

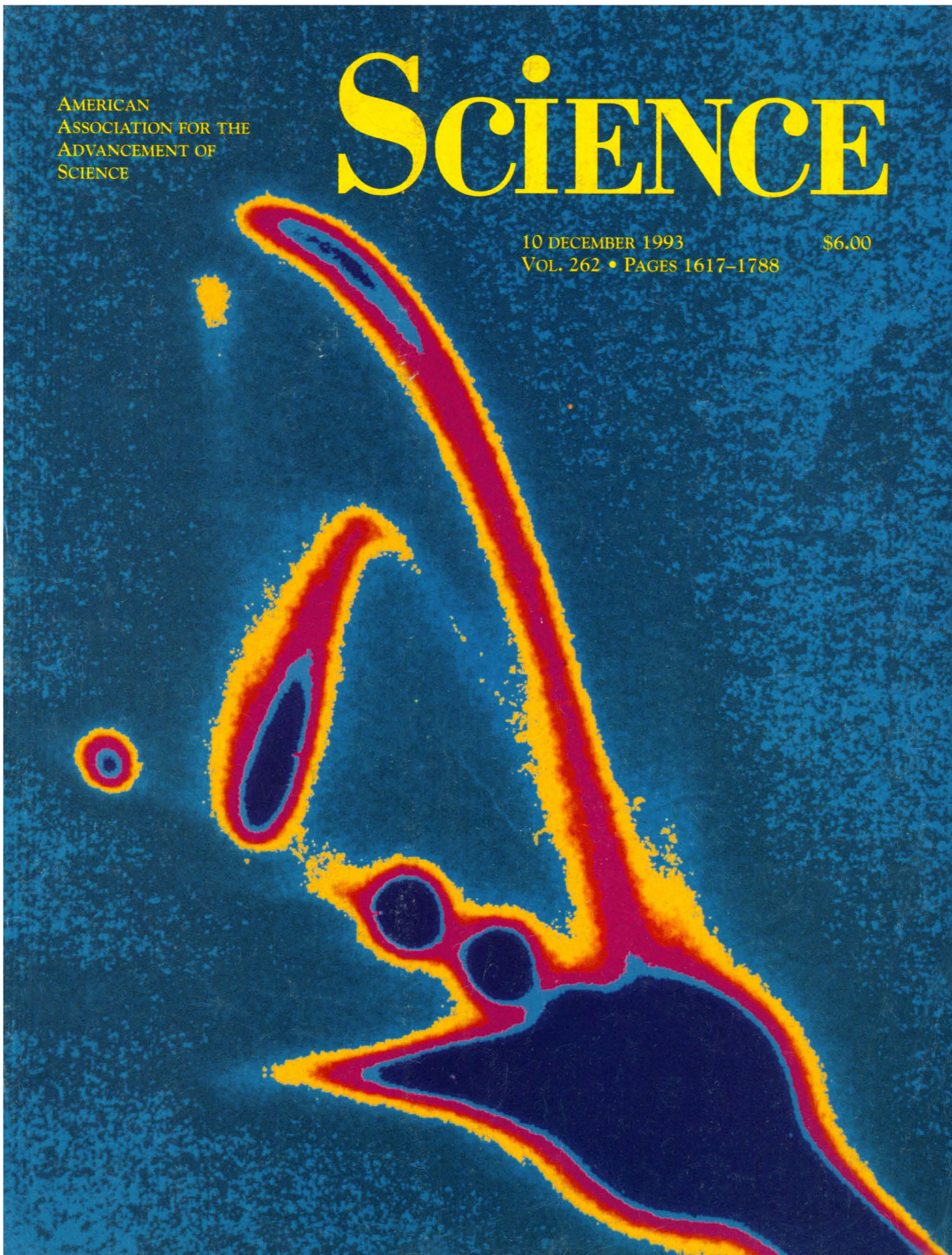
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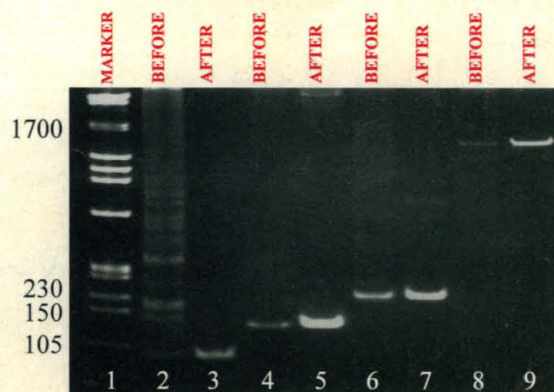
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PCR primers and DNA templates vary in purity, GC content and amount of secondary structure. In addition, DNA may have chemical modifications, nucleic acid analogs or other characteristics that can inhibit amplification efficiency. To improve the yield and specificity of the desired PCR products, the buffer components of a specific amplification reaction can be modified. But the process is tedious and time-consuming.

