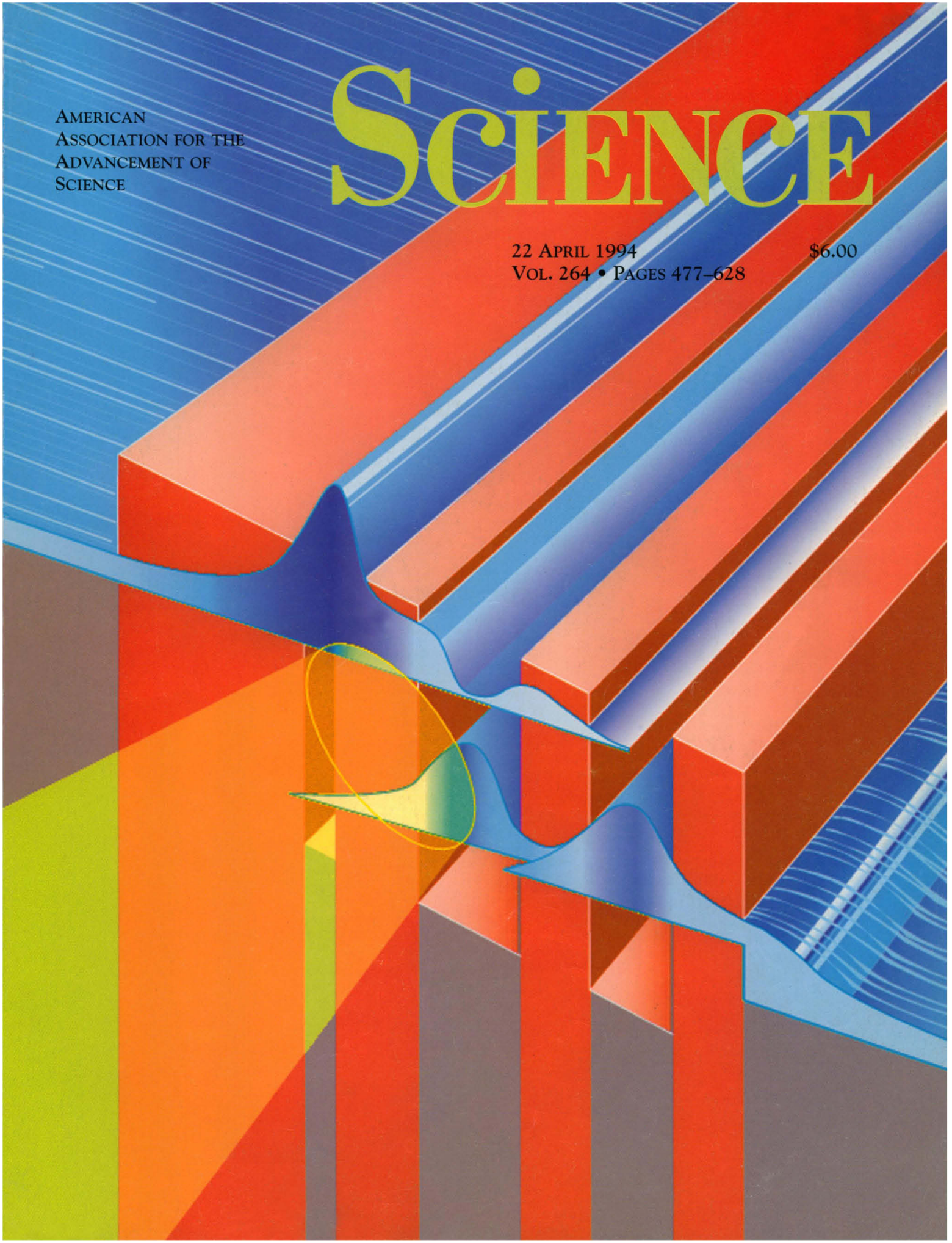

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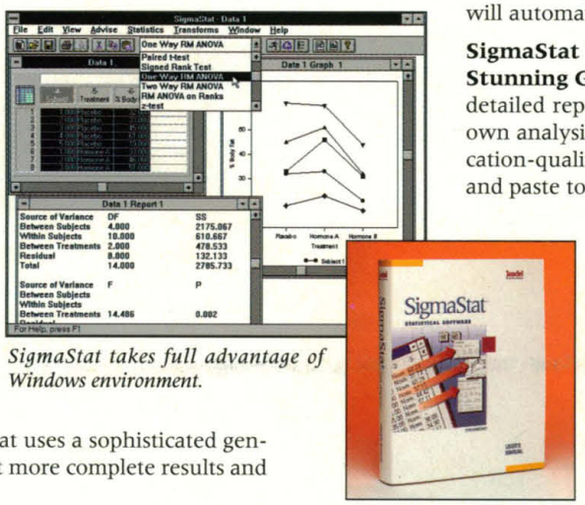

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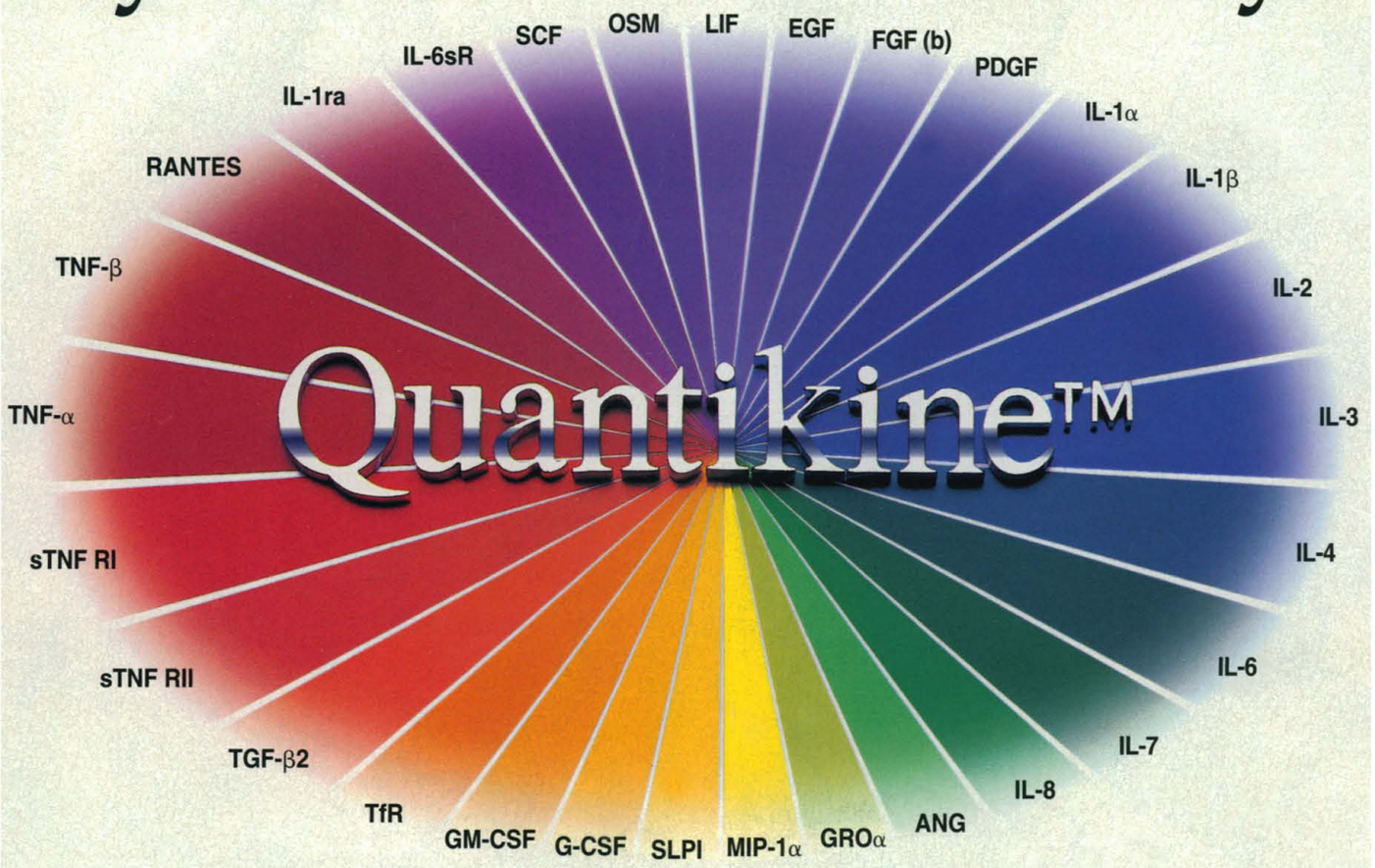

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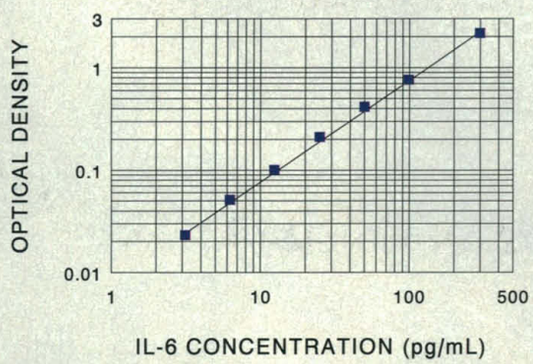

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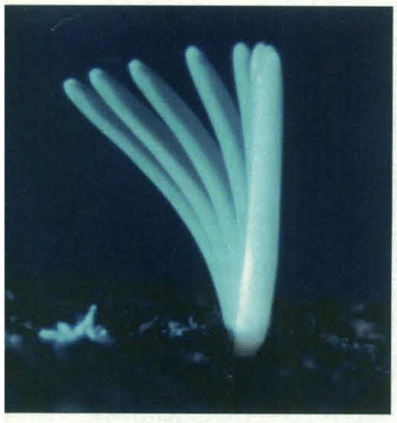
Bruce Alberts reshapes the NAS



