



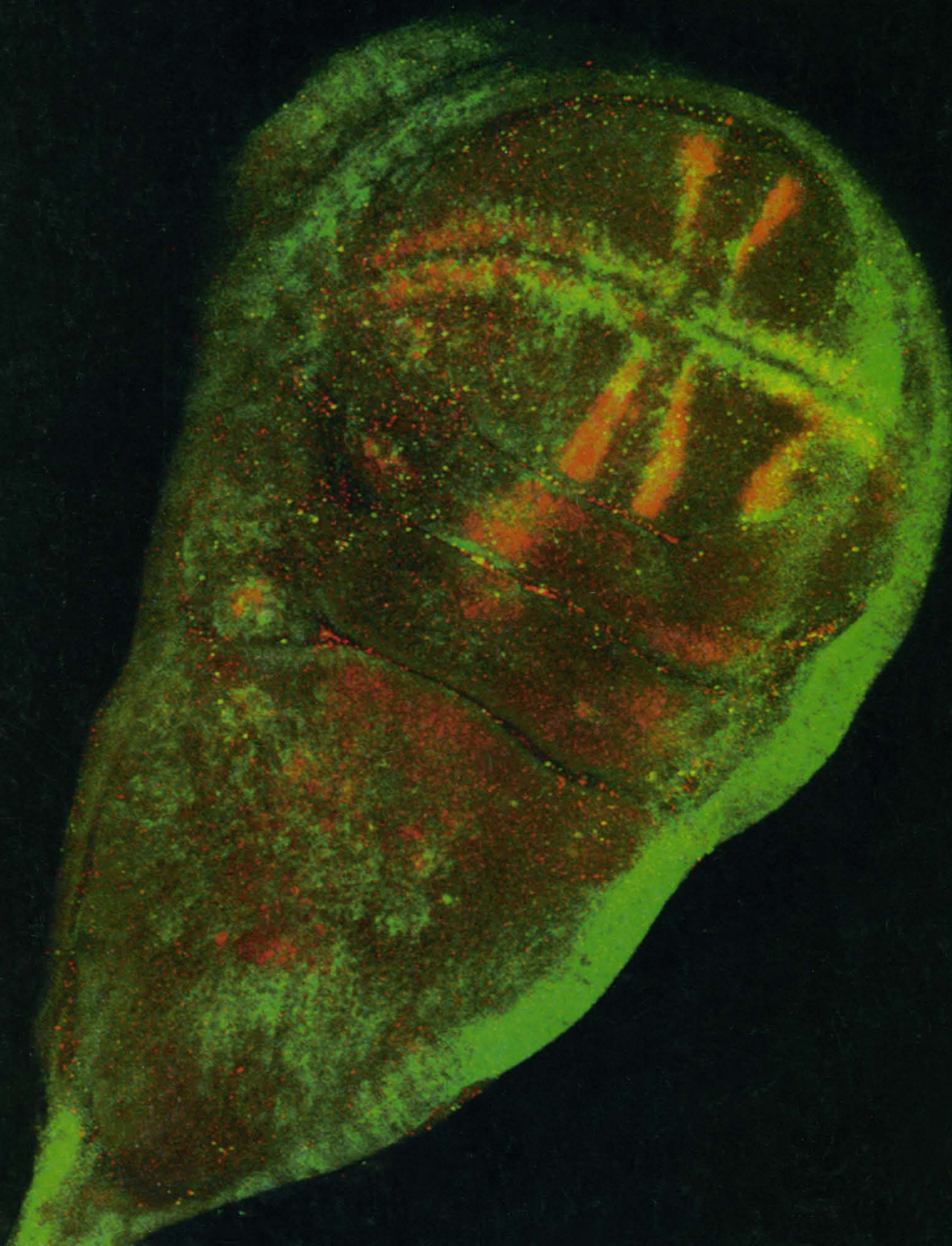
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# SCIENCE

22 AUGUST 1997

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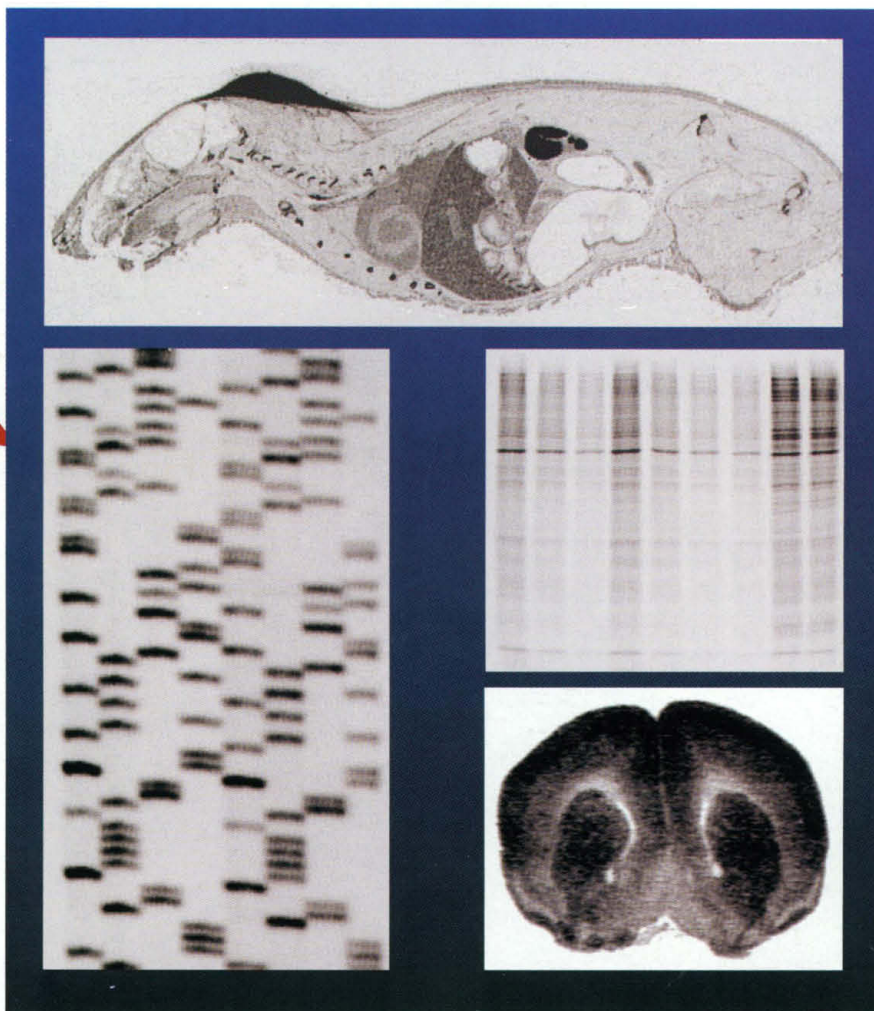