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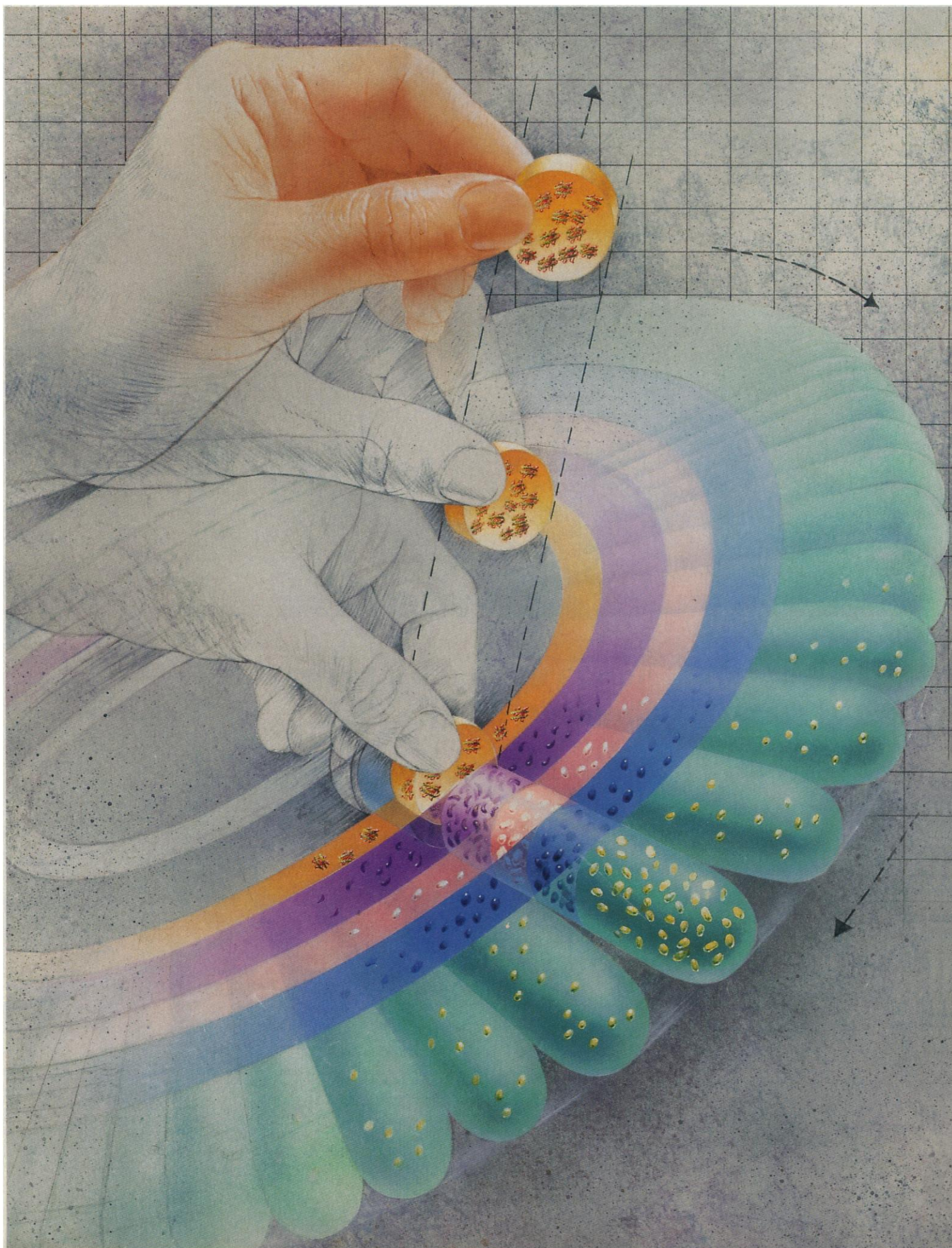
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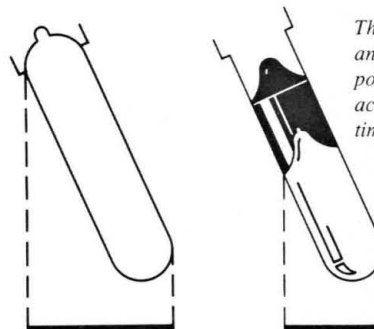
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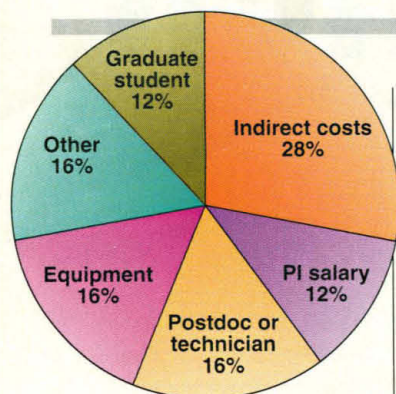
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Serving up an NSF grant