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Blue light phototropism

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVES

ARTICLE

RESEARCH ARTICLE

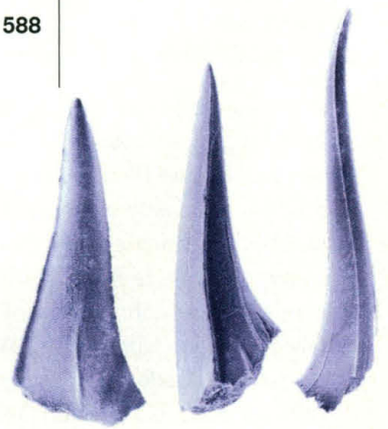
DEPARTMENTS

COVER

In the quantum cascade laser, alternating semiconductor layers (red and gray) create quantum wells for electrons. As electrons (light blue streaks) cascade from well to well (left to right), they jump from a higher to a lower energy level, emitting light (yellow band). The straight blue lines in the well regions represent the energy levels, and the bell-shaped curves, the probability distributions for occupation of that level. See page 553 and the news story on page 508. [Illustration: Keith D. Drake and Frank A. Antalec, AT&T Bell Labs]

REPORTS

TECHNICAL COMMENTS



546
Fishing for ancient seawater strontium

Indicates accompanying feature

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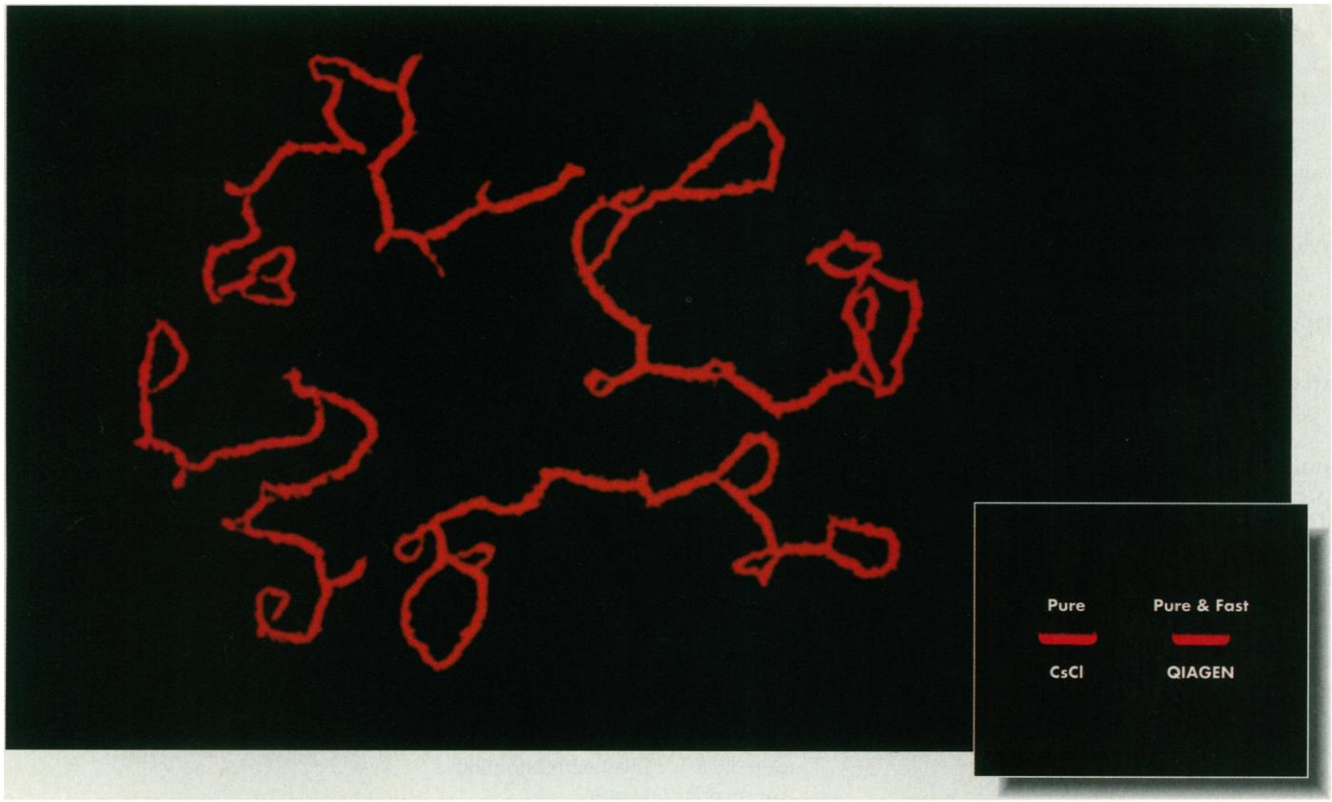

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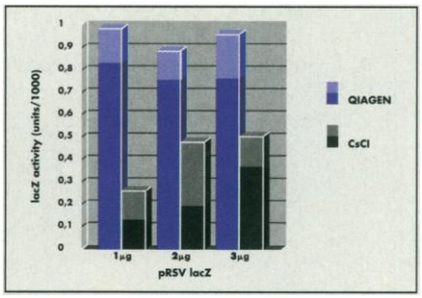

Comparison of transfection efficiencies. NIH 3T3 cells were transfected with the plasmid pRSVlacZ which was prepared with QIAGEN Plasmid Mega Kit (blue bar) or by CsCl (gray bar). Data from Ehlert et. al. (1993) BioTechniques ***14****: 546*

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edited by PHIL SZUROMI

Telltale teeth

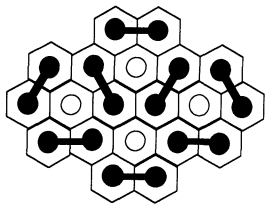
The strontium isotopic composition of seawater reflects the interaction of several processes, including continental weathering and hydrothermal circulation through ocean crust. The Cretaceous was a time of rapid formation of oceanic crust, but finding fossils that faithfully record seawater Sr compositions despite burial and diagenesis has been difficult. Ingram *et al.* (p. 546) show that fossil fish teeth provide such a record. The overall Sr isotopic variation in the fish teeth accounts for the volume of large Cretaceous oceanic plateaus but is inconsistent with high crustal production rates that have been proposed.

Cascade laser

In conventional semiconductor lasers, such as those found in compact disc players, the emitted light is produced as a result of electron-hole recombination across a band gap. Faist *et al.* (p. 553; see cover and news story by Taubes, p. 508) report a quantum well laser that operates on a different principle: the laser action occurs between quantum-confined conduction-band states in a semiconductor heterostructure. The lasers are grown by molecular beam epitaxy, so the dimensions of the quantum structures can be tailored to yield different lasing wavelengths. Lasing occurs at about 4.2 micrometers, a wavelength of interest to molecular spectroscopists and one that is difficult to obtain by other means.

Extra lithium

Atomic intercalation of metals into carbon solids, such as lithium intercalation into graphite and alkali metal insertion into fullerenes, is well known. Sato *et al.* (p. 556) use nuclear magnetic resonance and electron microscopy to show that in a disordered carbonaceous material, which was made by pyrolyzing polyphenylene, lithium could be introduced electrochemically not only in an atomic form but also as discrete Li_2 dimers. The identification of this covalent



site for lithium storage could lead to higher energy densities for batteries; the measured discharge capacity is about double that found for C_6Li electrodes.

Distant pulsar planets

Two years ago, timing variations were found in the radio signals from the isolated 6-millisecond pulsar PSR B1257+12 that suggested the existence of at least two orbiting planets. That discovery has now been confirmed. Wolszczan (p. 538; see news story by Travis, p. 506) explains how a total of 3 years of data show additional systematic variations in the pulse arrival times due to orbital changes caused by the gravitational interaction of the two Earth-mass planets. There is also a third inner planet which has a mass about that of the moon.

Defense secretions

A first line of defense against the entry of pathogens through the mucosal linings of the body is the secretion of immunoglobulin A (IgA) antibodies from antibody-containing cells. Ramsay *et al.* (p. 561) show that interleukin-6 (IL-6) is critical for the development of such immunity. Disrupting the IL-6 gene in mice greatly diminished IgA responses in the gut to viral challenges. Normal responses could be restored in the lungs of mice by infection with a recombinant vaccina virus that carried the IL-6 gene.

Sensing blue light

Blue light affects plants in a variety of ways. Some of the plant's responses to blue light can include developing new chloroplasts, opening stomata, and phototropism, or growth toward the source of the light. The receptor for the various blue light responses has, however, remained elusive. Quiñones and Zeiger (p. 558) manipulated the amount of the carotenoid zeaxanthin in maize coleoptiles and showed that the amount of zeaxanthin correlates with the phototropic response of coleoptiles to blue light. As zeaxanthin is present in very small concentrations, it may be a candidate for a blue light receptor.

Unevenly divided

When the bacterium *Bacillus subtilis* is starved, an asymmetric division is initiated, and transcription of certain genes is confined to one or the other of the daughter cells. Wu and Errington (p. 572) analyzed this process and found that the SpoIIIE protein is apparently required for movement of the chromosome into the smaller spore cell, a process that remains incomplete in SpoIIIE mutants. It may be the incomplete segregation of the chromosome in SpoIIIE mutants that leads to some of the normal sporulation—specific genes being transcribed, and others not, depending upon their location on the chromosome.

