obtained Raman spectra from highly pure

SWNTs and assigned peaks for different diameter tubes through model calculations. Changes in peak intensity at different excitation frequencies indicate that a resonant Raman scatter-



ing process occurs. As the electronic densities of states change with diameter, different sizes of SWNTs couple to the laser field, which enhances their spectral intensity.

Keeps on ticking

In higher organisms, circadian rhythms are controlled by clock proteins, which use a feedback loop to keep time—the protein is transported back to the nucleus, where it can disrupt its own expression. Prokaryotes can divide much faster than the circadian cycle time and lack a nuclear membrane, but Kondo *et al.* (p.

224) found evidence for circadian rhythms in wild-type and period-mutant reporter strains of the cyanobacterium *Synechococcus*. Even though these cells could have doubling times as short as 5 or 6 hours, their bioluminescence exhibited circadian oscillations.

A few grapes a day...

An important goal of cancer research is to identify chemopreventive agents, chemicals that reduce the risk of carcinogenesis and that can be safely ingested. Jang *et al.* (p. 218) have isolated and characterized a candidate chemopreventive agent from grapes. This agent, called resveratrol, was shown to inhibit a variety of biochemical and cellular events associated with carcinogenesis in experimental models. These results raise the possibility that resveratrol, a naturally occurring dietary component, may have chemopreventive activity in humans.

Protein turnabout

The decapentaplegic (DPP) protein of *Drosophila* is related to transforming growth factor- β (TGF- β) and functions during development to regulate differentiation. Penton *et al.* (p. 203) report that in the developing *Drosophila* eye, DPP has a different role. Rather than controlling cell fate, DPP promotes synchronization of the cell division cycle. Although in other instances TGF- β family members cause arrest of the cell cycle in the G₁ phase, DPP appears to act in the developing eye to promote progression through the G₂ and M phases of the cell cycle.

Neuronal give and take

Single neurons are complex computational devices. In two reports in this issue (Magee, p. 209, and Markram *et al.*, p. 213), also discussed in a Perspective by Sejnowski on p. 178, neurons of the hippocampus and cortex are shown to send, along with an action potential to the next downstream neuron, a feedback signal from the cell body to the dendrites that alters the efficacy of the dendritic input synapses. Other work, in part presented by Abbott *et al.* on p. 221 and discussed in a Perspective by Thomson on p. 179, examines the summed effect of many such plastic synapses on cortical neurons both experimentally and by constructing models. The results suggest that under certain circumstances these neurons act as coincidence detectors, but at other times they can respond to changes in the frequency of their input.

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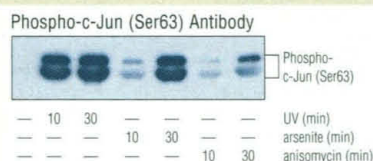
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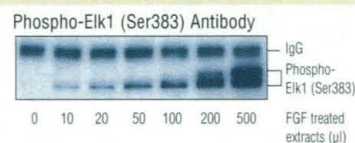
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Analysis Using: SAPK/JNK assay kit



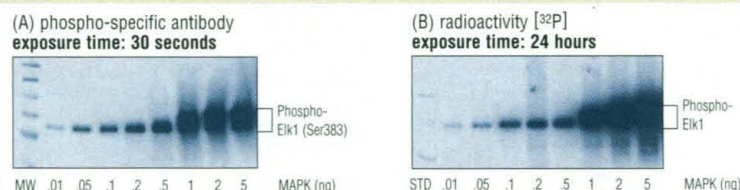
SAPK/JNK activity in extracts of treated SK-N-MC cells was analyzed by c-Jun "pull down"/kinase assay. Phosphorylation of c-Jun at Ser63 was visualized by immunoblotting with phospho-c-Jun (Ser63) antibody.

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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 [γ - 32 P]-ATP (B). MW = NEB's Biotinylated Protein Marker, Cat. No. 7710.