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Patterns for protein design

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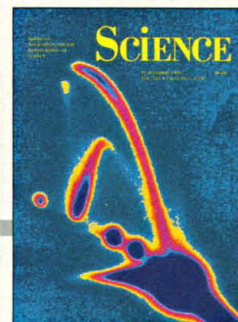
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COVER

Two-dimensional agarose gel electrophoresis of replicating DNA reveals the locations of DNA replication origins. DNA fragments are separated on the basis of mass (from left to right) and shape (from top to bottom). In this artificially colorized autoradiogram, a yeast chro-

mosomal replication origin is detected first as a series of fragments that contain bubbles (right arc) and later as a series of large simple Y's (left vertical arc). See page 1728. [Autoradiogram: Bonita J. Brewer. Colorization: Walton L. Fangman]



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Perhaps the most simplistic view of the structure of globular proteins is a solubilized oil drop—hydrophobic residues on the inside and hydrophilic residues on the outside. Kamtekar *et al.* (p. 1680) designed four-helix bundle proteins in which degenerate codes were incorporated into synthetic genes. A variety of nonpolar amino acids were specified by the codon NTN (where N is a mixture of A, G, T, and C) and were chosen to line the helical interfaces. Similarly, polar amino acids were specified by NAN and occupied the other helical positions. Specific residues such as glycine and proline were chosen to connect the helices. Despite this high degree of randomness, most of the proteins generated folded into compact α -helical structures.

■

Orienting iron

Seismic observations have indicated that the Earth's solid inner core has an anisotropic fabric with axial symmetry, which presumably arises from a preferred orientation of iron crystals. However, whether the preferred orientation results from deformation or convection in the inner core or some other process is uncertain. Karato (p. 1708) proposes that the orientation is produced by crystallization of iron crystals at the inner core–outer core boundary in the presence of a magnetic field. If this model is correct, the observed anisotropy should reflect the strength of the geomagnetic field.

■

Helping helpers

Individuals infected with human immunodeficiency virus-1 show a progression in their

Putting self-assembly to work

Molecular self-assembly is not only fascinating in terms of the intricate structures that can be built through molecular recognition but also in the wide variety of possible applications. Schnur (p. 1669) reviews recent progress in assembling lipid molecules into microtubules, which can be used as templates for metallized structures and as containers for controlled release. Müller *et al.* (p. 1706) have selectively assembled multiple protein layers by fabricating bifunctional linking molecules that make use of streptavidin, biotin, and concanavalin A. Vargo *et al.* (p. 1711) have deposited metal patterns on fluoropolymer substrates by chemisorbing a metal-chelating organosilane through self-assembly; the silane binds a palladium catalyst that facilitates the electrodeless deposition of nickel from a plating solution.



cytokine profiles from a T helper 1 (T_H1)–like pattern [high interleukin-2 (IL-2) and low IL-4 and IL-10] to the opposite T_H2 pattern that precedes the characteristic decline in CD4⁺ T cells. Clerici *et al.* (p. 1721) studied peripheral blood mononuclear cells (PBMCs) from asymptomatic HIV⁺ individuals in vitro. These PBMCs did not produce IL-2 when challenged by antigen, but administration of IL-12 restored IL-2 and interferon- γ production as well as T cell proliferation. These initial studies suggest the possible clinical use of IL-12 for restoring the T_H1 response.