Shouts and whispers

That the intensity of visual and auditory events varies over many orders of magnitude does not prevent humans from accurately sensing these stimuli. The relation between sensation and intensity is a power function, which reduces the dynamic range to a physiologically acceptable window. Zeng and Shannon (p. 564) used auditory prostheses that had been implanted in the cochlea or brainstem of deaf patients to examine where such transformations might occur between the periphery—the cochlea—and the central nervous system. They suggest that high-frequency stimuli undergo a logarithmic transformation in the cochlea, whereas low-frequency sounds are transmitted linearly until a logarithmic transformation occurs in the cochlear nucleus of the central nervous system.

Prying into prions

Prions are infectious proteins that cause diseases of the central nervous system—scrapie in sheep and Creutzfeldt-Jakob disease in humans. How prions infect cells without the involvement of nucleic acids has been puzzling, but in a Perspective, Cohen *et al.* (p. 530) discuss how an abnormal prion protein may act directly on normal host proteins to change their conformation to an abnormal, disease-causing one. In a related report, Wickner (p. 566; see accompanying Perspective by Weissmann, p. 528) discusses how yeast get into the prion business. An obscure yeast mutant, URE, seems to owe its unusual phenotype to a protein, Ure2p, with many of the same properties as prion proteins. This yeast "prion" could prove more amenable to genetic and biochemical analysis.

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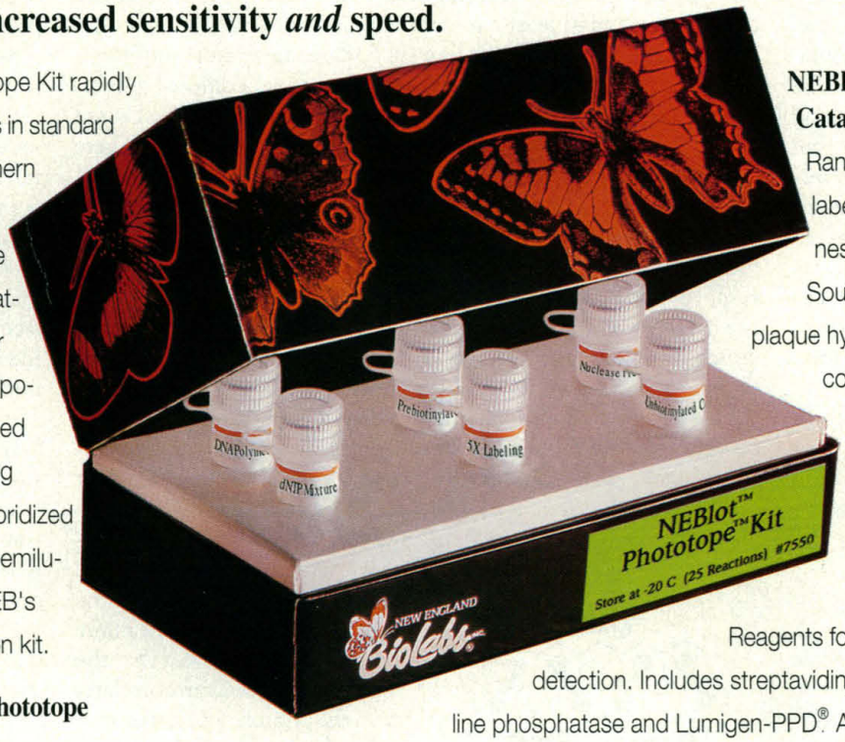

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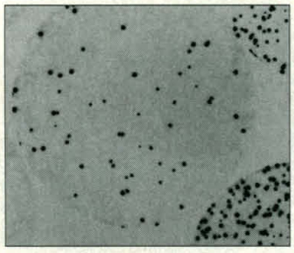

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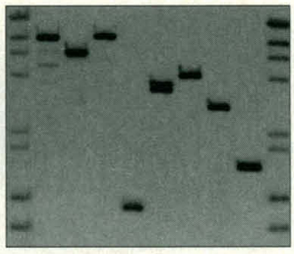

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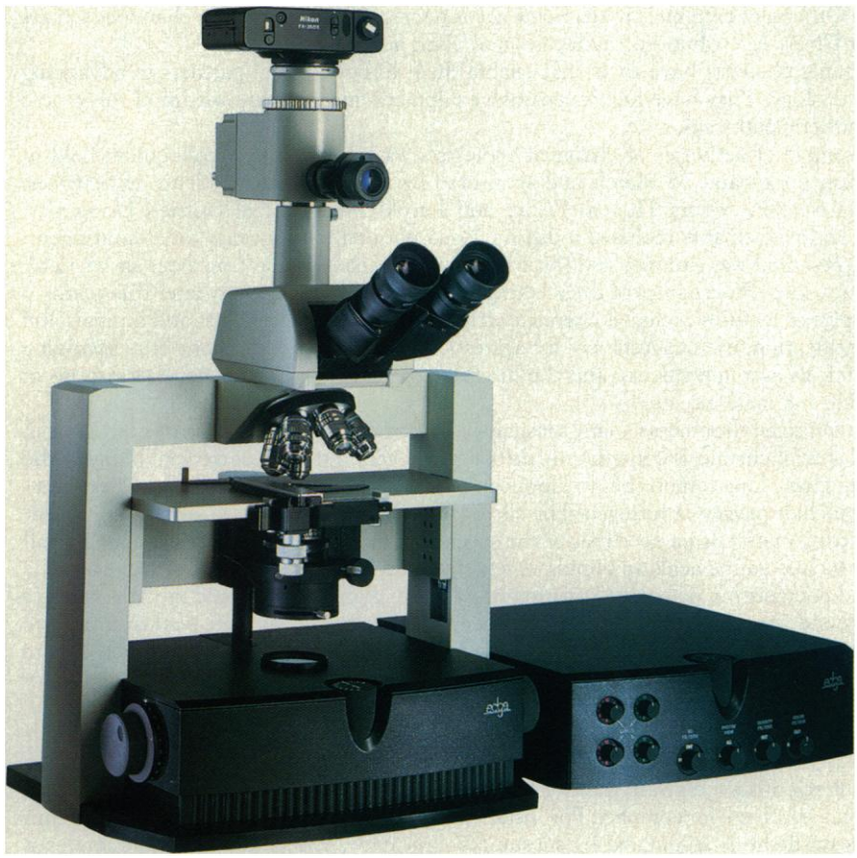

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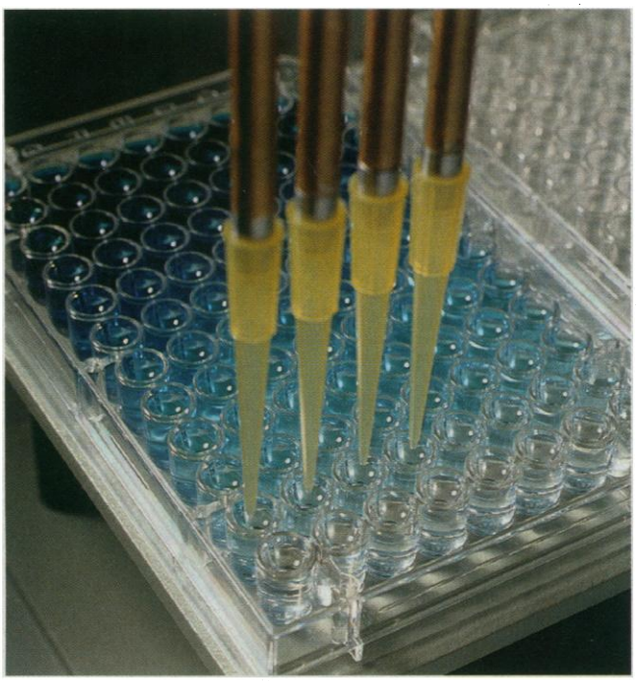

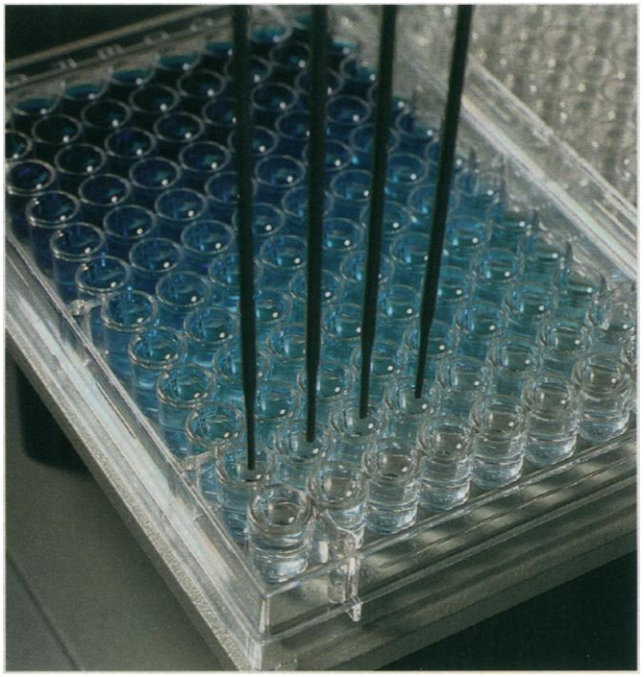

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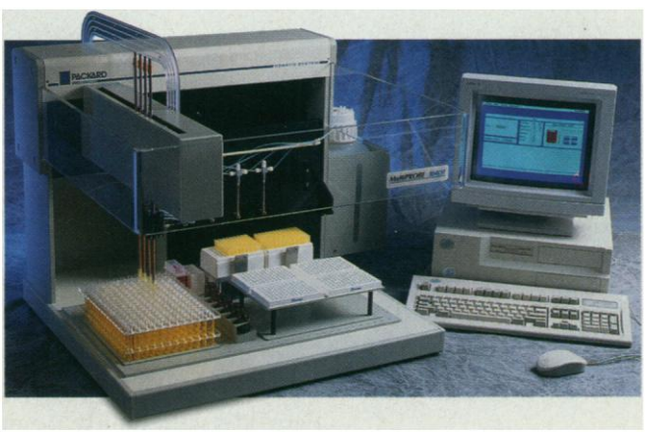

