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SCIENCE

7 JANUARY 1994
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High-Energy Astrophysics

The Major Advantages of Stratagene's pCR-Script™ Cloning Kit Over the Competition:

IT'S SIMPLE AND IT WORKS!

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- Uses pBluescript Sequencing Primers
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- Fast - One Hour
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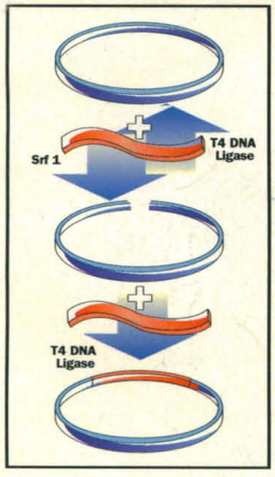

Stratagene's pCR-Script™ cloning kit is designed to efficiently clone PCR* products without requiring special primers or post-PCR treatment. PCR products are simply incubated with the predigested plasmid pCR-Script SK(+) DNA, rATP, T4 DNA ligase and the rare-cleavage blunt end *Srf I* restriction enzyme (1). The method selects for PCR DNA fragment-vector ligations and maintains a high steady-state concentration of the digested vector DNA. After a brief incubation, the mixture is added to competent cells without further treatment.

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The pCR-Script cloning kit is provided complete with predigested vector, enzymes and competent cells. Please call Stratagene for more information and the distributor nearest you.

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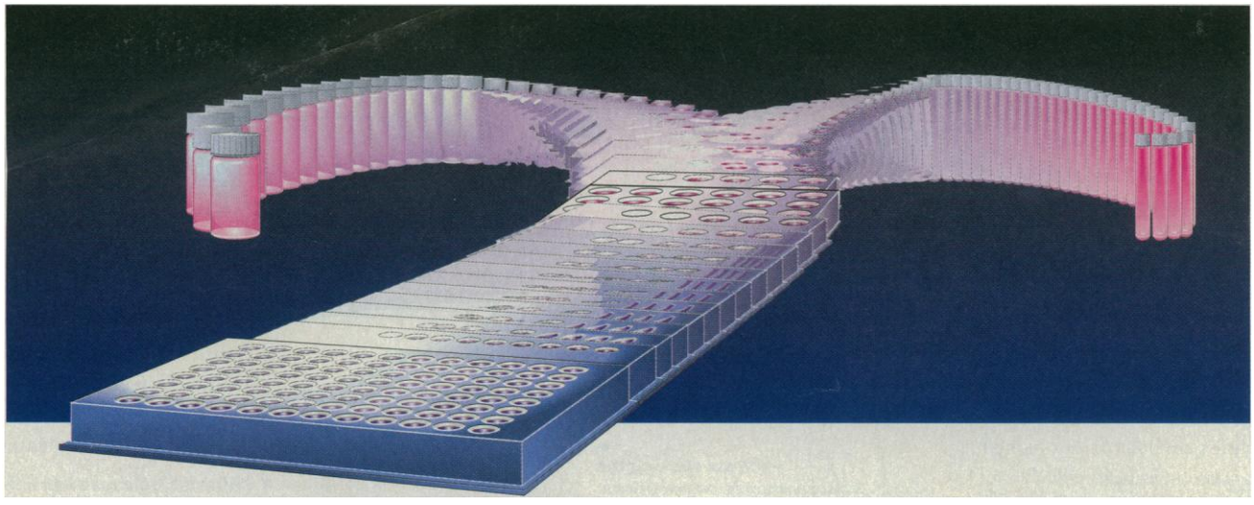
1. Bauer, J., et al. (1992) *Stratagies* 5:2-64

*The polymerase chain reaction (PCR) process is covered by patents in the United States owned by Hoffmann-La Roche. Use of the PCR process requires a license.



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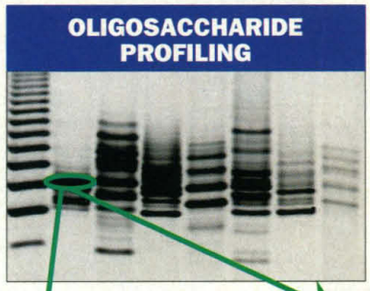
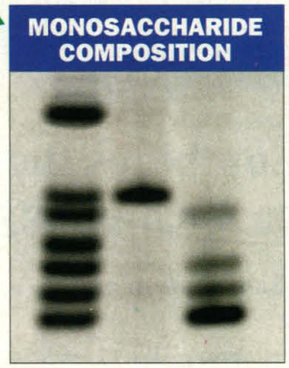
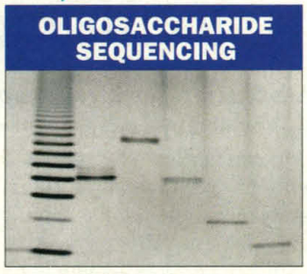
Now, in less than one day, you can perform profiling, composition, or sequencing experiments such as the ones shown here, using FACE chemistry kits.