■

Finding the target

Calmodulin is a small protein that translates changes of intracellular calcium concentration into changes of enzyme activity by binding calcium and interacting with a variety of dissimilar target enzymes. Meador *et al.* (p. 1718) present the high-resolution structure of Ca-calmodulin complexed to a peptide derived from such a target enzyme, the calmodulin-dependent protein kinase type II. By comparing this calmodulin conforma-

tion with conformations from a complex with a different target and from uncomplexed Calmodulin, they suggest how different targets are recognized and signaled that internal calcium has changed. A central helical part of calmodulin appears to act as an expansion joint for variable positioning of the calcium-binding domains.

■

Reaching the pole

Establishment of polarity is one of the earliest steps in the development of most organisms. In the amphibian *Xenopus laevis*, certain specific RNA transcripts become localized to the vegetal region of the oocyte during oogenesis. Kloc *et al.* (p. 1712) analyzed the distribution and function of a class of RNA transcripts that carry tandem repeats of a moderately repeated sequence. RNA molecules with these repeats, whether endogenous or artificial, localized early in oogenesis to the mitochondrial cloud and later translocated to the vegetal cortex. This class of transcripts may establish the RNA localization system in the oocyte as well as encode information used later in development.

More from methylation

Many organisms contain DNA methylated on cytosine residues at position 5, yet the function of such methylation is unknown. Foss *et al.* (p. 1737) have isolated a mutation (dim-2) in the fungus *Neurospora crassa* that eliminates DNA methylation. Strains containing the dim-2 mutation become aneuploid; they accumulate extra chromosomes or pieces of chromosomes. Thus, methylation may play a role in chromosome behavior. The methylation of DNA has been thought to occur only at symmetrical sites such as 5'CpG/3'GpC. Selker *et al.* (p. 1724) demonstrate that the methylation in *Neurospora crassa* associated with RIP (repeat-induced point mutation) is not limited to symmetrical sites, and that this methylation extends beyond the region mutated by RIP.

■

Tumor suppressor binding partner

Mutations in the APC tumor suppressor gene are found in a high percentage of human colon cancers and are thought to play a key role in tumorigenesis. Intriguing clues to the cellular function of the APC protein are provided by Su *et al.* (p. 1734) and Rubinfeld *et al.* (p. 1731), who show that APC associates with β -catenin, a protein implicated in epithelial cell adhesion. A *Drosophila* homolog of β -catenin, called Armadillo, is part of a signaling pathway through which cell fates are established during embryogenesis. These findings are discussed in a Perspective by Peifer (p. 1667), and recent progress on two other tumor suppressor genes is discussed in two news stories by Marx (p. 1644).

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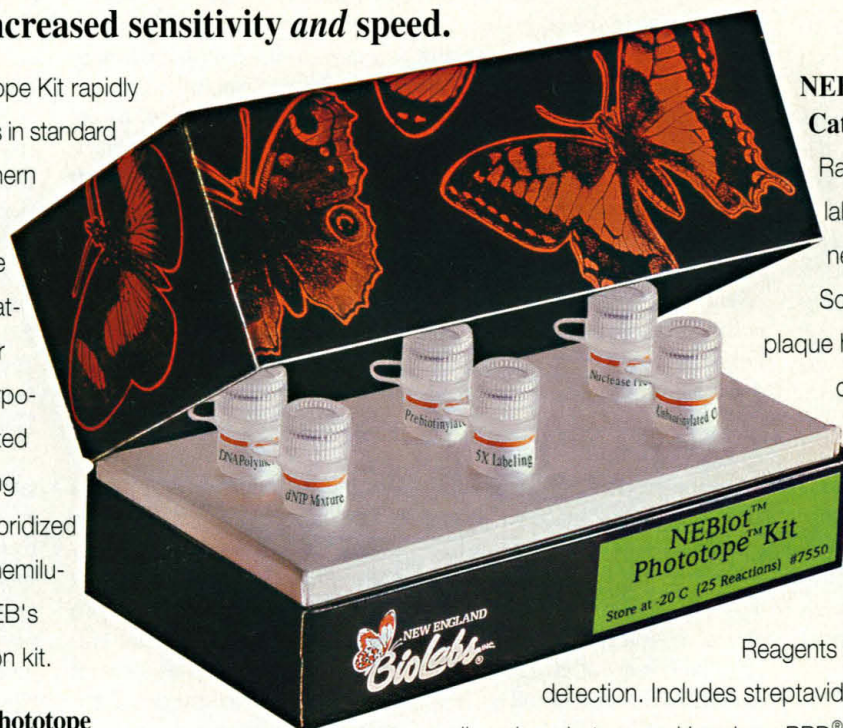
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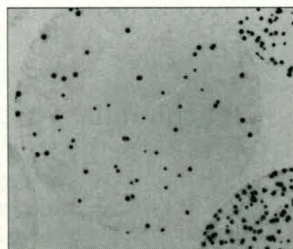