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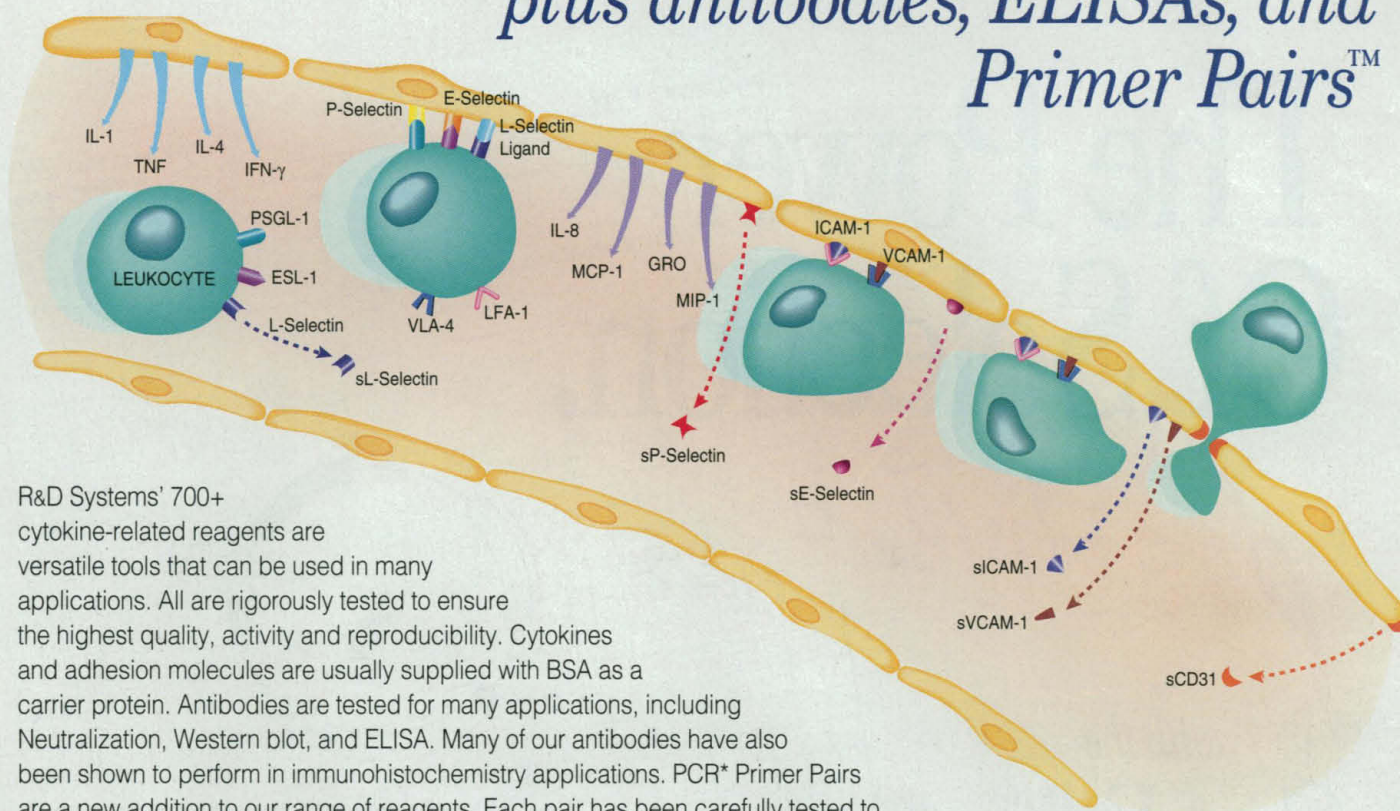
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sVCAM-1	✓	✓	✓	✓	✓
sE-Selectin	✓	✓	✓	✓	✓
sL-Selectin	✓	✓		✓	✓
sP-Selectin	✓	✓		✓	✓
sCD31 (PECAM-1)	✓	✓		✓	

CYTOKINES	Human ELISA	Recombinant human protein	Anti-human polyclonal antibody	Anti-human monoclonal antibody	PCR Primer Pairs
IFN-γ	✓	✓	✓	✓	✓
IL-1α	✓	✓	✓		✓
IL-1β	✓	✓	✓	✓	✓
IL-4	✓	✓	✓	✓	
IL-8	✓	✓	✓	✓	✓
MCP-1	✓	✓	✓	✓	✓
MIP-1α	✓	✓	✓	✓	
MIP-1β	✓	✓	✓	✓	
TNF-α	✓	✓	✓	✓	✓

\*PCR is covered by US Patent Nos 4683195 and 4683202 assigned to Hoffmann-LaRoche

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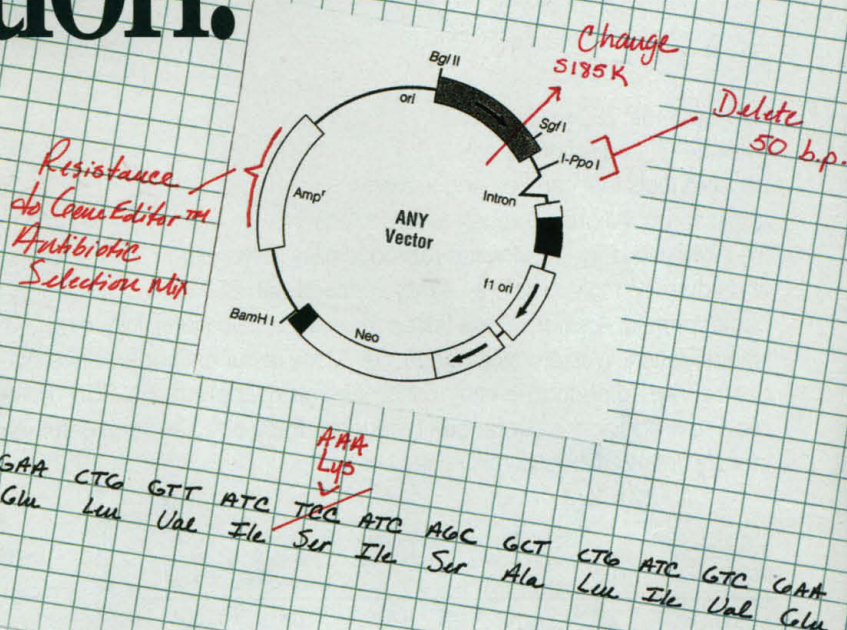
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Continued From Page