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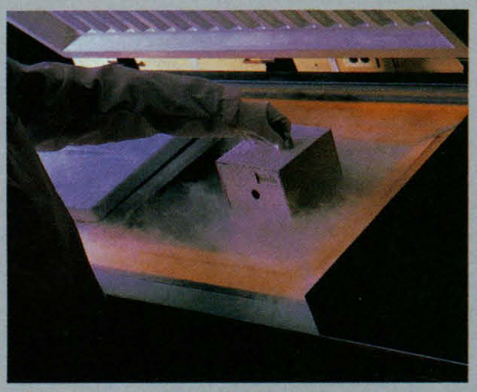

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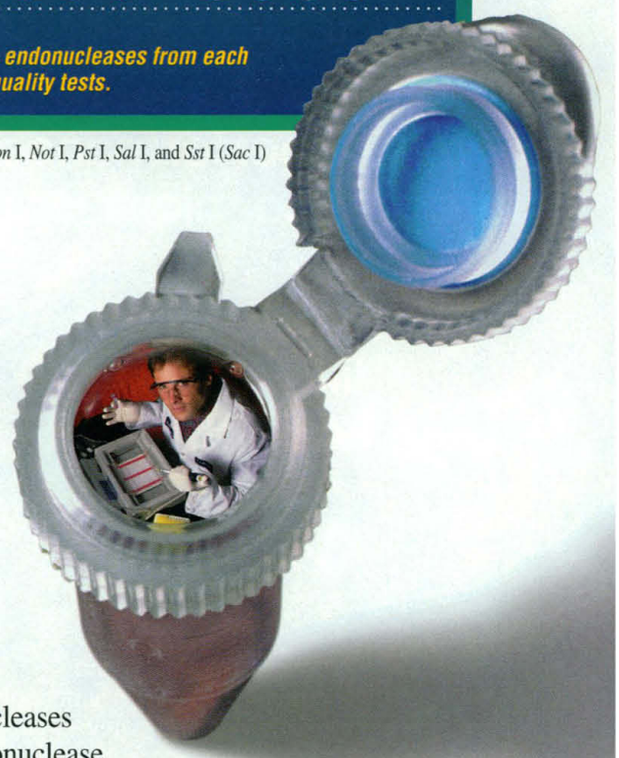
Our Competitors' Enzymes Can't Pass The Quality Testing Performed On GIBCO BRL Restriction Endonucleases†

Assay Performed	GIBCO BRL	Company A	Company B	Company C
DNA Endonuclease Assay	All Pass	⊘ ⊘	All Pass	⊘
DNA Exonuclease Assay	All Pass	All Pass	⊘ ⊘	⊘
DNA Ligation/Recut Assay	All Pass	⊘ ⊘	⊘ ⊘	All Pass
Nicking Assay	All Pass	⊘	⊘ ⊘	⊘ ⊘
Unit Assay	All Pass	⊘ ⊘ ⊘ ⊘ ⊘	⊘ ⊘ ⊘	⊘ ⊘ ⊘ ⊘

⊘ = One Failure

Summary: Seven out of ten restriction endonucleases from each competitor failed one or more of our quality tests.

†Enzymes tested in the manufacturers' recommended buffers: *Bam*H I, *Bgl* I, *Cla* I, *Eco*R I, *Hind* III, *Kpn* I, *Not* I, *Pst* I, *Sal* I, and *Sst* I (*Sac* I)



In a recent quality comparison between Life Technologies and three leading manufacturers, seven out of ten restriction endonucleases from each competitor failed one or more of our quality tests.

Life Technologies offers the highest quality restriction endonucleases on the market because of our unparalleled system of rigorous and complete quality testing. Up to eight different assays are performed at four separate critical stages of production: during the purification process, on the bulk product in storage buffer, on the diluted product, and on the final product you receive.

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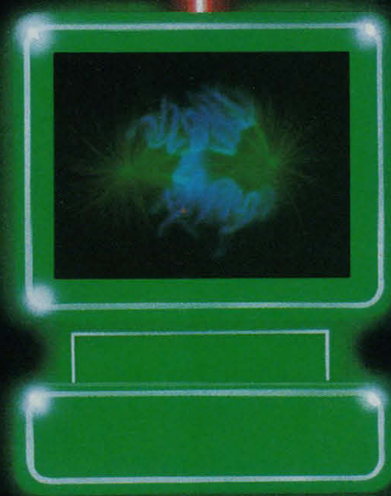

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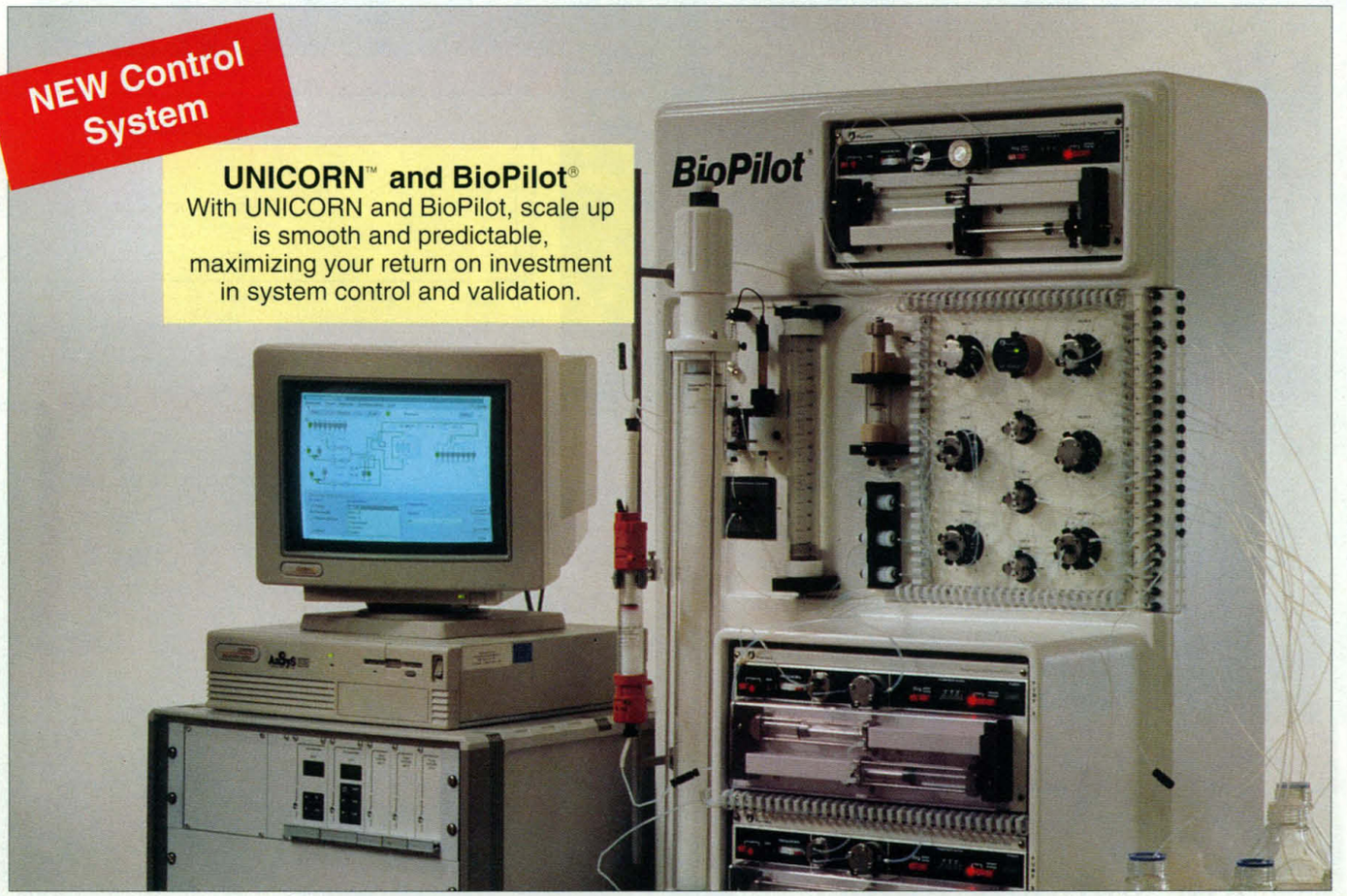
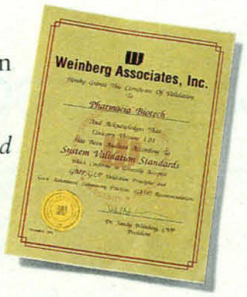


A smoother path from laboratory bench to production floor

Smooth transfer from one scale of operation to another is vital when bringing products to market. With UNICORN and BioPilot that transfer is both swift and efficient.

UNICORN is the new control system for BioPilot, the chromatography system for process development, scale up and small scale production. UNICORN complies fully with GLP/GMP requirements and includes validation support.



UNICORN is issued with a Validation Certificate and Report.