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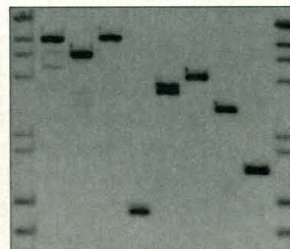
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Tm:	89.7
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nMol/A260:	4.6
ug/A260:	33.8
%GC:	75.0
dG:	-53.0
dH:	-210.8
dS:	-522.3
3'-end dG:	-6.1
Start base:	
Length:	24
<input checked="" type="checkbox"/> Top strand	<input checked="" type="checkbox"/> DNA
<input checked="" type="checkbox"/> Complementary	<input type="checkbox"/> RNA
dG Temp:	25.0
Probe con (pMol):	0.60
Salt con (mMol):	1000.00
% Formamide:	0.0
3'-end length:	7
Run length >=	4
Pal length >=	6
Stem length >=	3
R/P: P 1 1 6 GCCGGC	
1 of 5 + Hairpins Dimers	
Next Prev	5' GCCGGCA T 3' TGGACACCGGCCAC STEM AT 1 IS 5 BP LONG. LOO
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Endocrinology Under 35

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Paracrine and Autocrine Signals in the Hypothalamic Pituitary Complex

Scientific Organization: L. Martini (I) • D. de Wied (NL) • S.M. McCann (USA)
Stresa, Italy • September 9-10

Endothelins in Endocrinology

Scientific Organization: I. T. Cameron (UK) • M. J. Dunn (USA) • M. Serio (I)
Florence, Italy • October 6-8

Immunology

Differentiation Therapy

Scientific Organization: A. Kimchi (IL) • G.B. Rossi (I) • S. Waxman (USA)
Herzlia, Israel • March 7-10

Cytokines: Basic Principles and Practical Applications

Scientific Organization: A. K. Abbas (USA) • S. Romagnani (I)
Florence, Italy • March 28-30

Primary Immunodeficiency Diseases

Scientific Organization: F. Aiuti (I) • M. D. Cooper (USA) • F. S. Rosen (USA)
Orvieto, Italy • June 18-21

New Horizons in Gynaecological Malignancies

Scientific Organization: D. Ayalon (IL)
Eilat, Israel • November 16-18

Reproduction

Puberty: Basic and Clinical Aspects

Scientific Organization: C. Bergadá (ARG)
Buenos Aires, Argentina • April 6-8

Male Factor in Human Infertility

Scientific Organization: J. Tesarik (F)
Paris, France • April 21-22

Immunocontraception

Scientific Organization: O. Nilsson (S)
Uppsala, Sweden • June 30 - July 1

Recent Advances In:

Nutritional Aspects of Osteoporosis

Scientific Organization: P. Burckhardt (CH) • R. P. Heaney (USA)
Lausanne, Switzerland • May 5-7

Where Phenotype Does Not Match Genotype

Scientific Organization: M.I. New (USA)
Volterra, Italy • October 13-14

Gordon Research Conferences

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Fractals

May 1 - 6 • San Miniato (I)

Extrachromosomal Elements: Mitochondria and Chloroplasts

May 1 - 6 • Volterra (I)

Phase Transitions in Non-Metallic Solids

May 8 - 13 • Volterra (I)

Bioelectrochemistry

September 18 - 23 • Irsee (FRG)