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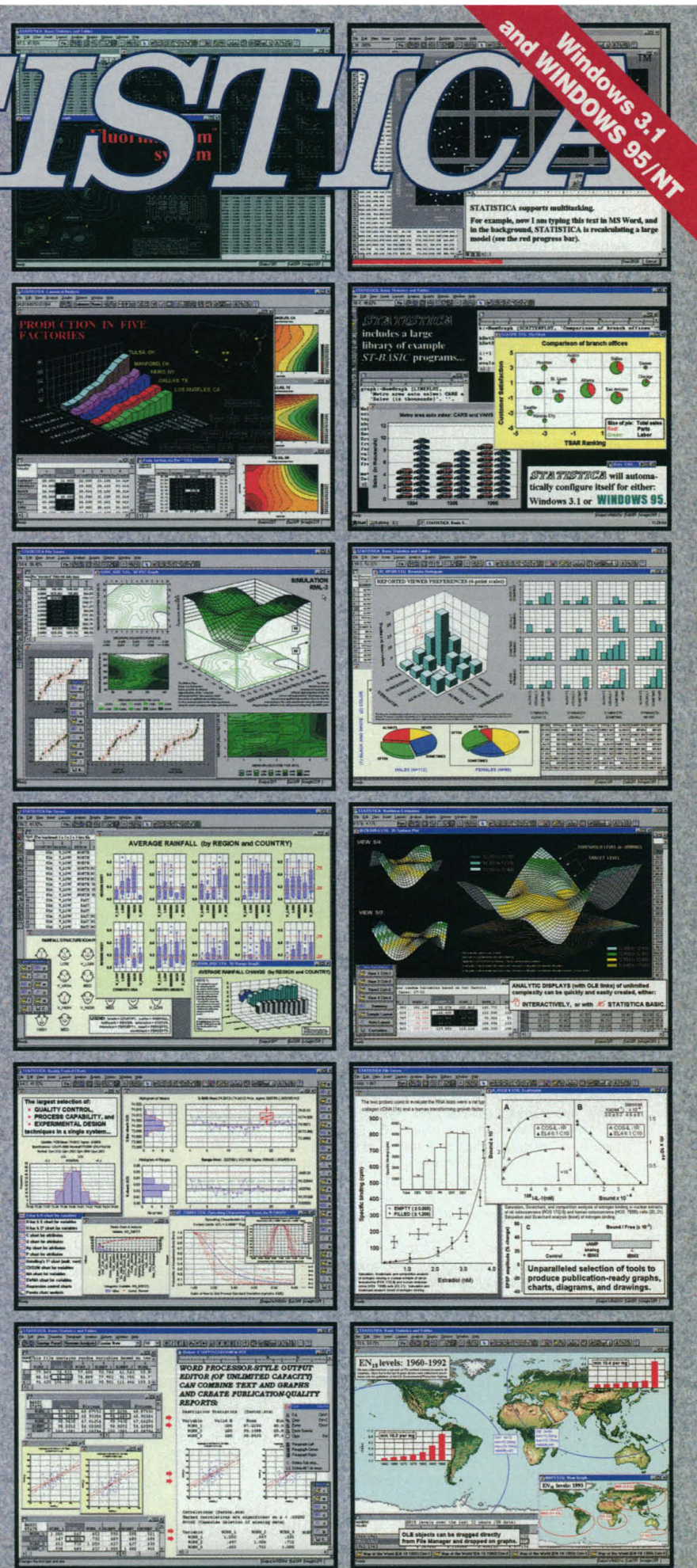
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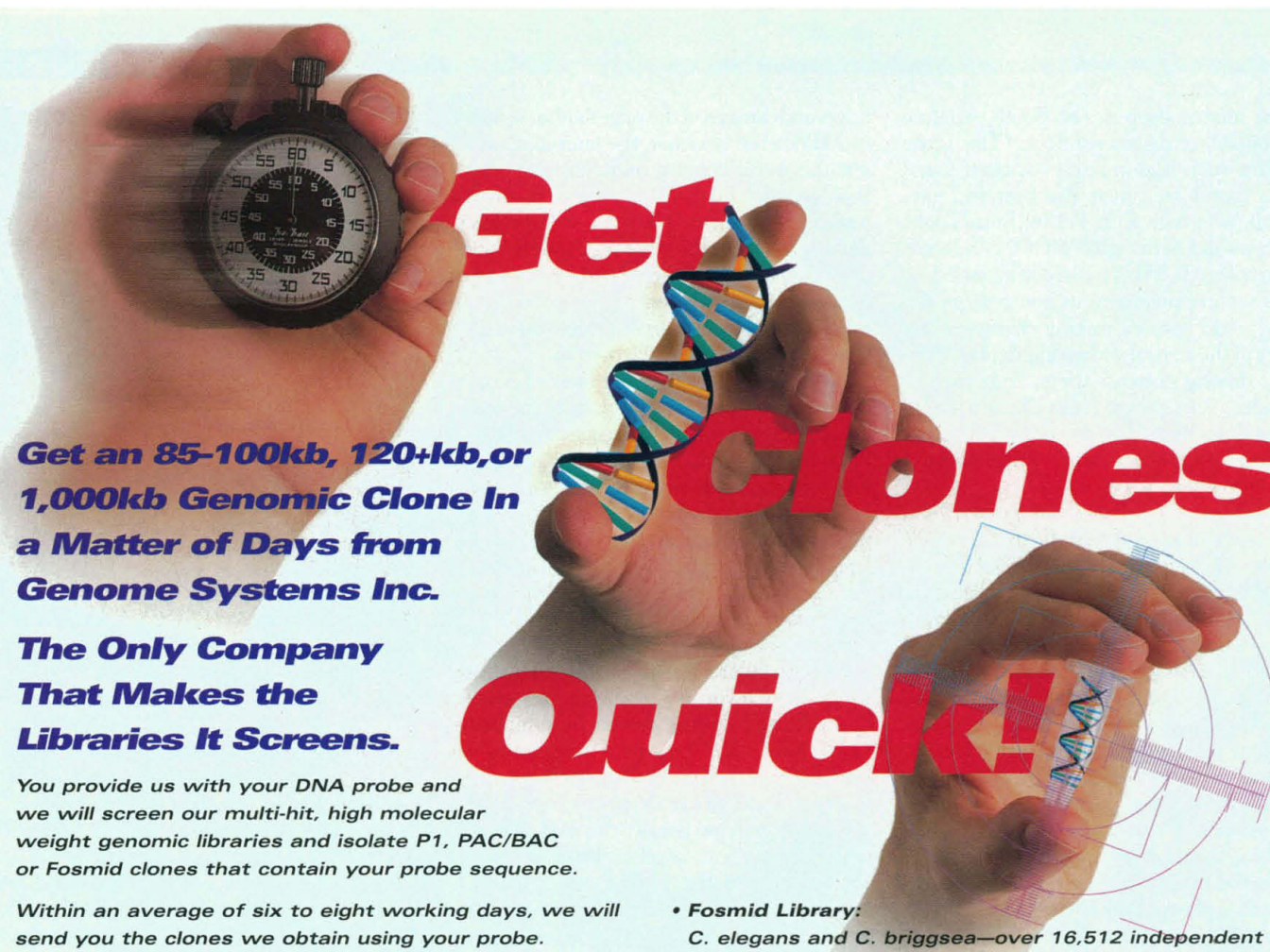
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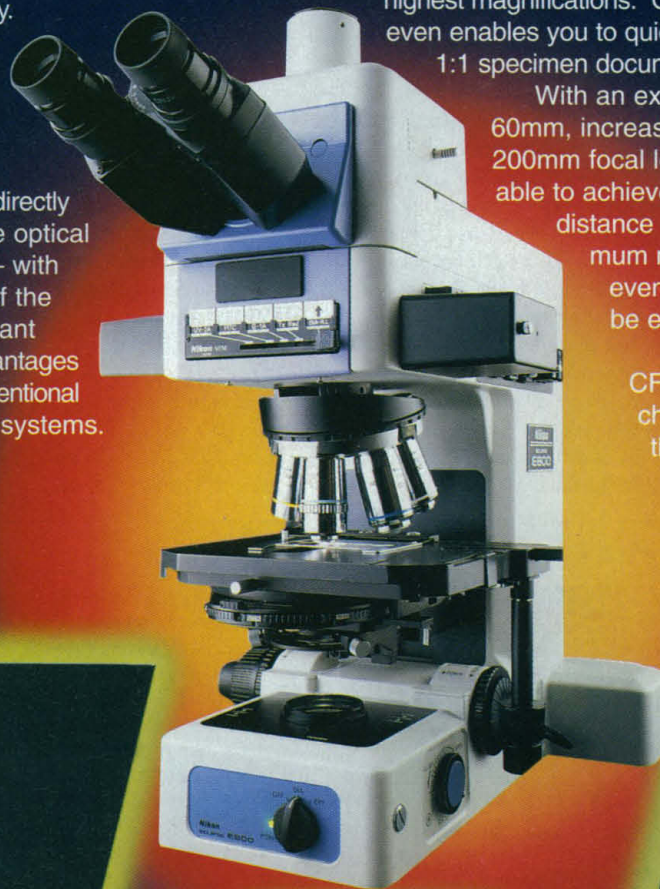
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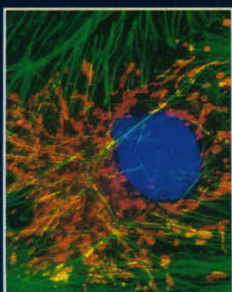
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As with all Nikon optics, CFI60 infinity objectives are chromatic aberration-free over the entire field of view.