◀ **FACE gel profile of N-linked oligosaccharides released from a number of different glycoproteins**



▶ **FACE gel showing the monosaccharide compositional analysis of a tri-sialylated, triantennary oligosaccharide**



◀ **FACE gel illustrating the enzyme-based sequencing of a tri-sialylated, triantennary oligosaccharide**

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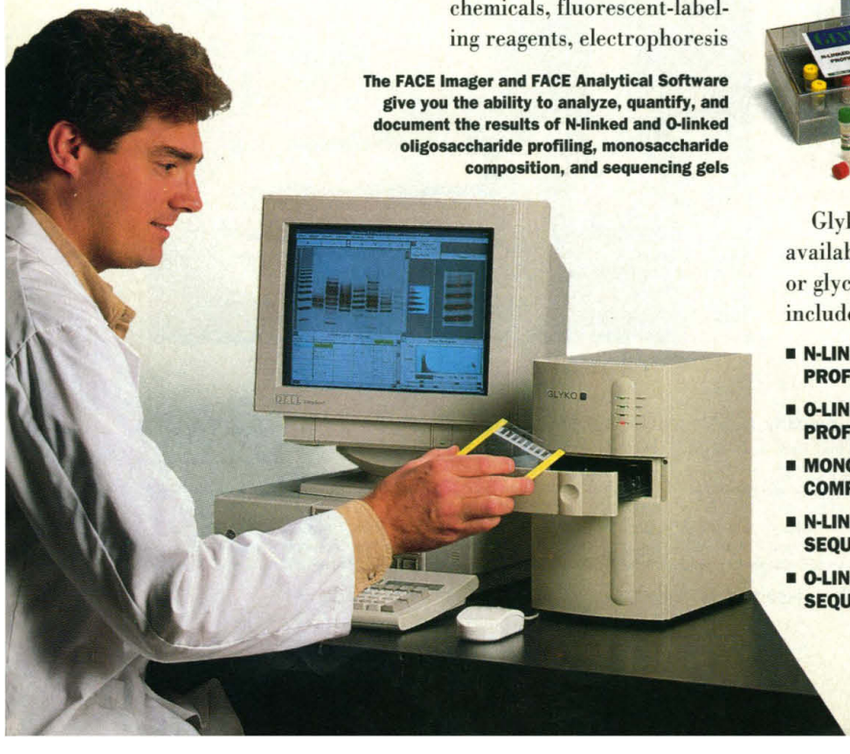

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- **NANase II, releases α2-3,6 N-acetylneuraminic acid**
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- **Neuraminic Acid Linkage Analysis Kit contains NANase I, II, and III**
- **HEXase I, releases β1-2,4,6 N-acetylglucosamine**
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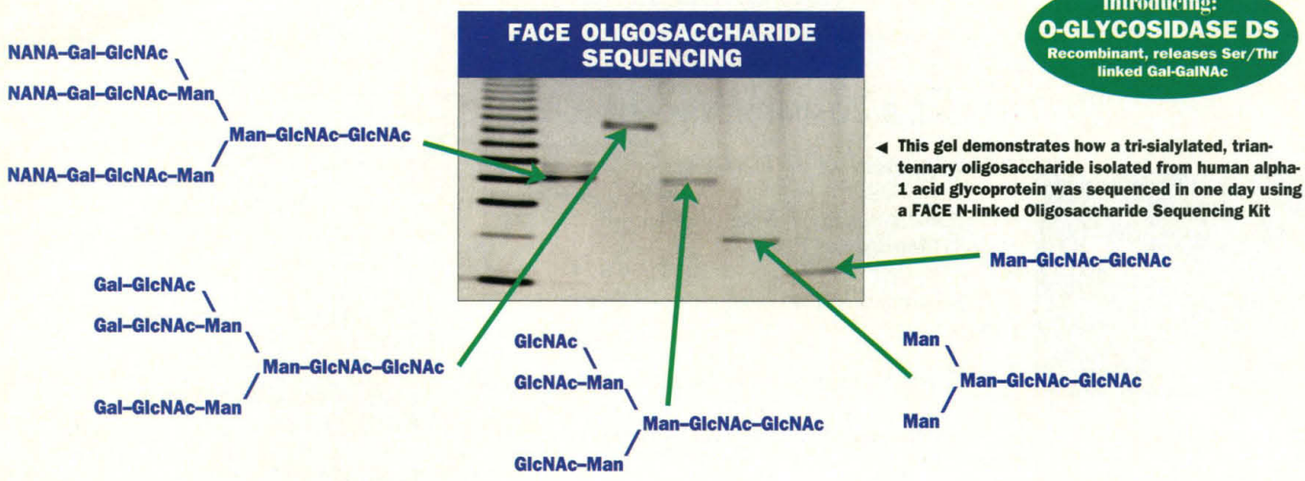