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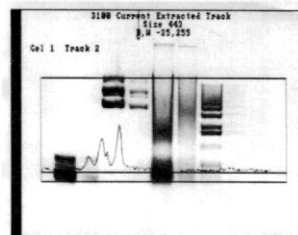
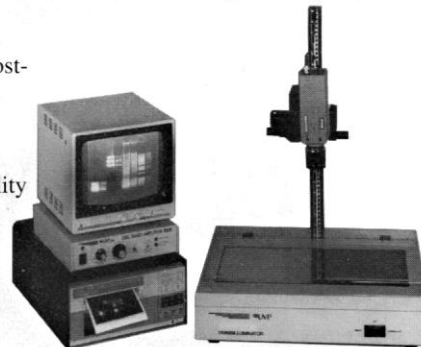
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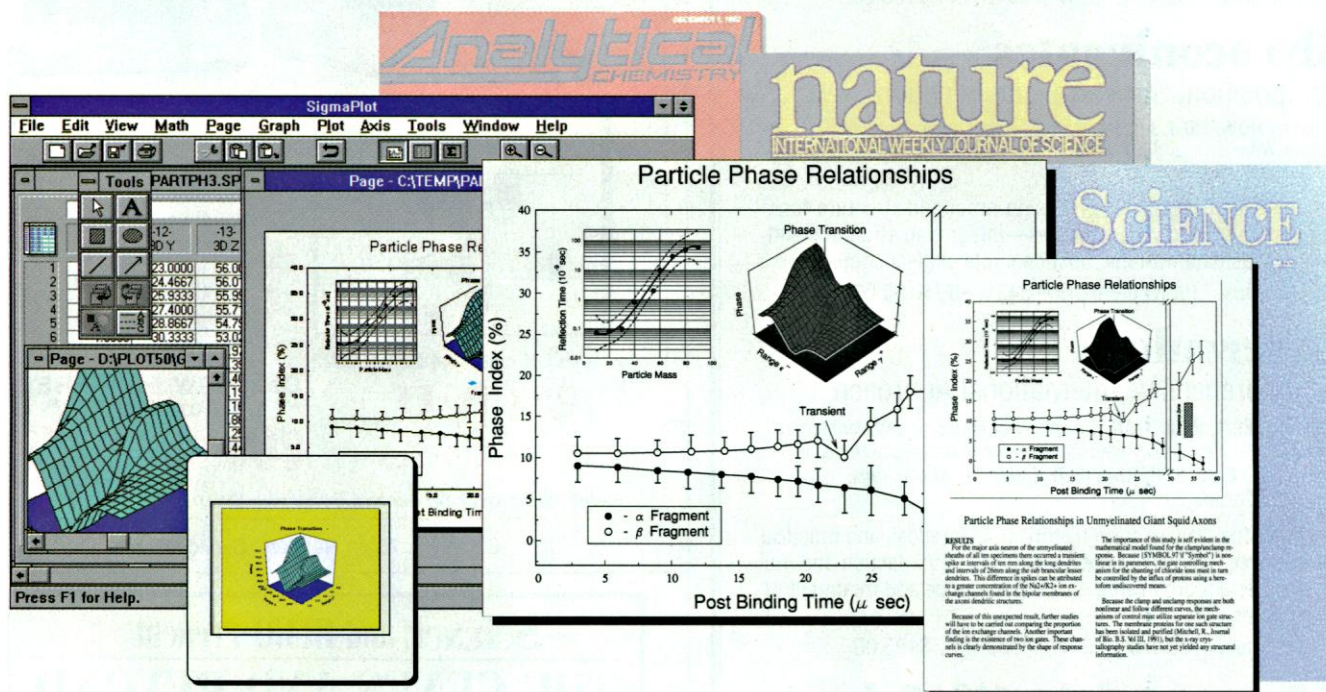
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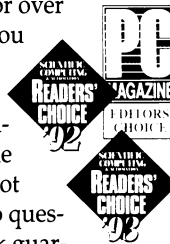
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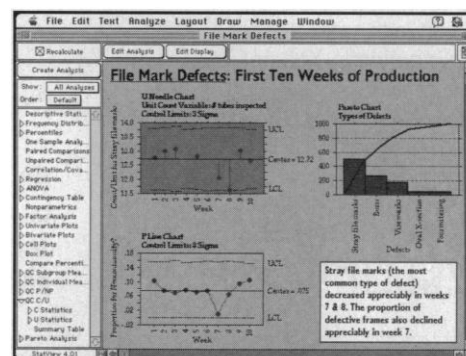
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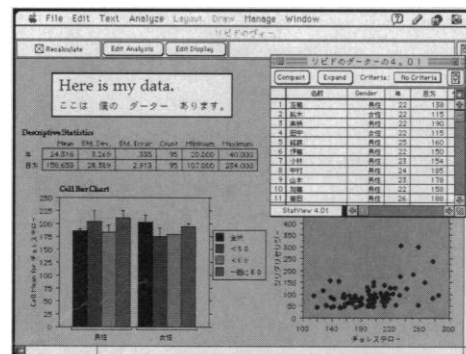