UNICORN Control System:

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- Displays the actual liquid flow path and the readings of the process monitors on a unique dynamic flow diagram
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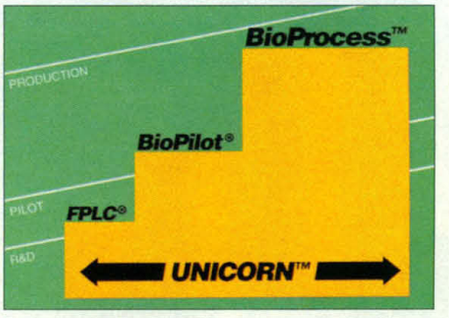

UNICORN control system is scaleable. It supervises BioPilot and BioProcess systems keeping documentation and user interface constant.

1140

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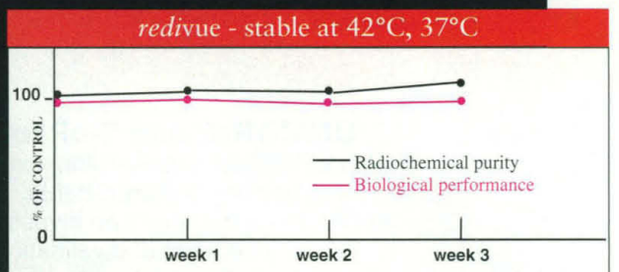
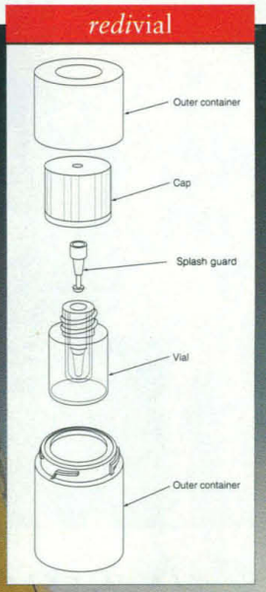


[32P]dCTP was stored at +42°C for 2 days and then at +37°C for 3 weeks. The control was stored at -20°C. Radiochemical purity was determined by HPLC and biological performance by DNA labeling using the random prime protocol.



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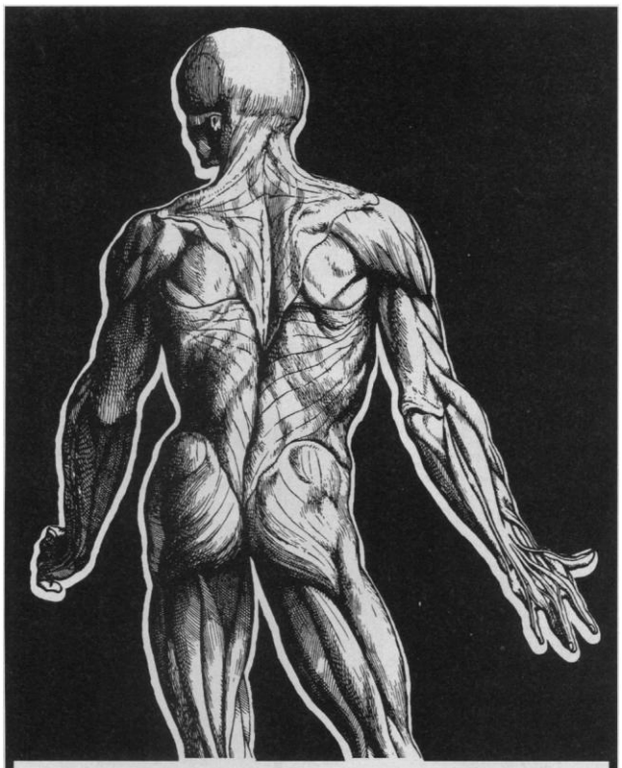

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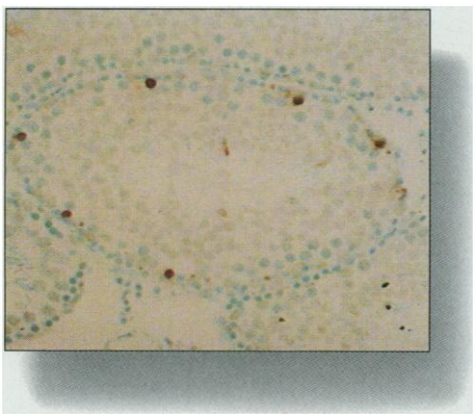
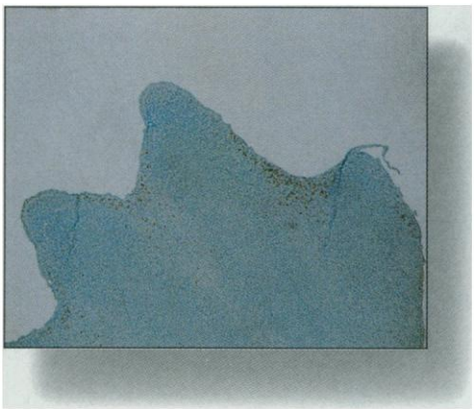
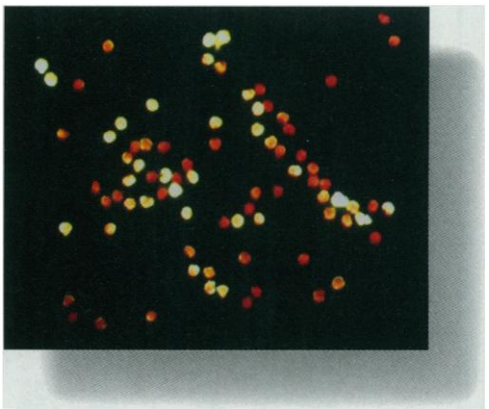


Spontaneous spermatogonial apoptosis in rat testis[1], ApopTag™ Peroxidase Kit and methyl green (X400)



Developmental cell deletion in remodeling of mouse forelimb bud (14-day embryo), ApopTag™ Peroxidase Kit and methyl green (X200)[2]



Apoptosis of human peripheral blood lymphocytes *in vitro*, ApopTag™ Fluorescein Kit (yellow) and propidium iodide (red) (X400)[3]

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[1] DJ Allan, BV Harmon & SA Roberts, (1992) *Cell Proliferation;* 25:241-250.

[2] JFR Kerr, J Searle, BV Harmon & CJ Bishop, in: Potten, CS (ed) (1987) *Perspectives in mammalian cell death.* Oxford U. Press, pp. 93-128. Z Zakeri, D Quaglino, T Latham & R Lockshin, (1993) *FASEB Journal;* 7:470-478; and manuscripts submitted.

[3] X Li, W James, F Traganos & Z Darzynkiewicz, (1993) manuscript submitted.

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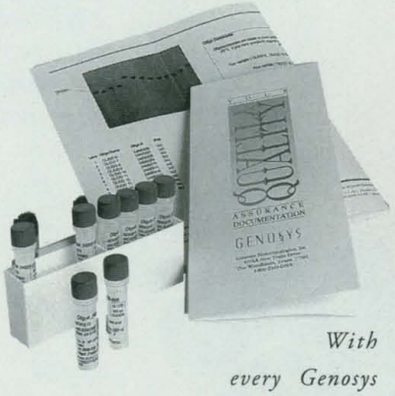

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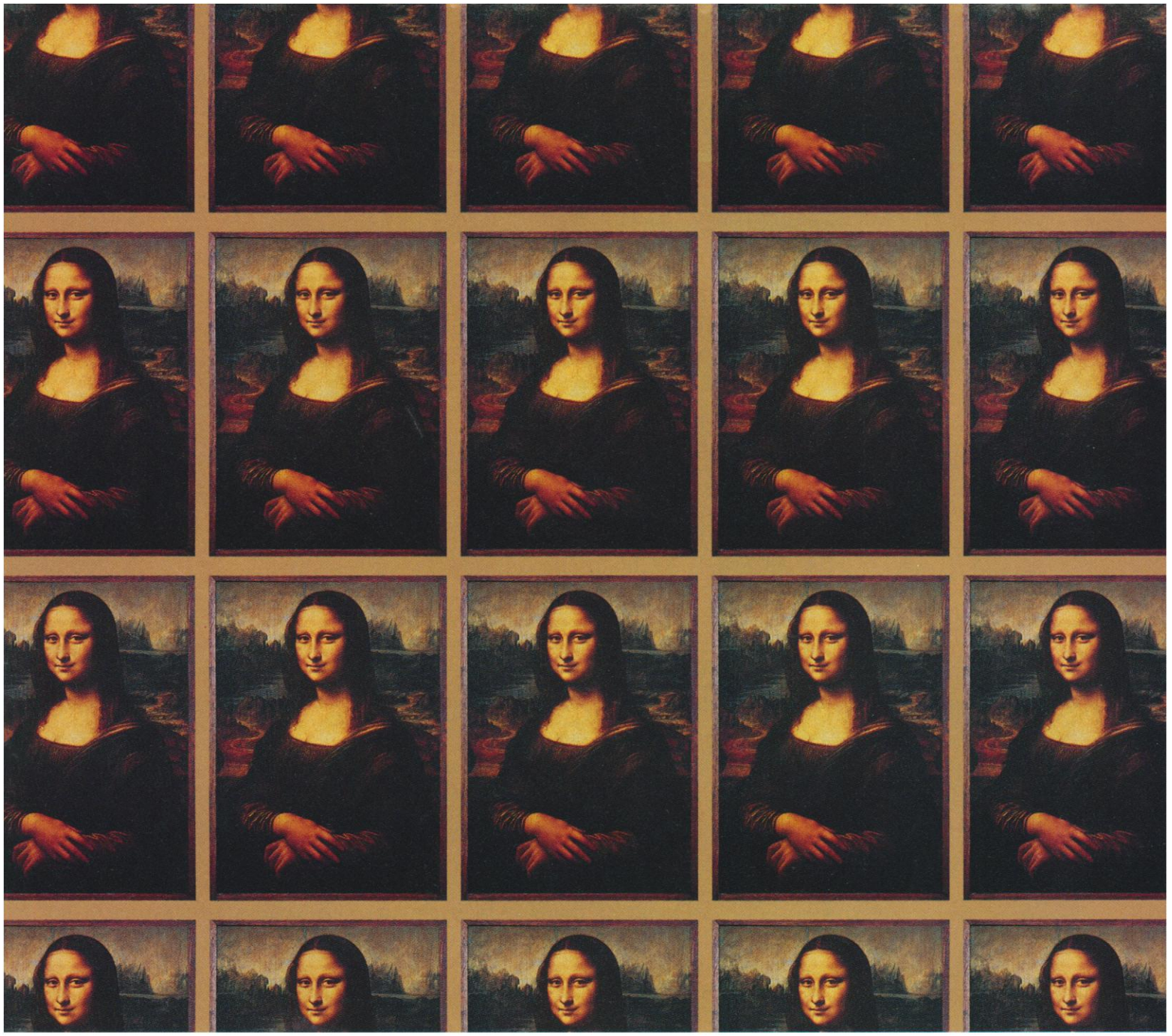