Introducing:
O-GLYCOSIDASE DS
Recombinant, releases Ser/Thr linked Gal-GalNAc

◀ This gel demonstrates how a tri-sialylated, triantennary oligosaccharide isolated from human alpha-1 acid glycoprotein was sequenced in one day using a FACE N-linked Oligosaccharide Sequencing Kit

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- **NANase I** *releases α2-3 N-acetylneuraminic acid*
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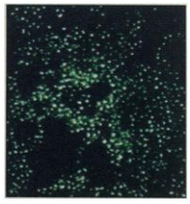
25
Whales on the rebound



66
Into the void

NEWS & COMMENT

RESEARCH NEWS

HIGH-ENERGY ASTROPHYSICS

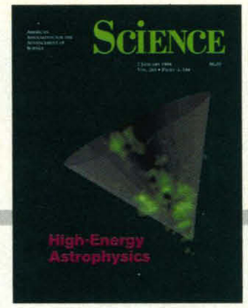
PERSPECTIVES

ARTICLES

DEPARTMENTS

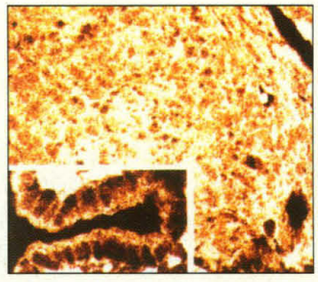
COVER

Emission from gas clouds in the active galaxy NGC 1068 observed by the Hubble Space Telescope. The gas is ionized by radiation from the galaxy nucleus, which is thought to be encircled by a dusty torus that allows the radiation to escape only within the conical region indicated on the image. Depending on the orientation of the torus relative to the disk of the galaxy it inhabits, this model can explain many types of galactic activity. See the Perspective on page 40. [Image: National Aeronautics and Space Administration]