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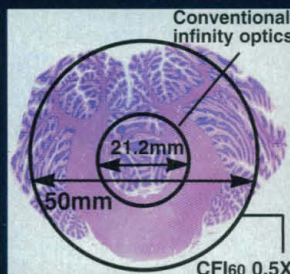
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Achieving truly superior performance in all techniques, Nikon CFI60 infinity optics are especially well suited for low light level applications such as fluorescence because they offer numerical apertures up to 1.4, the highest of any infinity objective available today. Combined with the unsurpassed stability of the new Eclipse

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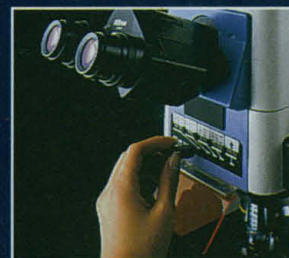
This photomicrograph of a cat brain illustrates the revolutionary 0.5X objective's astounding 50mm field of view.

Ergonomically ideal

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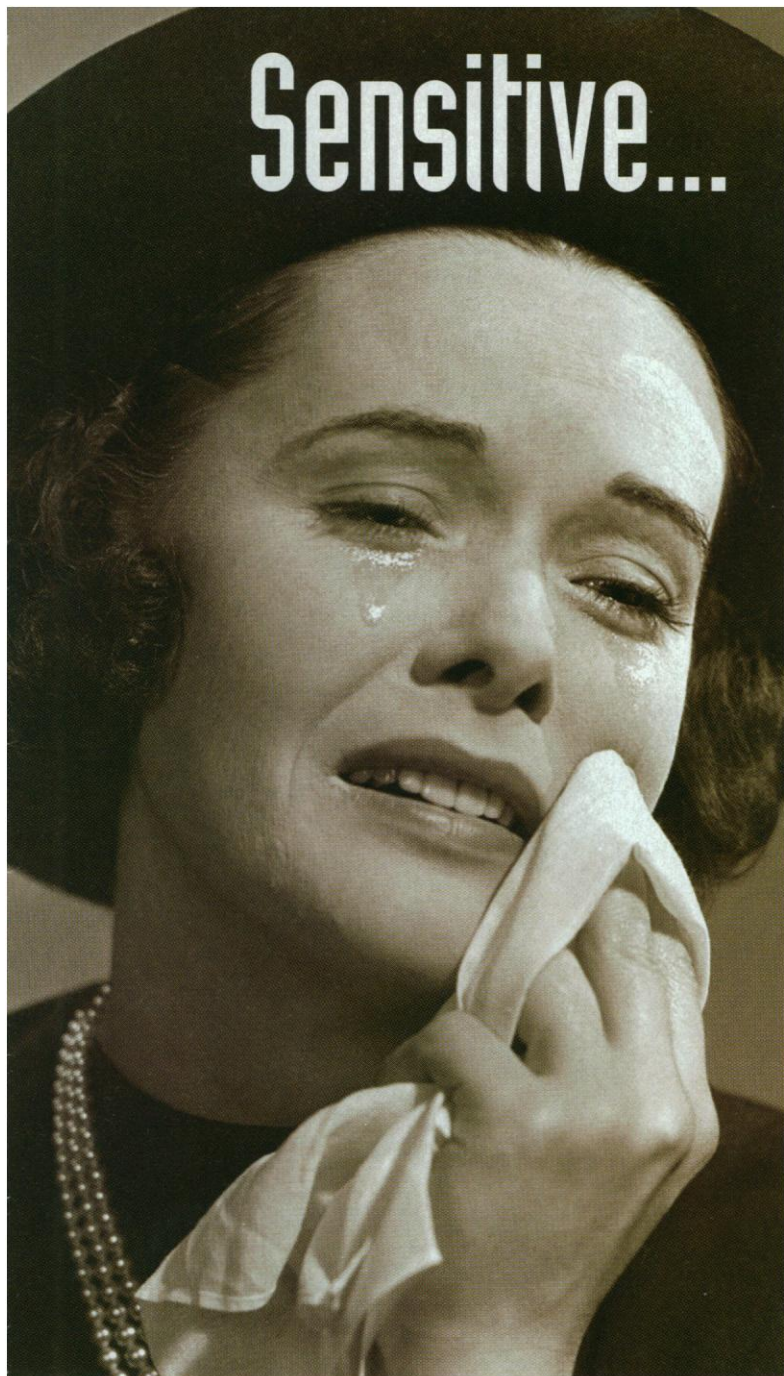
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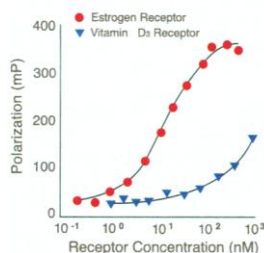