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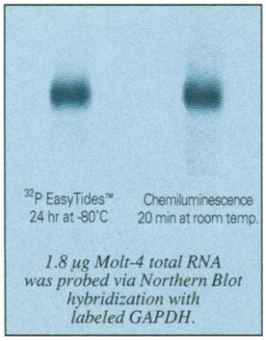

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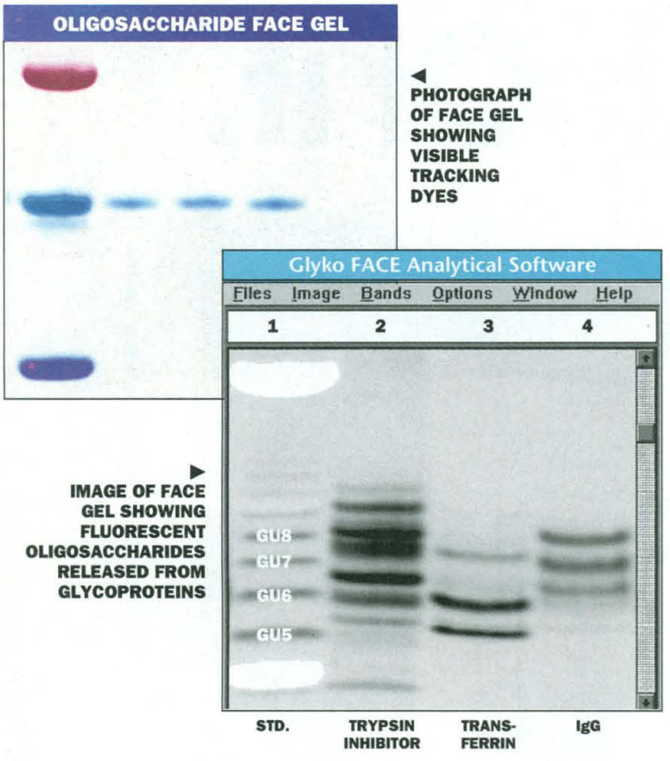

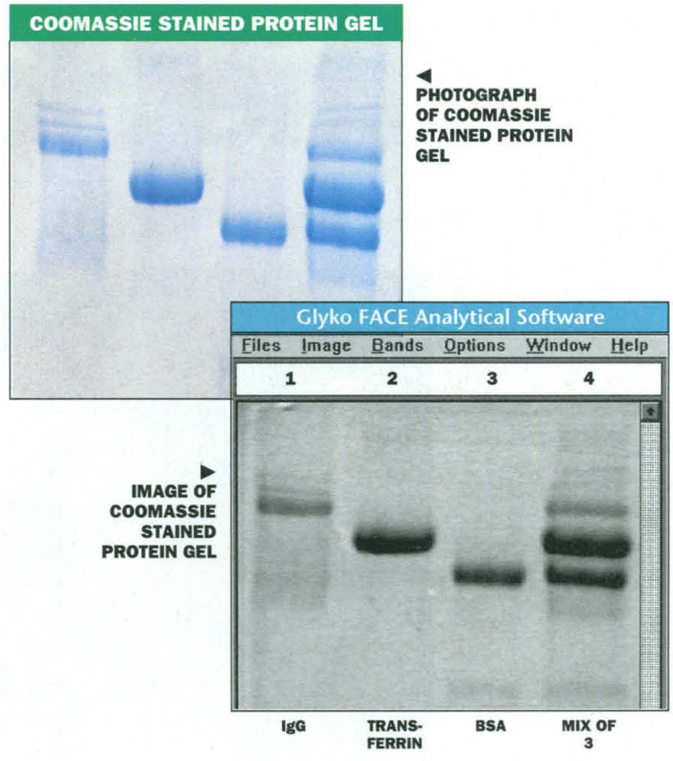

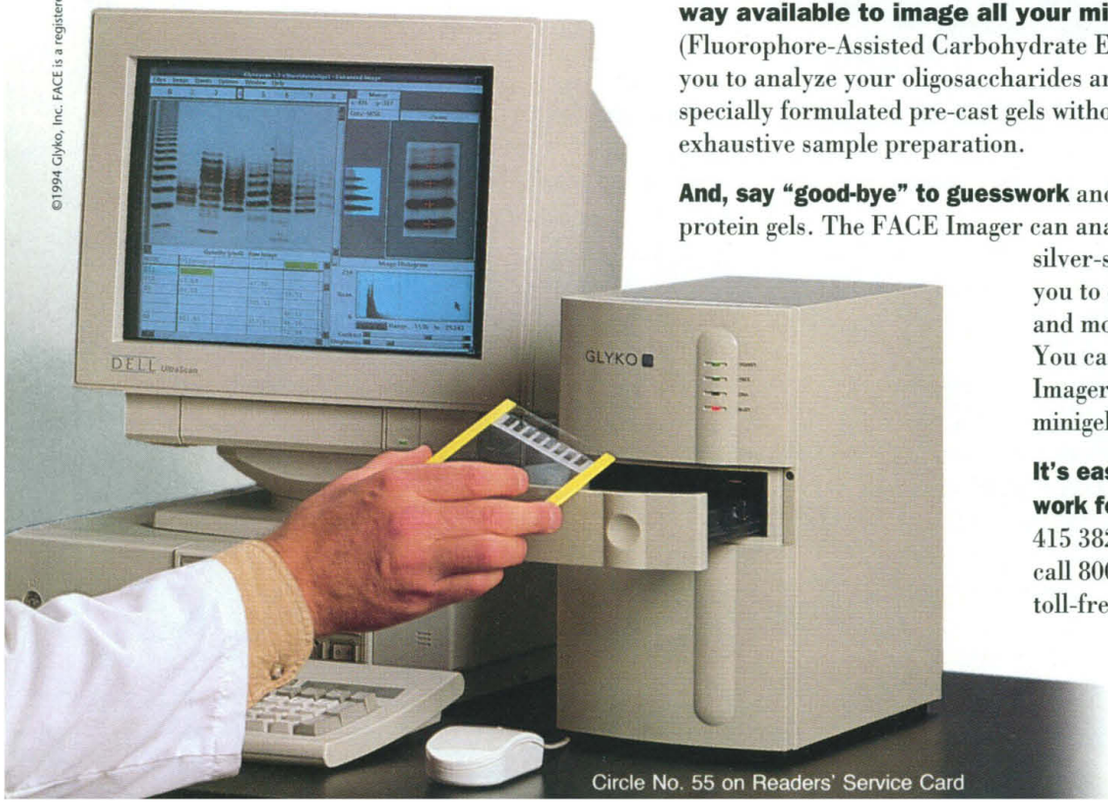

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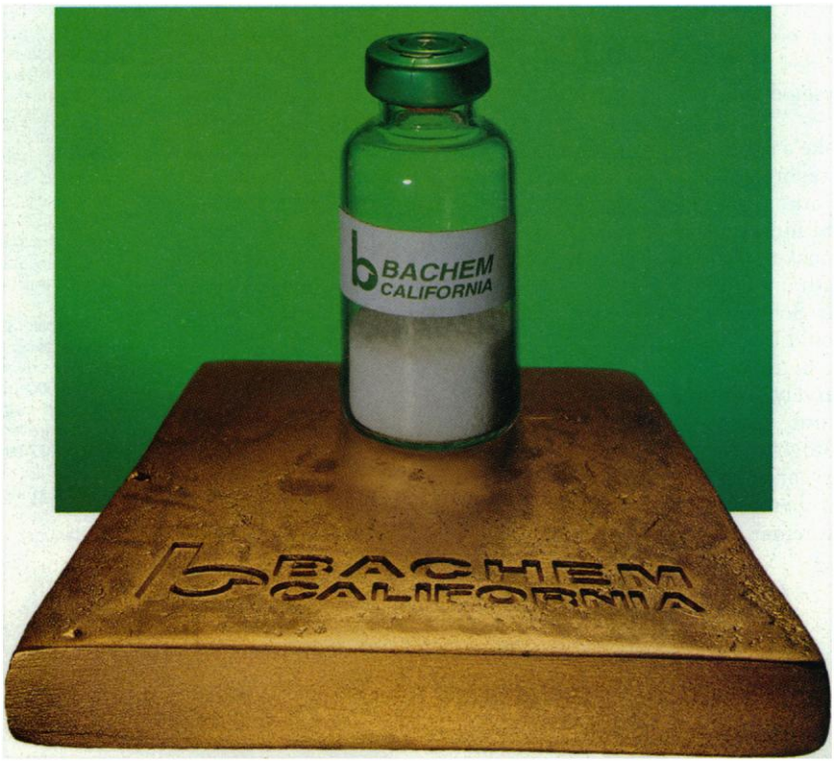