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The cationic lipid component of the Tfx™ Reagents is covered by US Patent No. 5,527,928 assigned to The Regents of the University of California and pending foreign patents. Tfx is a trademark of Promega Corporation.

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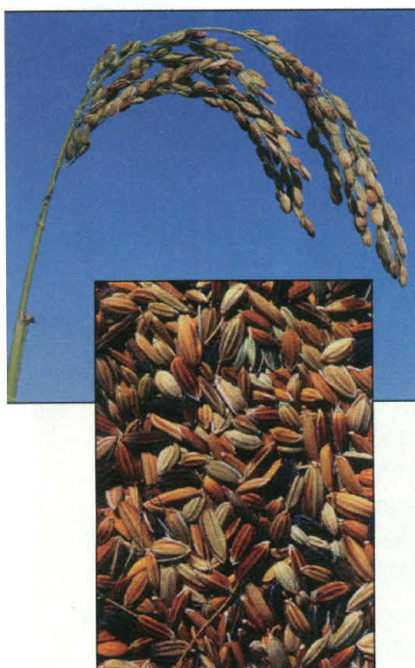
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**1038 & 1063**

Seeds of change

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## COVER

Antibody staining of a *Drosophila* wing imaginal disc (500 micrometers long) for the activated form of MAP kinase (dp-ERK) (green) and Argos (red). With antibody to dp-ERK, the activated state of signaling pathways triggered by receptor tyrosine kinases can be followed in situ,

revealing the time and amount of activation, the extent of ligand diffusion, and the effects of inhibitory ligands. The regions of maximal epidermal growth factor receptor activation correspond to the future wing veins. See page 1103. [Image: L. Gabay, R. Seger, B-Z. Shilo]



### Discrete Intensity Jumps and Intramolecular Electronic Energy Transfer in the Spectroscopy of Single Conjugated Polymer Molecules

D. A. Vanden Bout, W.-T. Yip, D. Hu, D.-K. Fu, T. M. Swager, P. F. Barbara

### Selective Colorimetric Detection of Polynucleotides Based on the Distance-Dependent Optical Properties of Gold Nanoparticles

R. Elghanian, J. J. Storhoff, R. C. Mucic, R. L. Letsinger, C. A. Mirkin

### Superconductivity up to 126 Kelvin in Interstitially Doped

$\text{Ba}_2\text{Ca}_{n-1}\text{Cu}_n\text{O}_x[02(n-1)n-\text{Ba}]$

C. W. Chu, Y. Y. Xue, Z. L. Du, Y. Y. Sun, L. Gao, N. L. Wu, Y. Cao, I. Rusakova, K. Ross

### Natural (Mg,Fe)SiO<sub>3</sub>-Ilmenite and -Perovskite in the Tenham Meteorite

N. Tomioka and K. Fujino

### Size Variation in Middle Pleistocene Humans

J. L. Arsuaga, J. M. Carretero, C. Lorenzo, A. Gracia, I. Martínez, J. M. Bermúdez de Castro, E. Carbonell

### Ecological Effects of an Insect Introduced for the Biological Control of Weeds

S. M. Louda, D. Kendall, J. Connor, D. Simberloff

### A Macrophage Invasion Mechanism of Pathogenic Mycobacteria

J. S. Schorey, M. C. Carroll, E. J. Brown

### Functional Role of High-Affinity Anandamide Transport, as Revealed by Selective Inhibition

M. Beltramo, N. Stella, A. Calignano, S. Y. Lin, A. Makriyannis, D. Piomelli

### An NGF-TrkA-Mediated Retrograde Signal to Transcription Factor CREB in Sympathetic Neurons

A. Riccio, B. A. Pierchala, C. L. Ciarallo, D. D. Ginty

### Hypermethylated SUPERMAN Epigenetic Alleles in *Arabidopsis*

S. E. Jacobsen and E. M. Meyerowitz

### In Situ Activation Pattern of *Drosophila* EGF Receptor Pathway During Development

L. Gabay, R. Seger, B-Z. Shilo

### Thermophilic Fe(III)-Reducing Bacteria from the Deep Subsurface: The Evolutionary Implications

S. V. Liu, J. Zhou, C. Zhang, D. R. Cole, M. Gajdarziska-Josifovska, T. J. Phelps

### Altered Neural Cell Fates and Medulloblastoma in Mouse *patched* Mutants

L. V. Goodrich, L. Milenković, K. M. Higgins, M. P. Scott

### Epidermal Cell Differentiation in *Arabidopsis* Determined by a Myb Homolog, CPC

T. Wada, T. Tachibana, Y. Shimura, K. Okada

## TECHNICAL COMMENTS

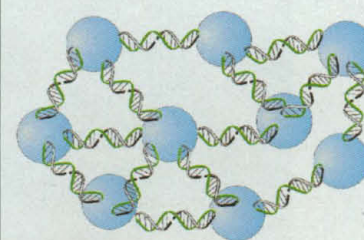
### Distribution and Causation of Species Endangerment in the United States

B. Czech and P. R. Krausman; *Response:* A. Dobson, J. P. Rodriguez, W. M. Roberts, D. S. Wilcove



1109

Brain tumor model



1036 & 1078

DNA gets it together

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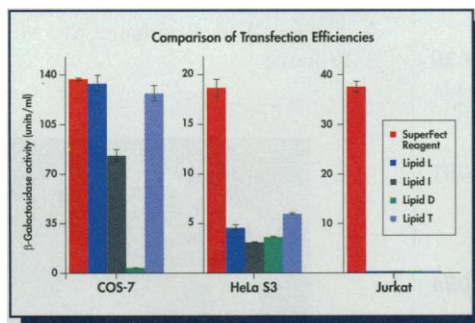
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## Structures and spins

Ten years after its discovery, high-temperature superconductivity in copper oxide materials continues to be a complex puzzle. One unifying property is that all of the oxide superconductors are derived from antiferromagnetic insulators; thus the behavior of the copper spins is crucial. Wells *et al.* (p. 1067) have gone back to the parent compound—oxygen-doped lanthanum copper oxide—to study spin dynamics with neutron scattering. They find a system of spin fluctuations that is incommensurate (length scales different from that of the crystal lattice) and highly robust. The authors point out how the results put strong constraints on theory for these superconductors.