REPORTS

TECHNICAL COMMENTS



98

Signaling cell conversion

◩ Indicates accompanying feature

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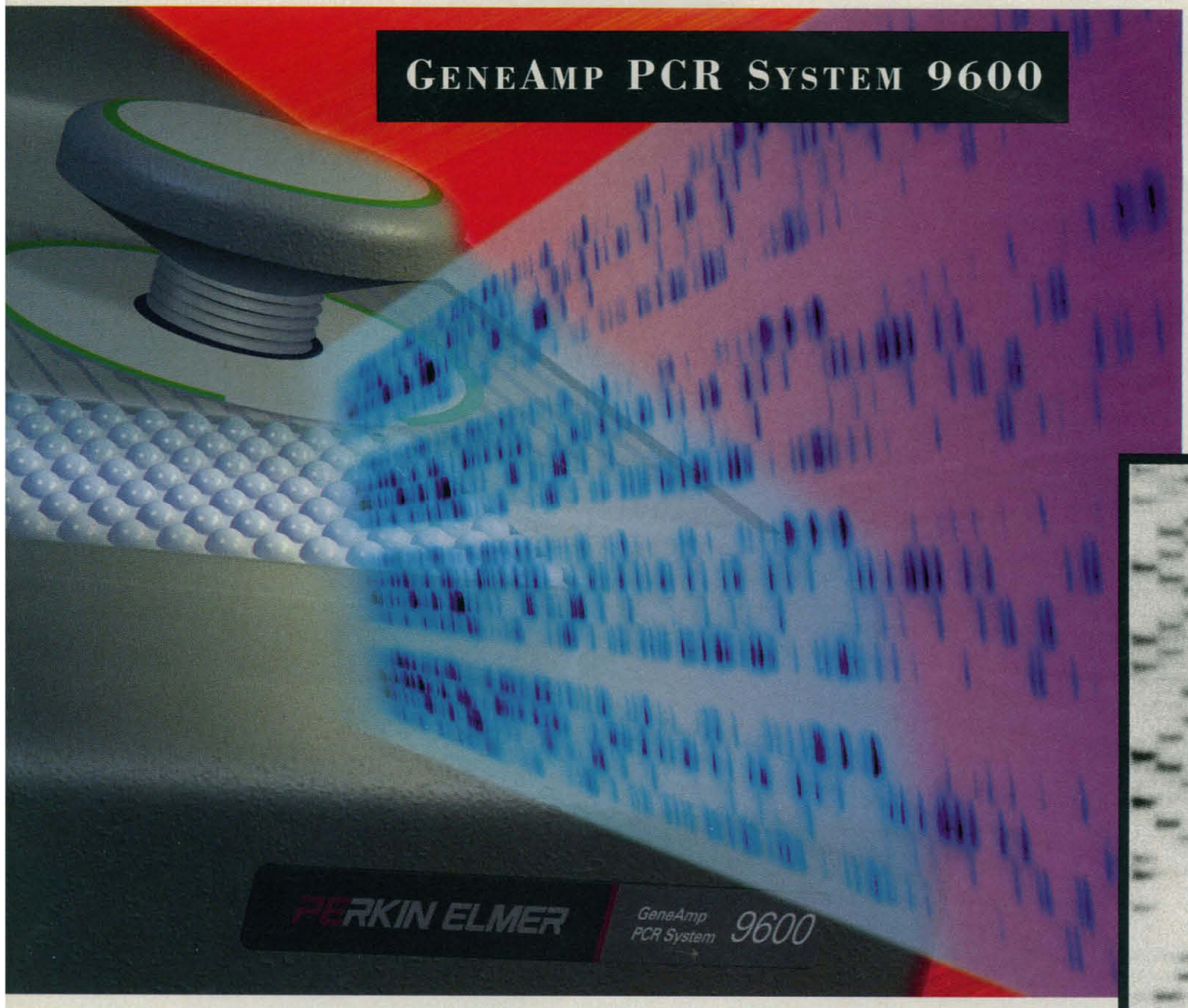

DNA SEQUENCING OF RETROVIRAL LTR USING PCR PRODUCTS AMPLIFIED FROM NIH 3T3 FIBROBLAST CELL LINE ON THE GENEAMP PCR SYSTEM 9600. COURTESY OF PIA MARIA CHALLITA, CHILDREN'S HOSPITAL, LOS ANGELES, CALIFORNIA.

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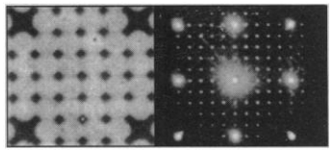
edited by PHIL SZUROMI

Growing gratings

Condensation figures (CFs) form when water condenses and forms droplets on the hydrophilic areas of a surface. Kumar and Whitesides (p. 60) created patterned surfaces of self-assembled monolayers of alkanethiols on gold substrates that, when exposed to water vapor under the appropriate conditions, form CFs that diffract optical light.



A polymer stamp was used to transfer a pattern of one type of alkanethiol to the gold substrate. The other type of alkanethiol was then adsorbed from solution. Because the intensity of the diffraction spots was highly sensitive to changes in relative humidity and temperature, these films could be useful as sensors. Diffraction could be observed through the grating for thin, transparent gold layers.

■

Inferences from interference

Structural information about proteins can be obtained in a variety of ways from monolayer membrane samples in which the protein molecules form ordered arrays, but often such samples are disordered. Sasaki *et al.* (p. 62) show that x-rays produced by fluorescence of metal atoms in the sample can produce interference patterns that yield structural information. For ferritin, which contains an iron core, their value for the core diameter agrees well with that known from electron microscopy. Bovine serum albumin, which was labeled with metal atoms, forms an oriented structure with its long axis parallel to the substrate.

Tumor cell conversion

The proto-oncogene product Met is a tyrosine kinase receptor that is often overexpressed in tumors. When NIH 3T3 fibroblasts are engineered to co-express Met and its ligand, hepatocyte growth factor, the cells induce tumor formation in nude mice. Tsarfaty *et al.* (p. 98) provide evidence that the cells comprising these tumors are undergoing a conversion from a mesenchymal to an epithelial phenotype. The tumors express cytoskeletal markers characteristic of both mesenchymal and epithelial cells and form lumenal structures in vivo. A similar conversion is seen during development of the embryonic kidney. Thus, Met may play a role in normal cell lineage switching as well as in tumorigenesis.