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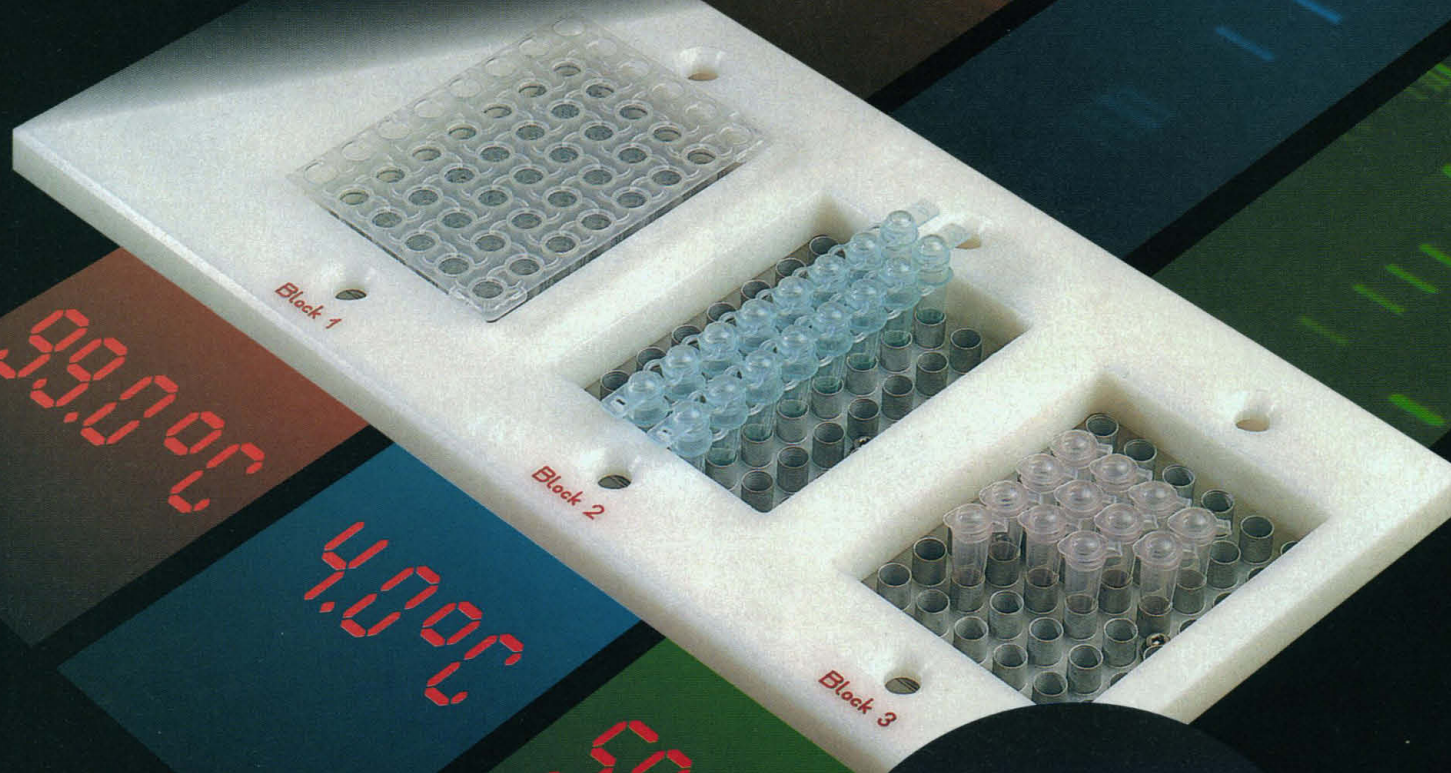
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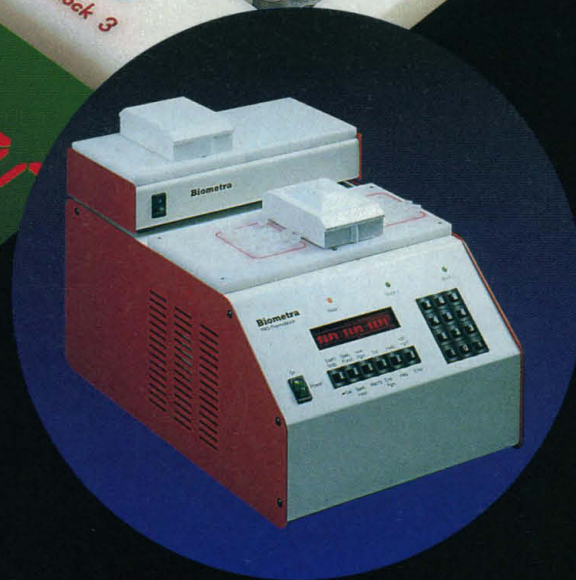
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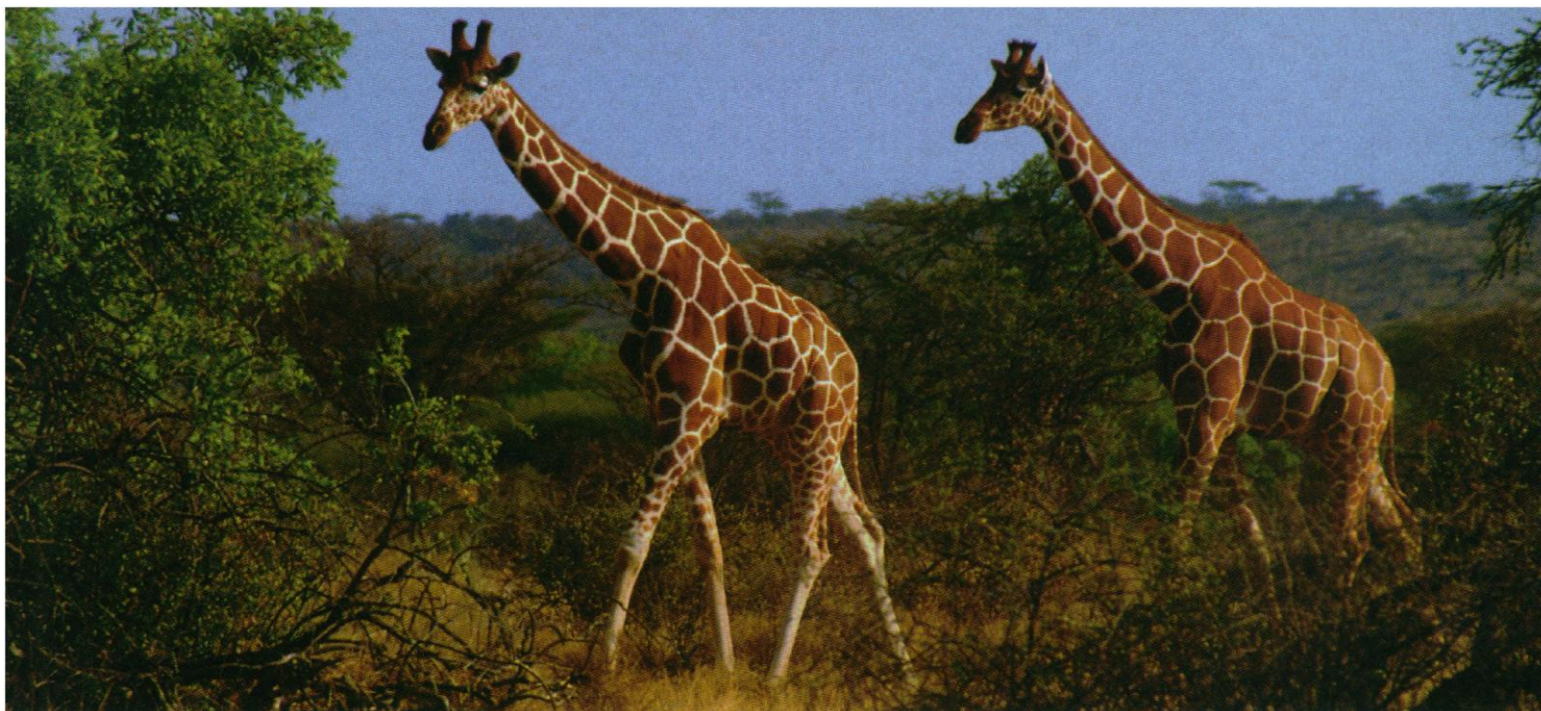
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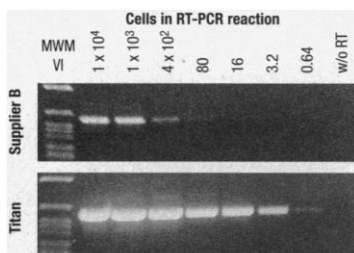