## DNA litmus test

Hybridization assays, which may be used to detect a particular genetic mutation or a pathogen, often make use of radioactive labels. Elghanian *et al.* (p. 1078; see the news story by Service, p. 1036) have developed an alternative approach for detecting DNA hybridization that takes advantage of the color changes that occur when gold nanoparticles are brought into close contact. Two oligonucleotides bearing 13-nanometer gold particles (one with 13 bases and the other with 15) are hybridized to two halves of the targeted region; the close proximity of the particles leads to a color change from pink to blue. This change is accelerated by freezing the solutions and is visualized with a solid support.

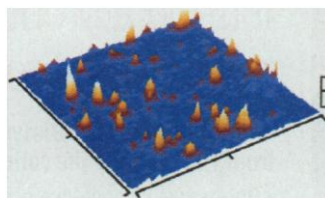
## Jumping polymer emission

Fluorescence microscopy studies of polymer molecules that contain several chromophores reveal jumps in emission intensity

## Just as different then as now

It has been suggested that hominids in the Middle Pleistocene showed greater sexual dimorphism (variation of body size and cranial capacity of men and women) than modern populations, but the comparison has been difficult because the fossil samples are limited and are from different times and places. Arsuaga *et al.* (p. 1086), thus, analyzed a large collection of hominids (at least 32) from the Sima de los Huesos site in Spain. The analysis suggests that sexual dimorphism was comparable in the modern and ancient populations.

that can be attributed to transfer of electronic energy along the polymer chain. Vanden Bout *et al.* (p. 1074; see the Perspective



by Moerner, p. 1059) show that these jumps are not due to spectral diffusion, which has been observed for single molecules and is caused by changes in the spectrum of the molecule. Instead, reversible photochemistry occurs in the polymer that changes the quantum yield for emission. Similar polymers find use in light-emitting diodes, and these results show how a small number of defects could dramatically reduce light emission.

## Mycobacteria versus macrophages

Tuberculosis continues to be a major health threat; it has been estimated that one-third of the world's population is infected with the causative agent, *Mycobacterium tuberculosis*. Schorey *et al.* (p. 1091) have found a mechanism by which the bacteria infect macrophages that is specific to the disease-causing mycobacteria. This pathway depends on the association of complement cleavage product C2a with mycobacteria. Identification of this method of invasion could provide new targets for therapies.

## Signal and messenger

Signals received at the terminals of sympathetic neurons are transmitted along extended axons to the nucleus in the cell body. Riccio *et al.* (p. 1097; see the news story by Barinaga, p. 1037) examined the mechanism by which such a signal is propagated. They developed special culture conditions in which they could apply nerve growth factor (NGF) to the distal processes and terminals of cultured sympathetic neurons and then monitored changes in the activation of the nuclear transcription factor CREB in the cell bodies, which were several millimeters away and not exposed to the growth factor. Activation of CREB in response to NGF applied at the terminals requires transport of the NGF receptor along with its bound ligand to the cell body. Thus, the activated receptor itself appears to be the messenger that carries the signal.

## A cautionary tale

Biological pest control strategies are generally thought to be more environmentally friendly than ones that are chemically based. However, as vividly illustrated by Louda *et al.* (p. 1088; see the Perspective by Strong, p. 1058), they are not without their hazards. A weevil, introduced from Europe into North America to control thistles that had previously followed the same route, has spread widely geographically and expanded its host range to include many native thistle species, some of which are rare.

Stark reductions in seed viability of infected native plants were recorded. As has been seen in other cases, nonindigenous species, once introduced, can be very difficult to control.

## Managing methylation

Methylation of genomic DNA is a widespread phenomenon, but the causes and the effects of such methylation is complex. Jacobsen and Meyerowitz (p. 1100) have identified mutations in *Arabidopsis* that cause distortions in flower development as a result of changes in transcription of a single gene. The more highly methylated alleles support diminished transcription. Demethylation of these unstable alleles restores normal transcription. In a transgenic line in which genomic methylation as a whole was suppressed, this particular gene still carried excess methylation. Thus, the methylation in the genome may be regulated in several ways, including both specific single-gene decisions and global whole-genome decisions.

## The good seeds

Years of effort in building germplasm banks have built a collection of seeds that represents a great variety of plants, including the traditional crop plants but also including so much more—their wild or weedy relatives and unusual or rare plants not represented in the normal course of agriculture. As discussed by Tanksley and McCouch (p. 1063; see the news story by Mann, p. 1038), these seed banks offer a tremendous resource for the agronomist looking to improve or diversify crops. Recent and ongoing progress in understanding plant genomes makes these germplasm banks even more useful than before, as the power of molecular genetics can be combined with traditional plant breeding.