Hot and cold

The sun's chromosphere gets its name from the pinkish hue it shows during total eclipse, due to emission in spectral lines of hydrogen at a temperature of some 6000 K. Line emission from carbon monoxide (CO) has suggested the existence of a cooler component, at 4000 K or less, but the theoretical problem of accommodating these two phases at close proximity has caused controversy over the CO observations. Solanki *et al.* (p. 64) obtained spectra of high spatial resolution which show that the CO emission indeed lies at the base of the chromosphere and covers more than half the sun's surface. The width of the CO line indicates tangential velocities close to the local sound speed, indicating that gas is rising convectively, then expanding and cooling rapidly at the surface.

■

Voids and colloids

X-ray scattering measurements of dilute solutions of charged colloidal particles reveal a single broad peak indicative of an ordered array, but the corresponding lattice spacing is smaller than that expected for uniformly dispersed particles. Microscopy studies have confirmed the presence of large void structures, but the presence of an interface (the glass slide) complicates these results. Ito *et al.* (p. 66) have studied such dispersions far away from the interface with confocal microscopy and find that the void structures grow even more rapidly in the bulk phase than near the interface. Similar void structures may occur in ionic polymer solutions and in Langmuir-Blodgett films.

■

Relatively benign

Hydrochlorofluorocarbons (HCFCs) are being developed as substitutes for CFCs, which damage the ozone layer, yet many HCFCs contain CF_3 groups that might react with ozone to produce potentially reactive CF_3O and CF_3O_2 radicals. Ravishankara *et al.* (p. 71) measured the reaction rates of several key CF_3 reactions and used these numbers to model potential ozone depletion through this route. They conclude that the ozone depletion potentials that result from the presence of CF_3 are negligible.

■

Let Jak do it

Members of the ciliary neurotrophic factor cytokine family, which includes interleukin-6 (IL-6), interact with receptors that share a signal-transducing component, the β receptor. Two reports indicate that the β receptor signals through the Jak/Tyk family of cytoplasmic tyrosine kinases. Stahl *et al.* (p. 92) show that the β receptor constitutively associates with all known members of this kinase family in the absence of cytokine. Cytokine stimulation activates the Jak/Tyk kinases and induces different patterns of phosphorylation in different cell lines. Lütticken *et al.* (p. 89) show that the Jak1 kinase, as well as a transcription factor previously implicated in the interferon signaling pathway, associate with the β component of the IL-6 receptor and are phosphorylated in response to IL-6.

■

RNA repression

The entry into mitosis represses RNA transcription by both RNA polymerase II and III. Gottesfeld *et al.* (p. 81) have examined the repression of Pol III and find that $p34^{cdc2}$–cyclin B kinase can mediate this effect in vitro. The repression involves the phosphorylation of a component of TFIIIB, which contains TATA box–binding protein and other associated factors.

■

Recovered ribozyme

The splicing of precursor messenger RNA has been postulated to have originated from and may still rely on catalytic RNA. Yang *et al.* (p. 77) noticed the resemblance of a highly conserved domain of the U6-U4 small nuclear RNA complex to a hammerhead ribozyme. When they made minor nucleotide substitutions in the U4-U6 complex, it could cleave an RNA substrate and behave like a hammerhead ribozyme.

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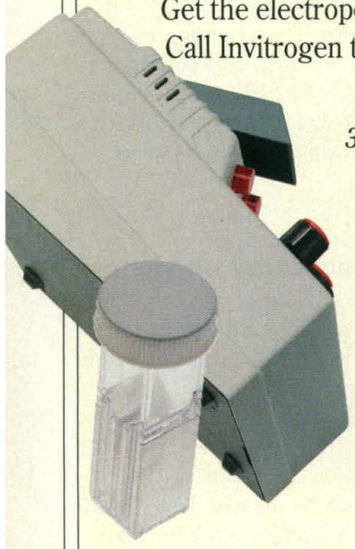