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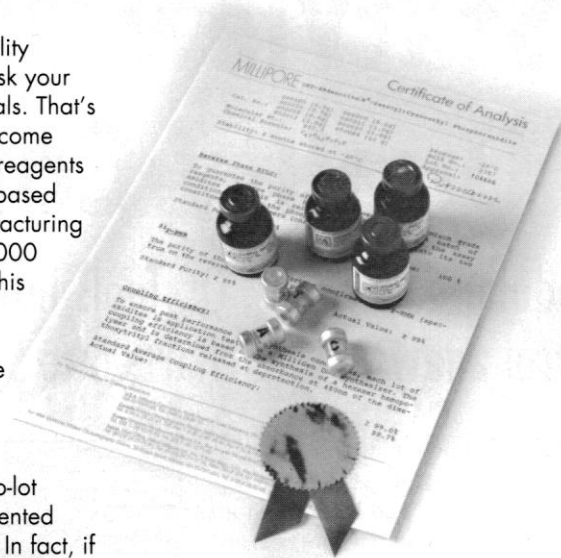
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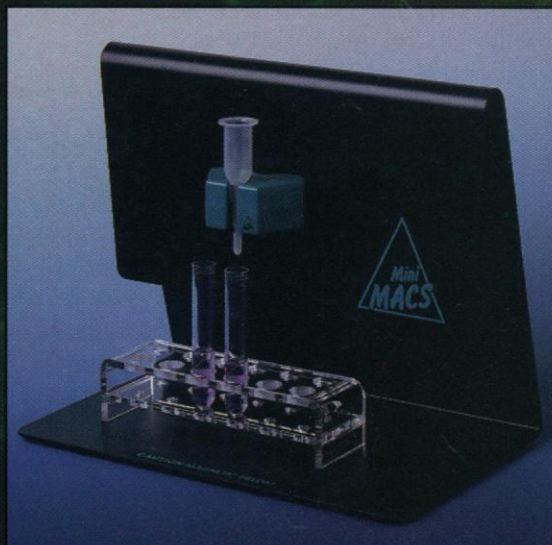
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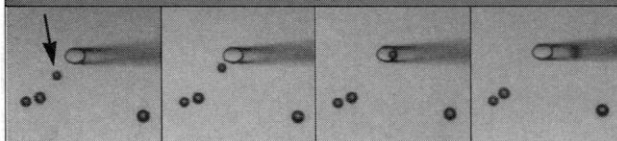
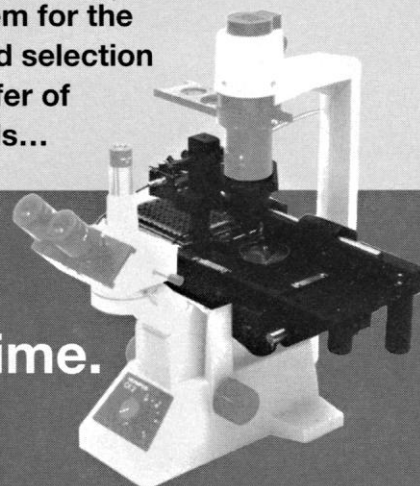
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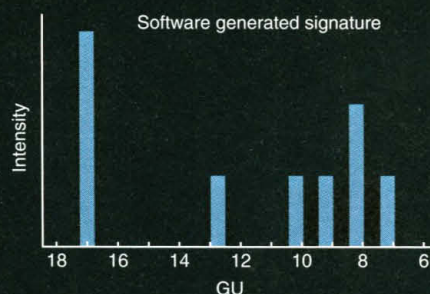
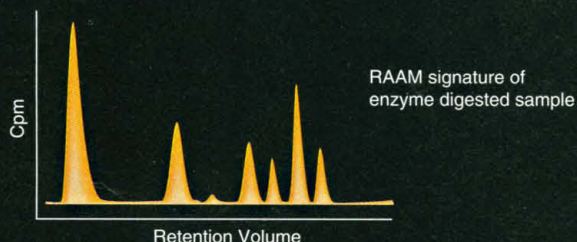