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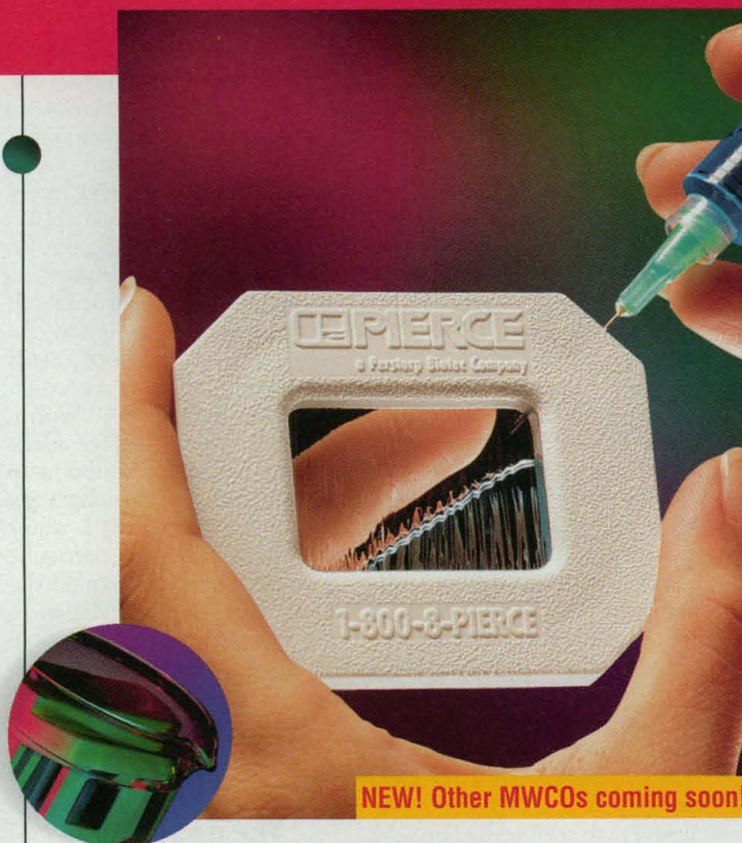
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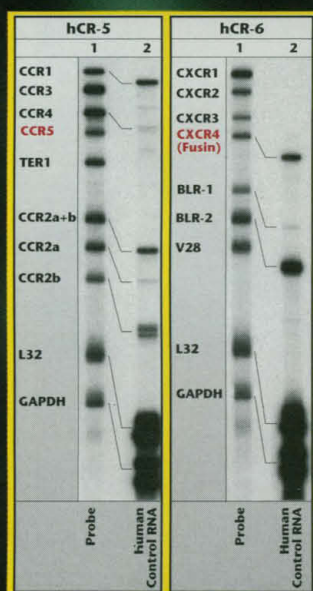