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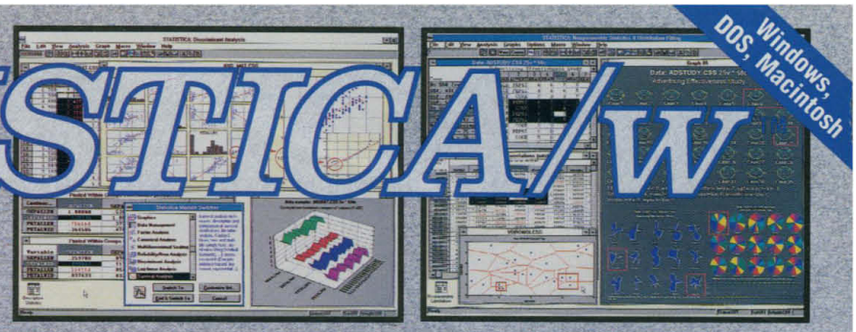

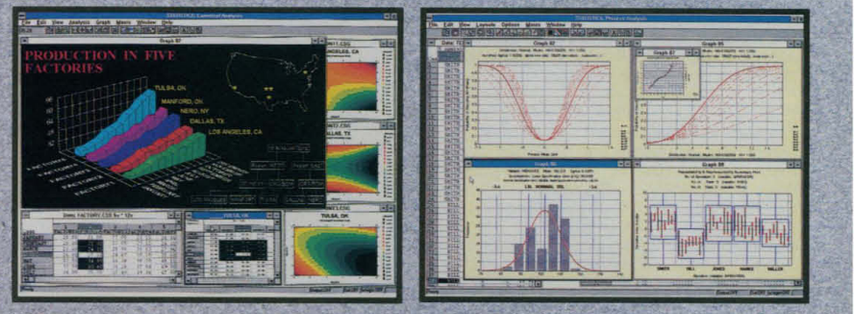

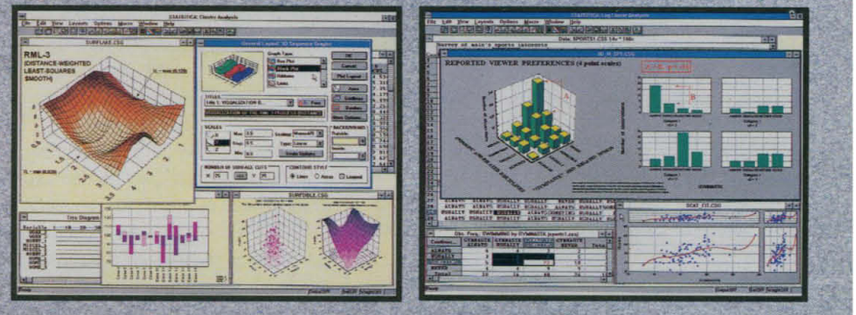

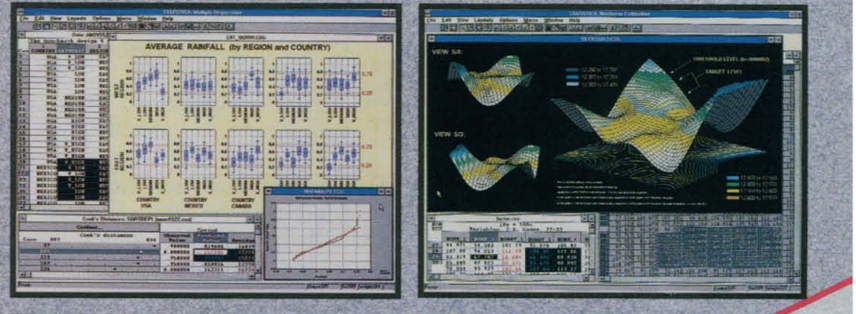