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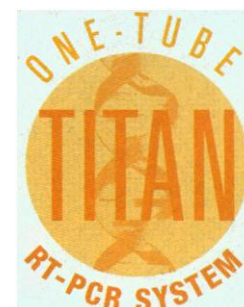
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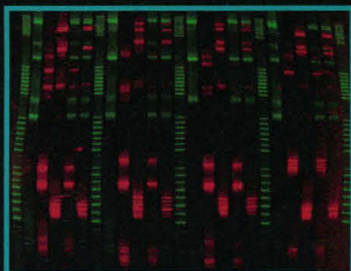
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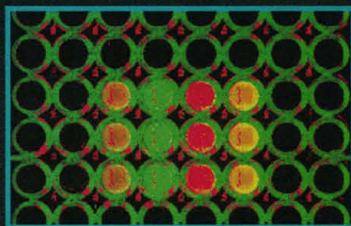
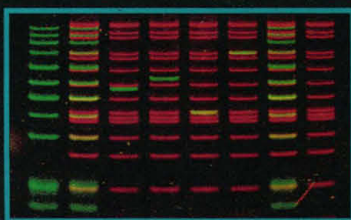
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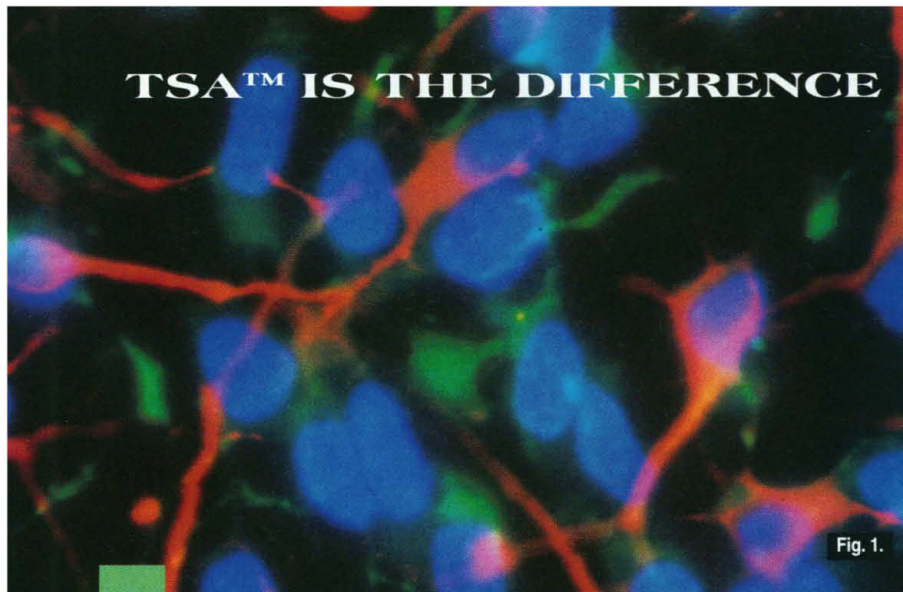