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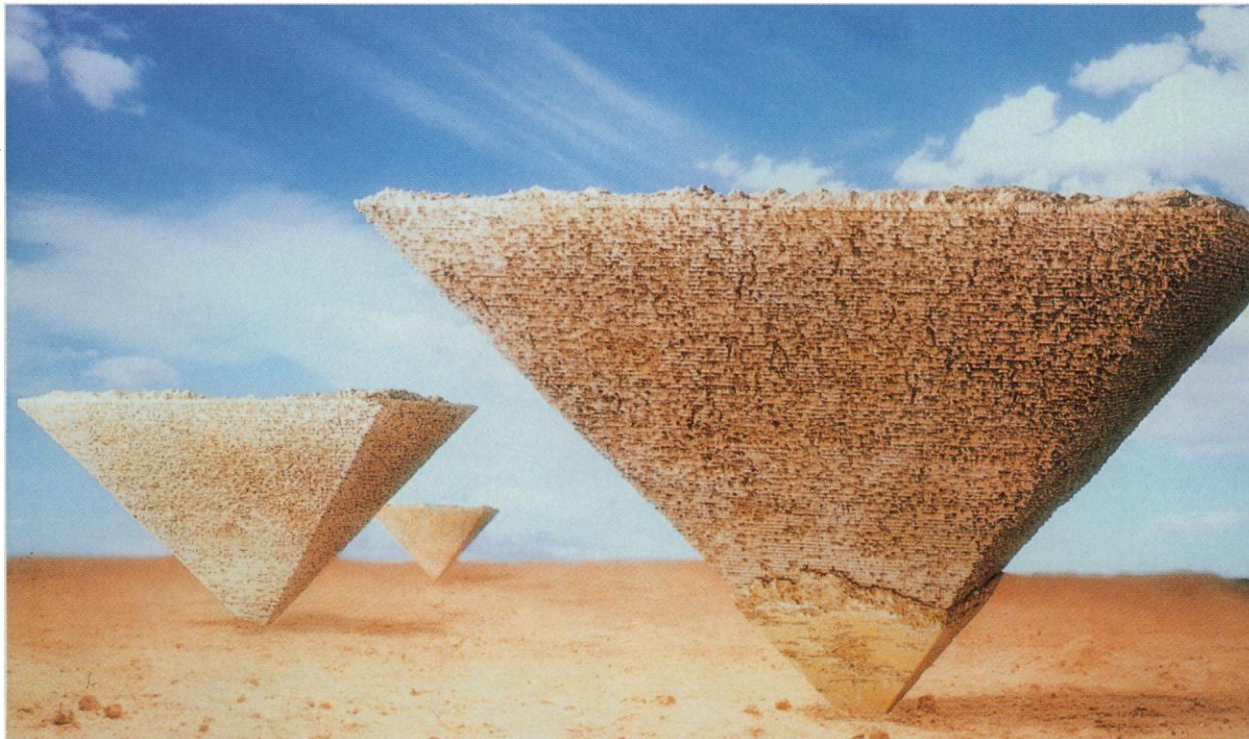
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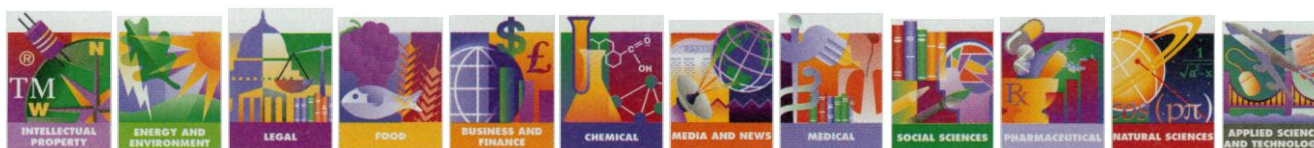
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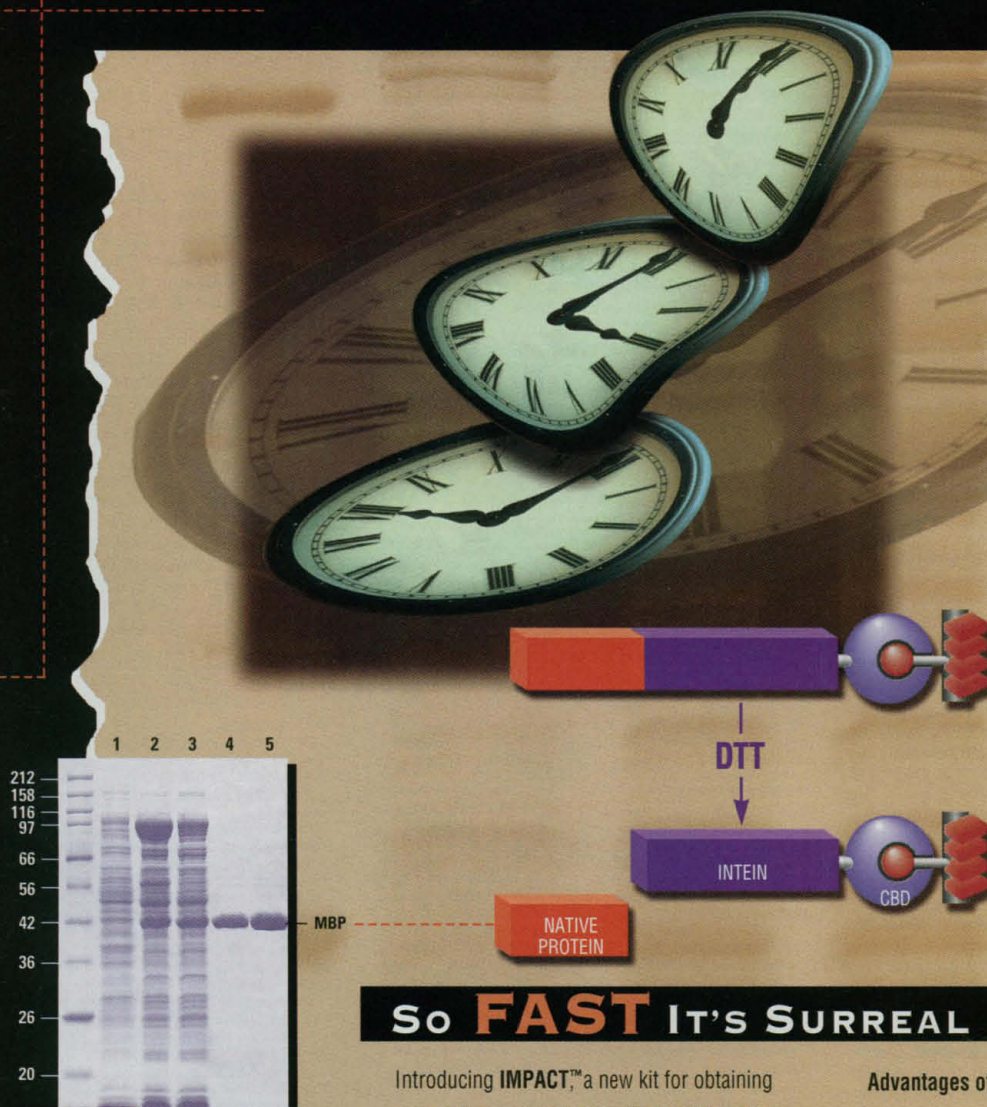
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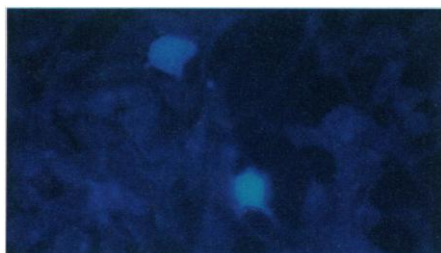
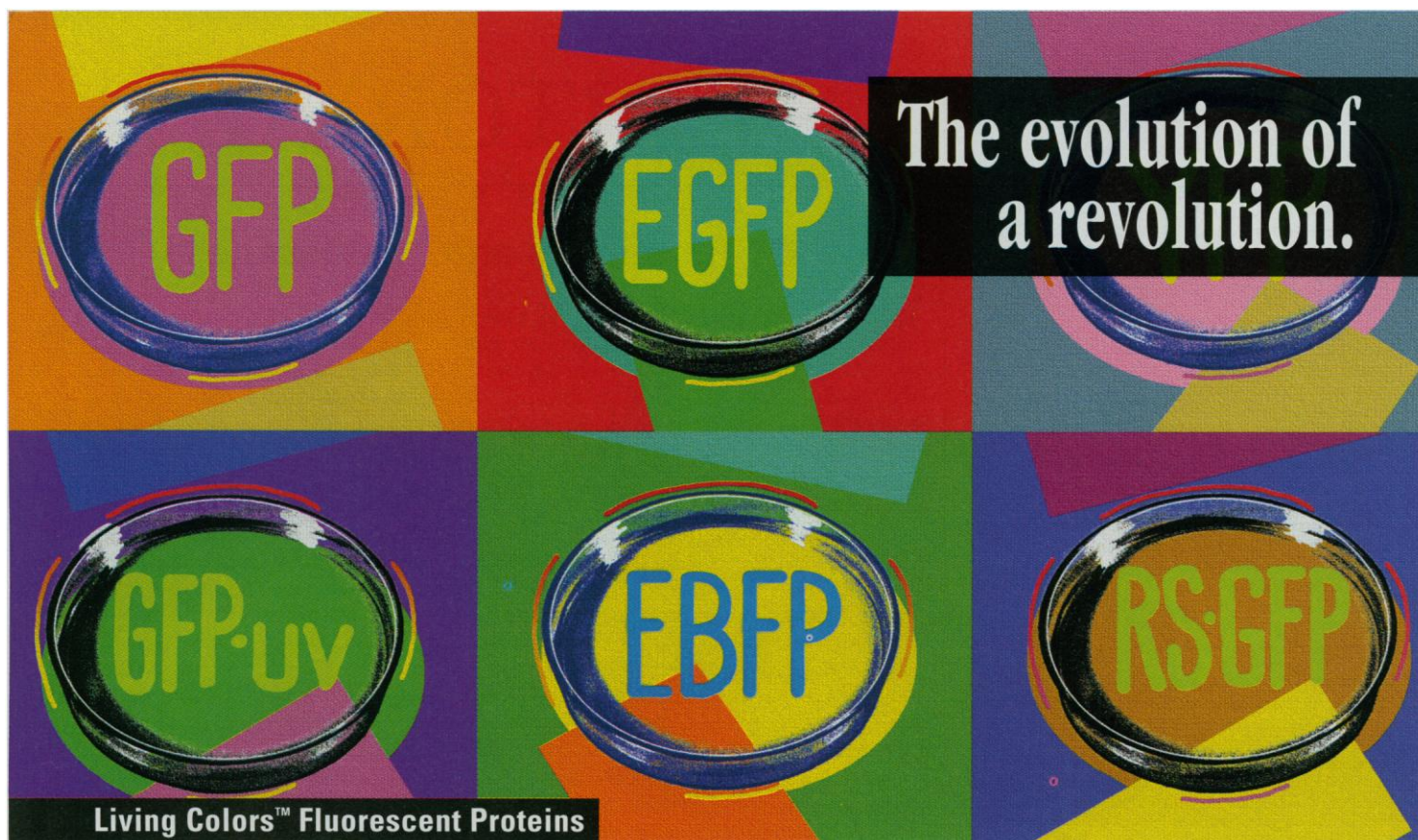
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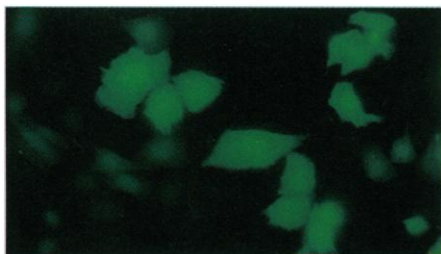