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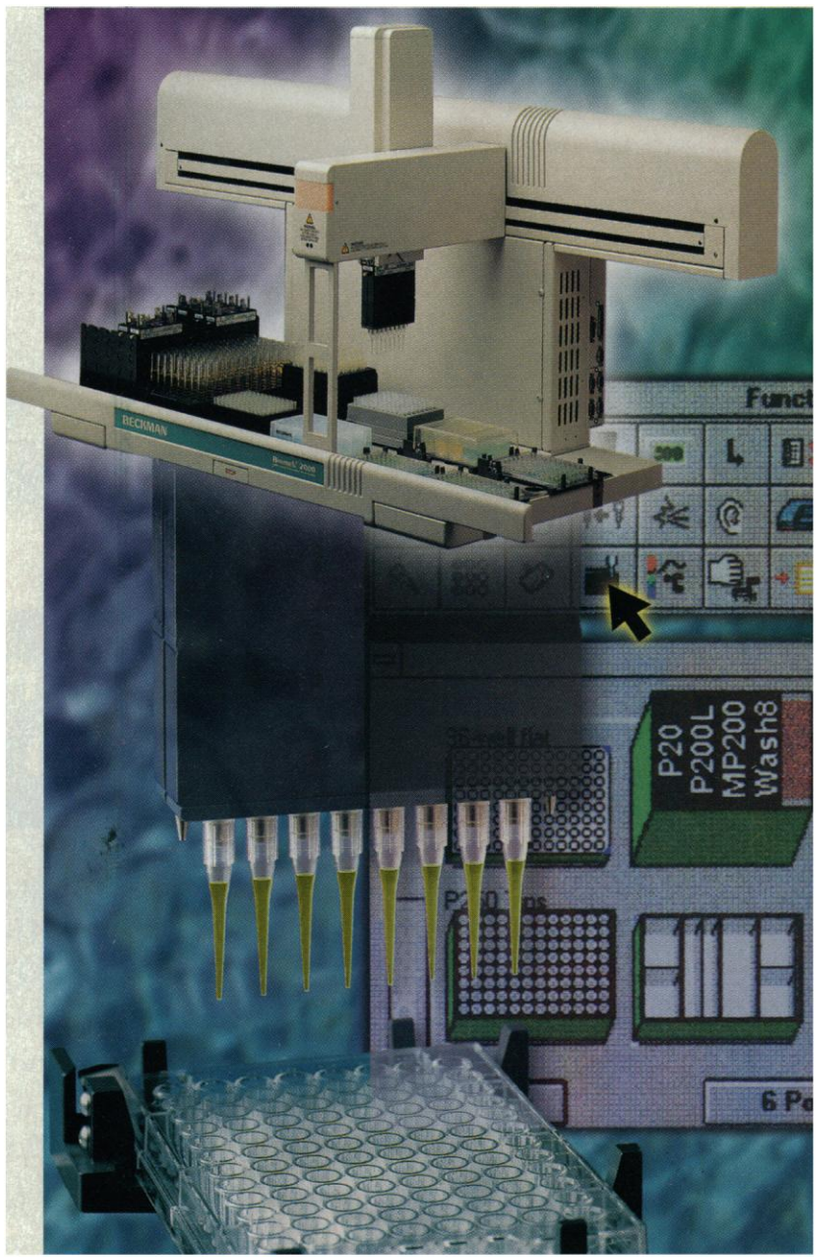

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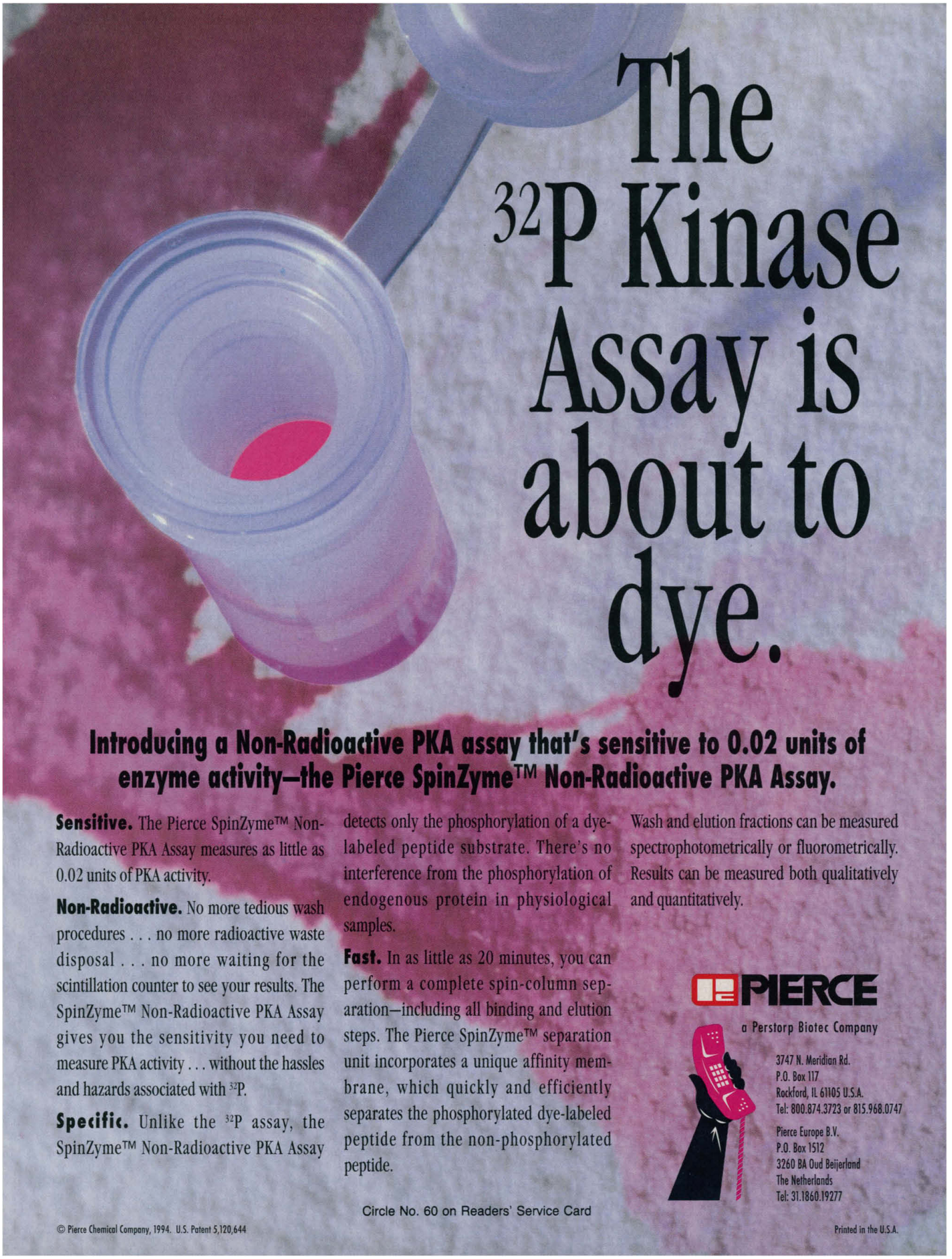

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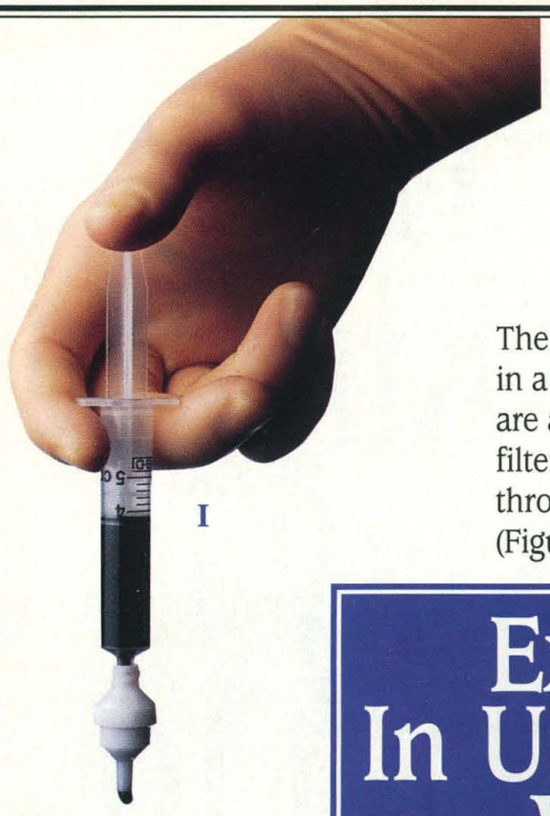

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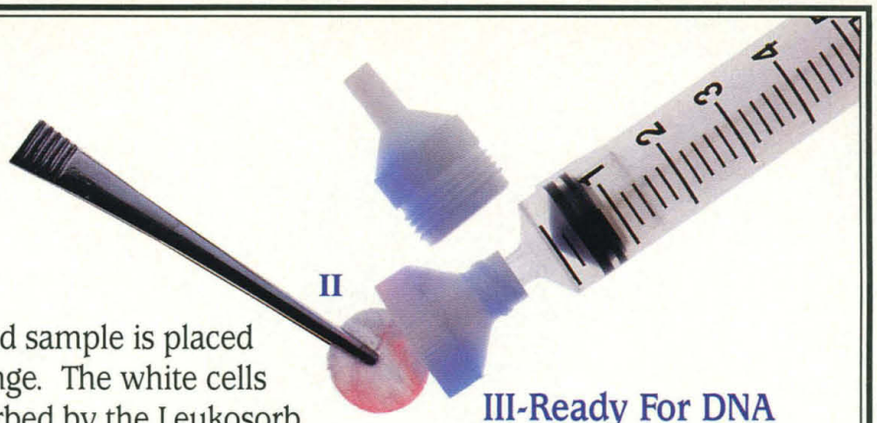

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The blood sample is placed in a syringe. The white cells are adsorbed by the Leukosorb filter as the blood passes through the fibrous matrix (Figure I).