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Fig. 1. Multicolor detection using TSA-Direct.
Courtesy of Kevin Roth, M.D., Washington University
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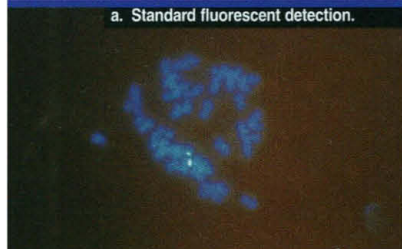
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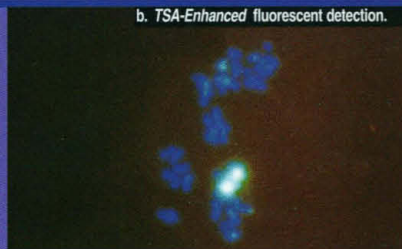
These labels can then be detected directly or indirectly by standard techniques. The deposition occurs right at the enzyme site, resulting in minimal loss of resolution. This easy-to-use signal amplification technique may be applied to both IHC and ISH.

Fig. 2

a. Standard fluorescent detection.



b. TSA-Enhanced fluorescent detection.



c. Standard chromogenic ISH.



d. TSA-Enhanced chromogenic ISH.



Enhance signal up to 1000-fold.

Figs. 2 a-b. Fluorescent detection of chromosome centromere probes in metaphase spreads.
Figs. 2 c-d. *In situ* chromogenic detection of oxytocin in rat brain tissue sections.

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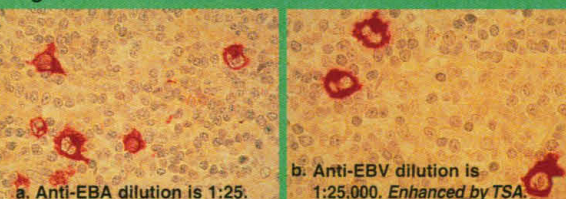
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Fig. 3



Figs. 3 a-b. IHC of EBV antigen in Hodgkin's Lymphoma of mixed cellularity.
Courtesy of R. Von Wasielewski and S. Gignac, Pathologisches Institut de
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