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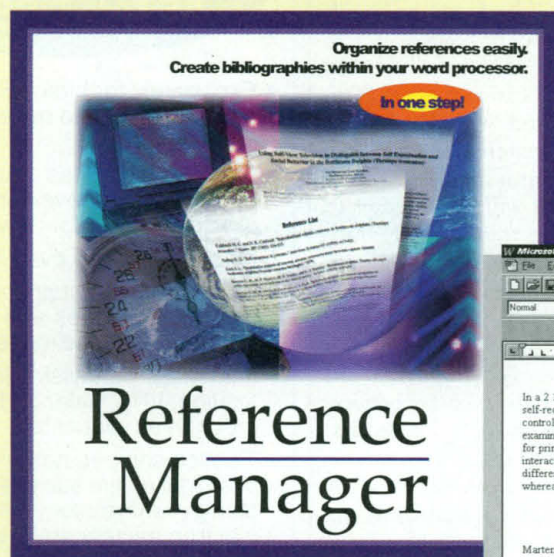
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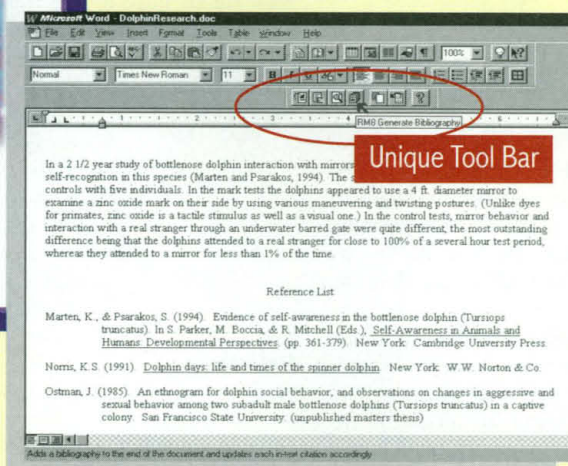
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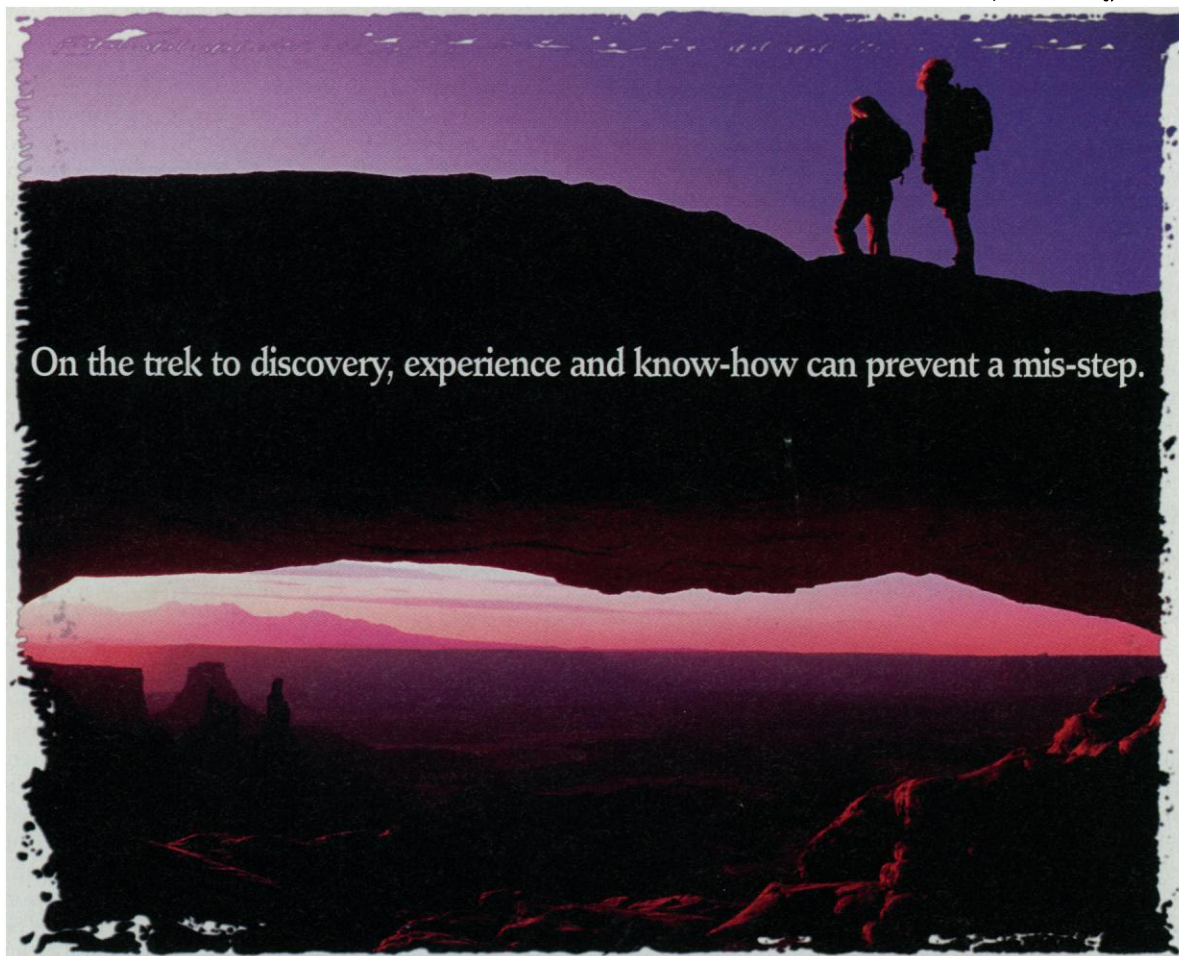
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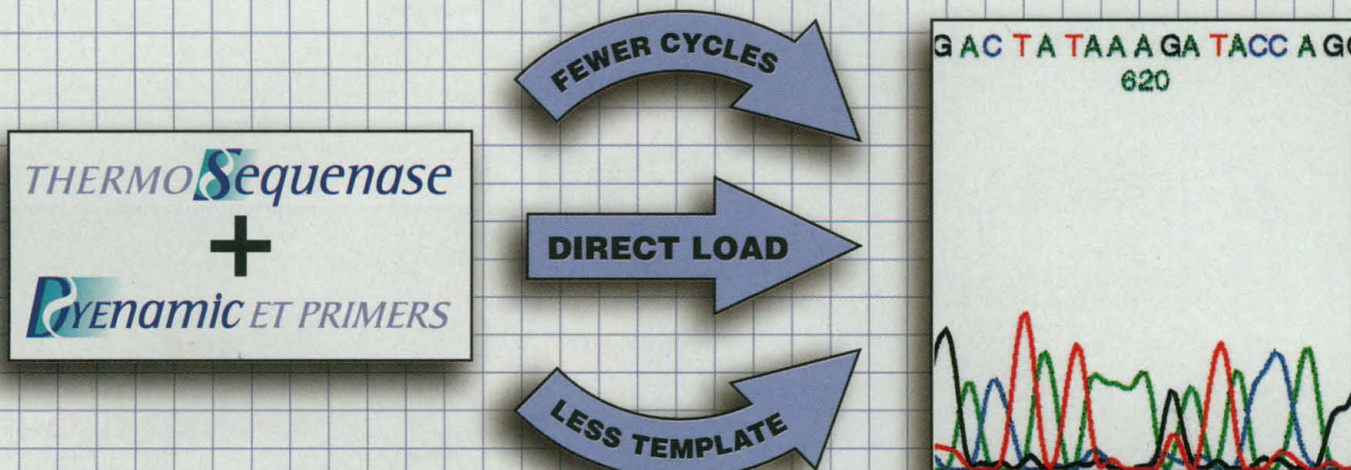
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Fig. 1. Multicolor detection using TSA-Direct.  
Courtesy of Kevin Roth, M.D., Washington University  
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Fig. 1.