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III

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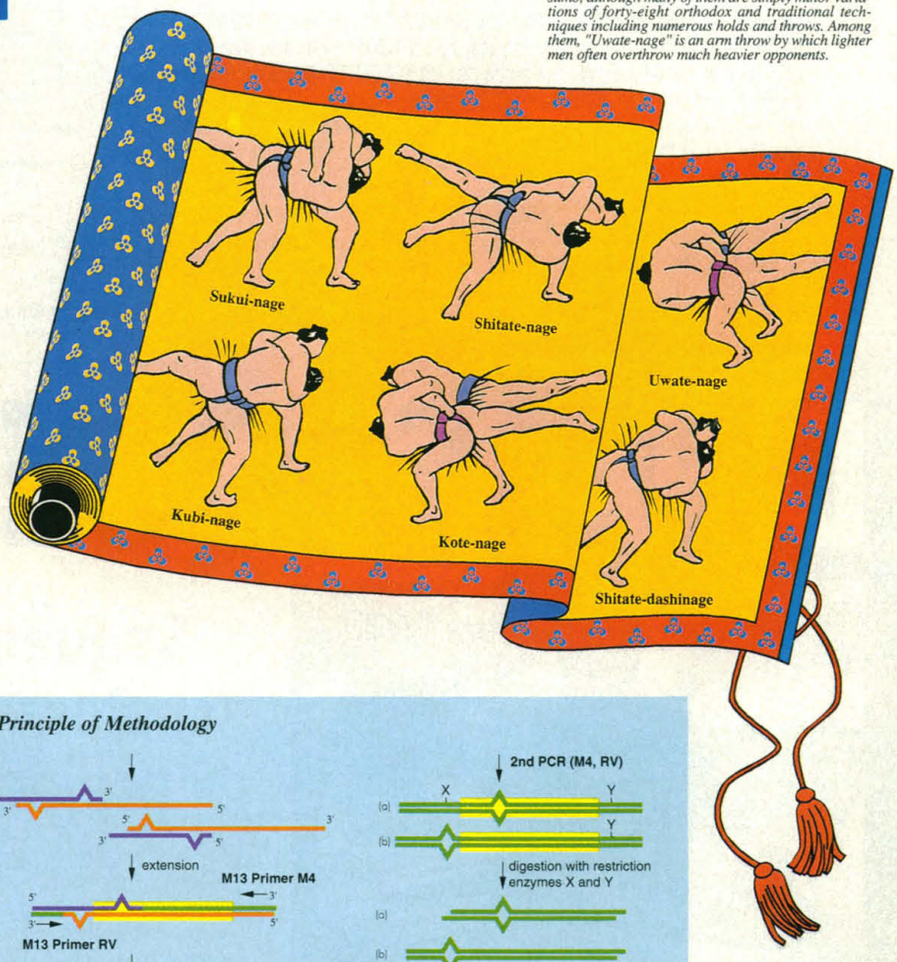
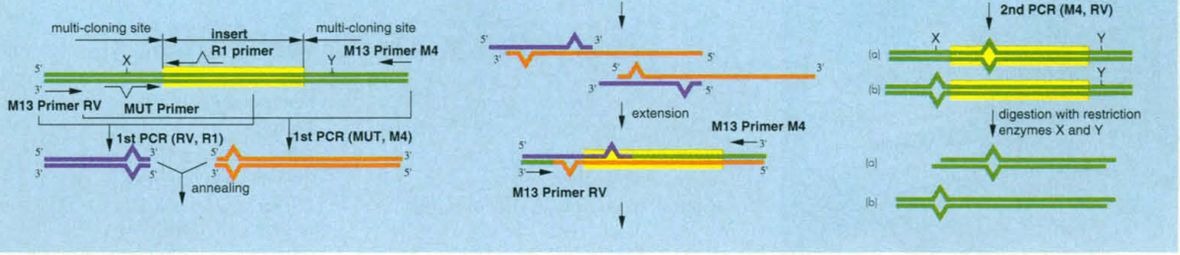


Principle of Methodology



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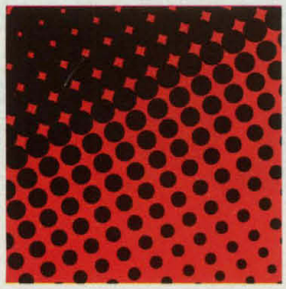

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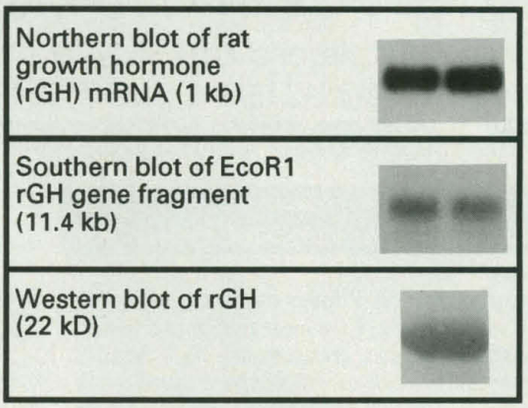

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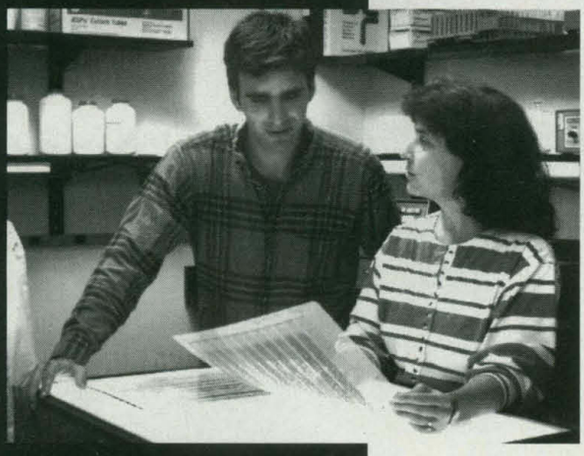

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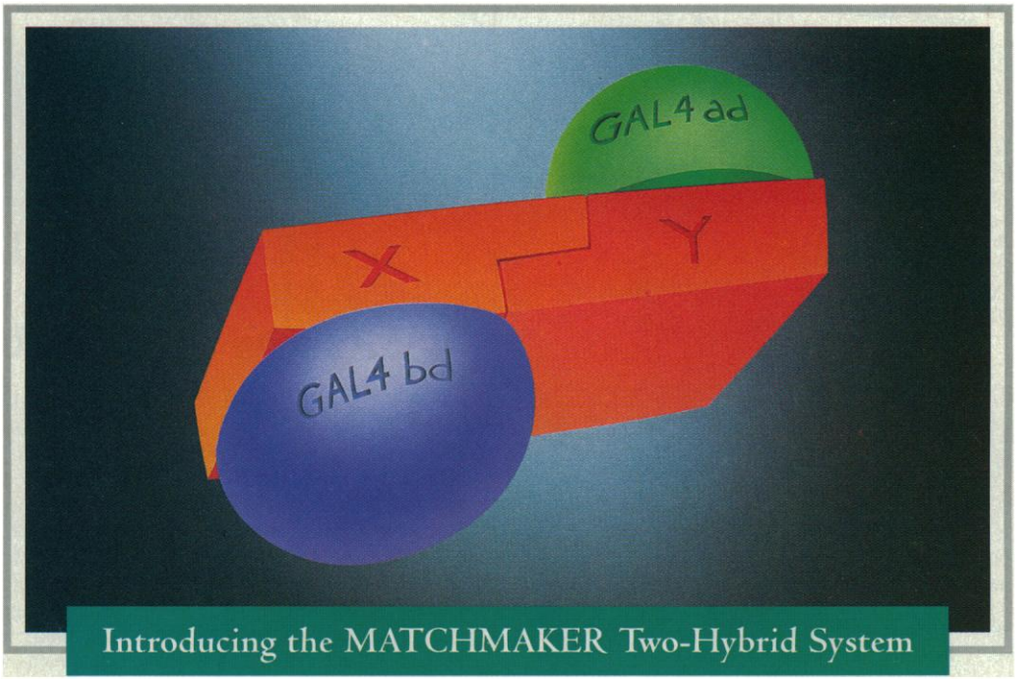

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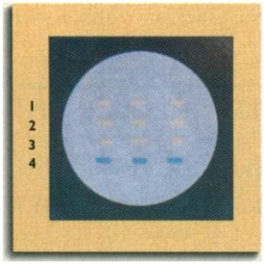

Results of a MATCHMAKER Two-Hybrid assay for interaction of the murine p53 protein with SV40 large T-antigen. The two candidate proteins were cloned into a DNA-binding domain vector and an activation domain vector, respectively. Transformants were assayed for β-galactosidase expression. Rows 1-3: negative controls. Row 4: test interaction.

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