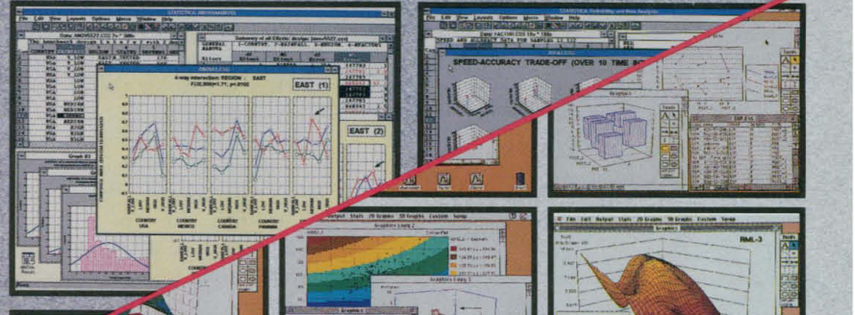

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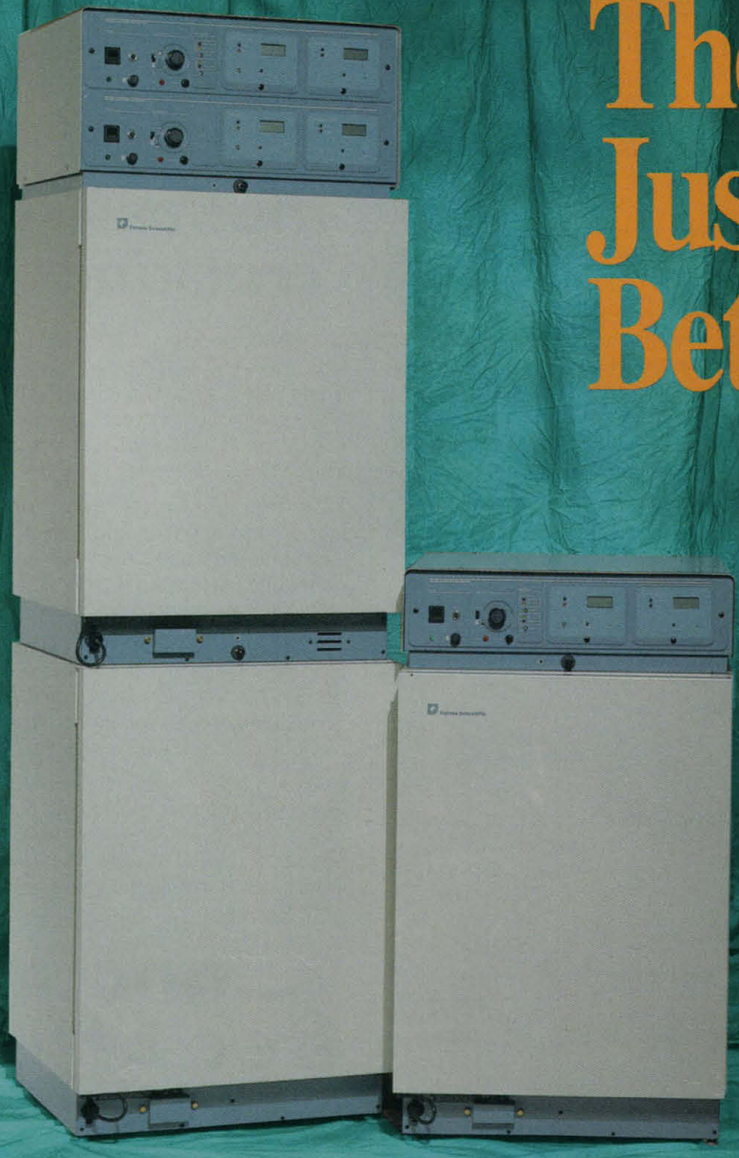

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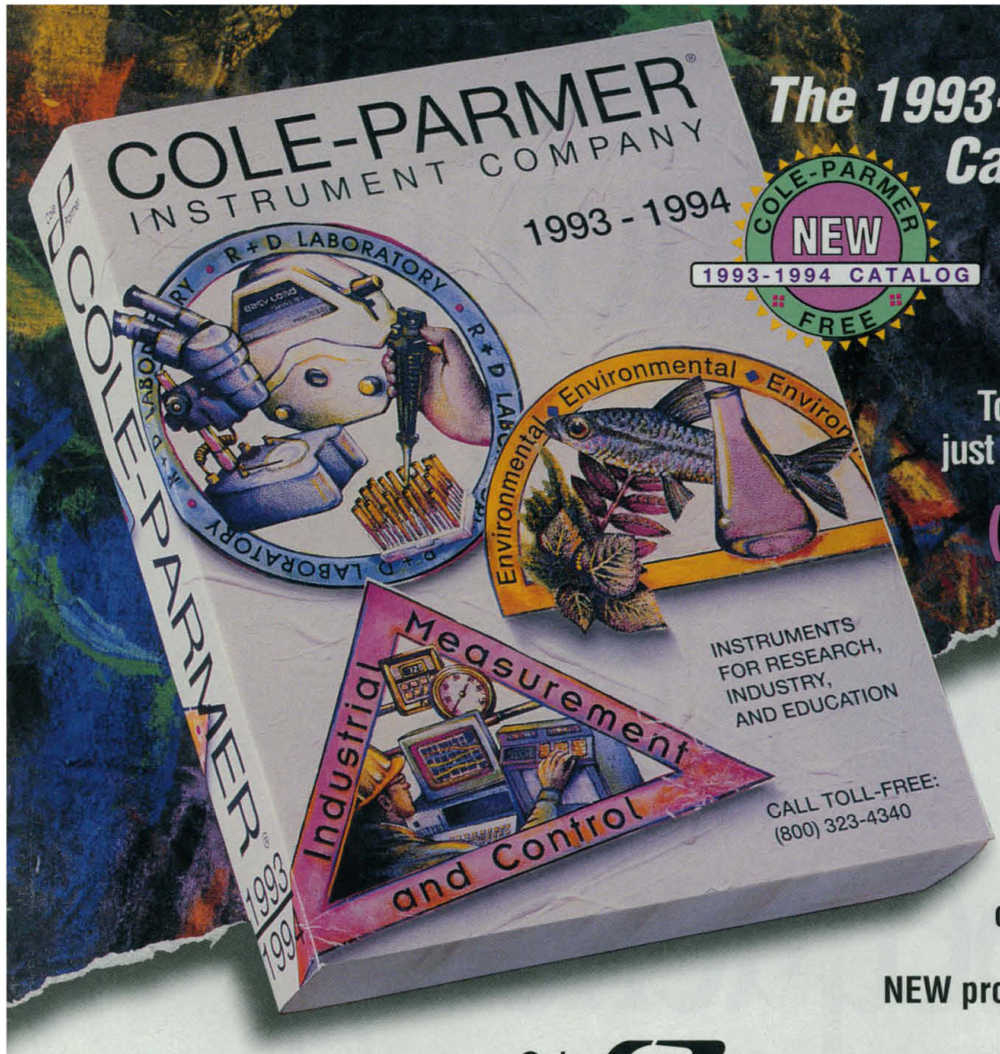