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Fig. 2

a. Standard fluorescent detection.

b. TSA-Enhanced fluorescent detection.

c. Standard chromogenic ISH.

d. TSA-Enhanced chromogenic ISH.

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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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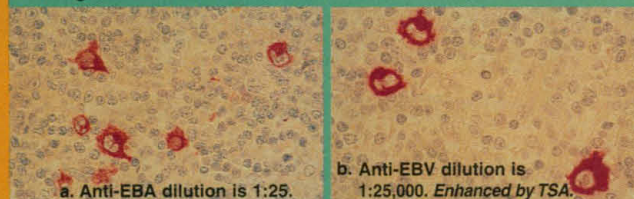
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Fig. 3



a. Anti-EBA dilution is 1:25.

b. Anti-EBV dilution is 1:25,000. Enhanced by TSA.

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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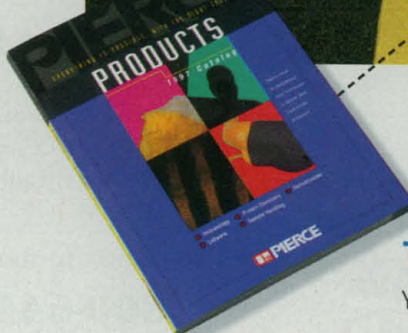
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RC 26U	26000	20000	RC 26U	26000
RC 26V	26000	20000	RC 26V	26000
RC 26W	26000	20000	RC 26W	26000
RC 26X	26000	20000	RC 26X	26000
RC 26Y	26000	20000	RC 26Y	26000
RC 26Z	26000	20000	RC 26Z	26000

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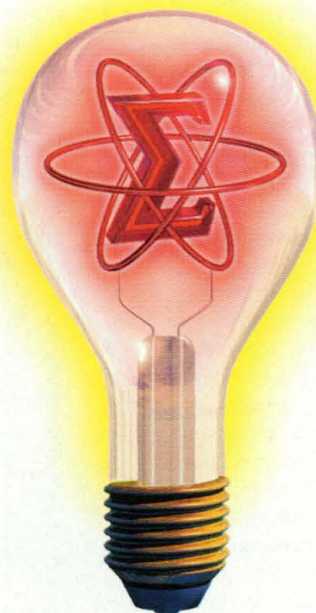


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## Thinking Recombinant Protein Expression?

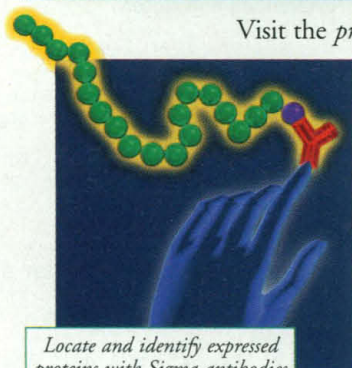


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