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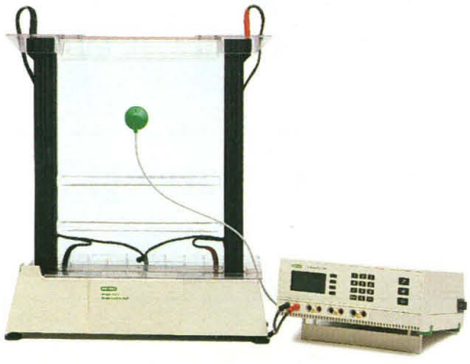

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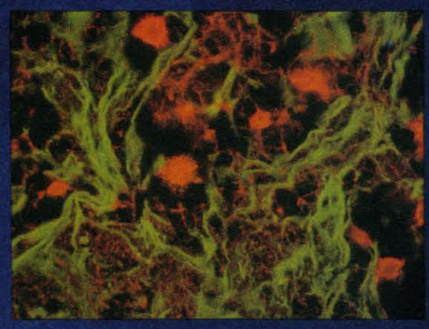

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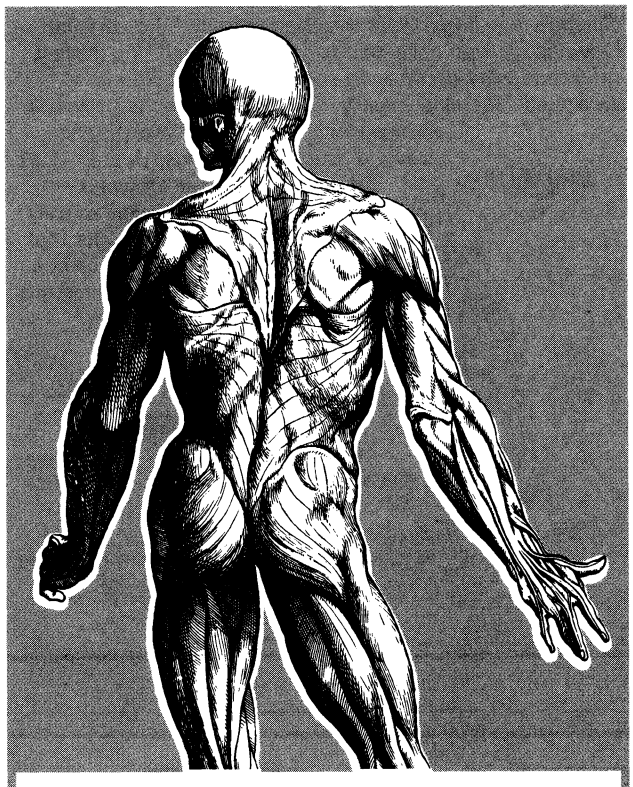

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