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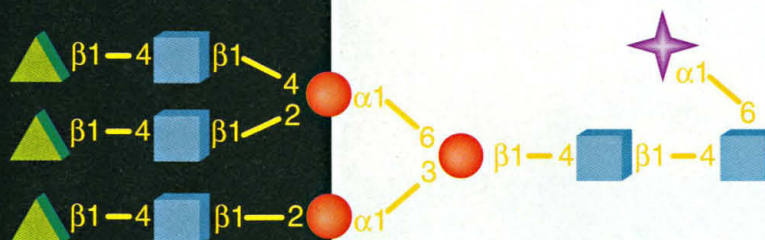
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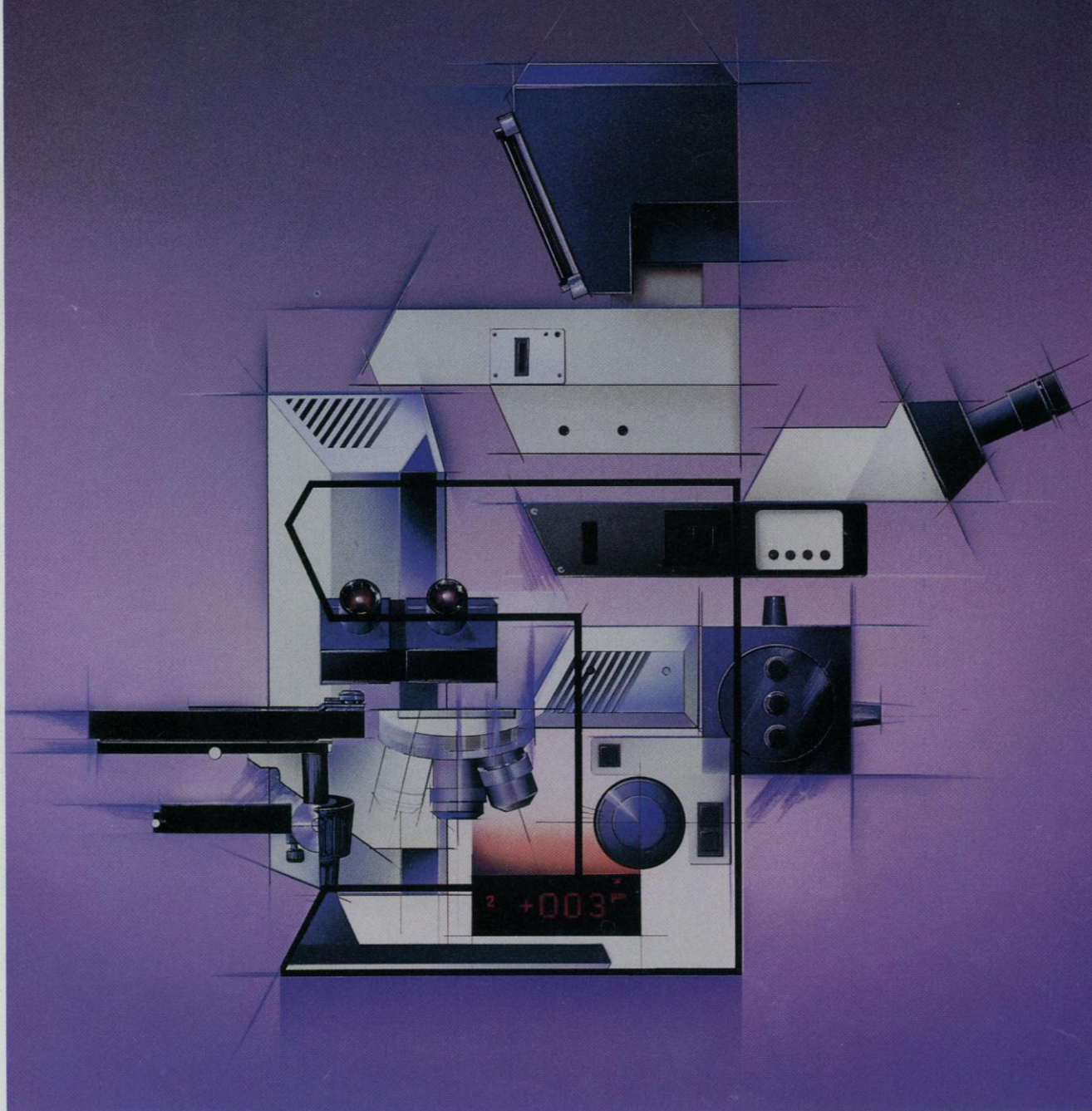
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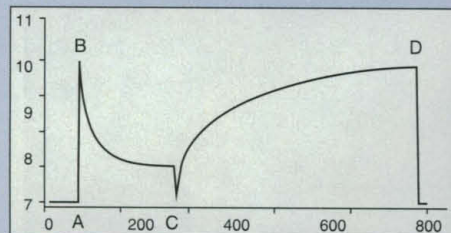
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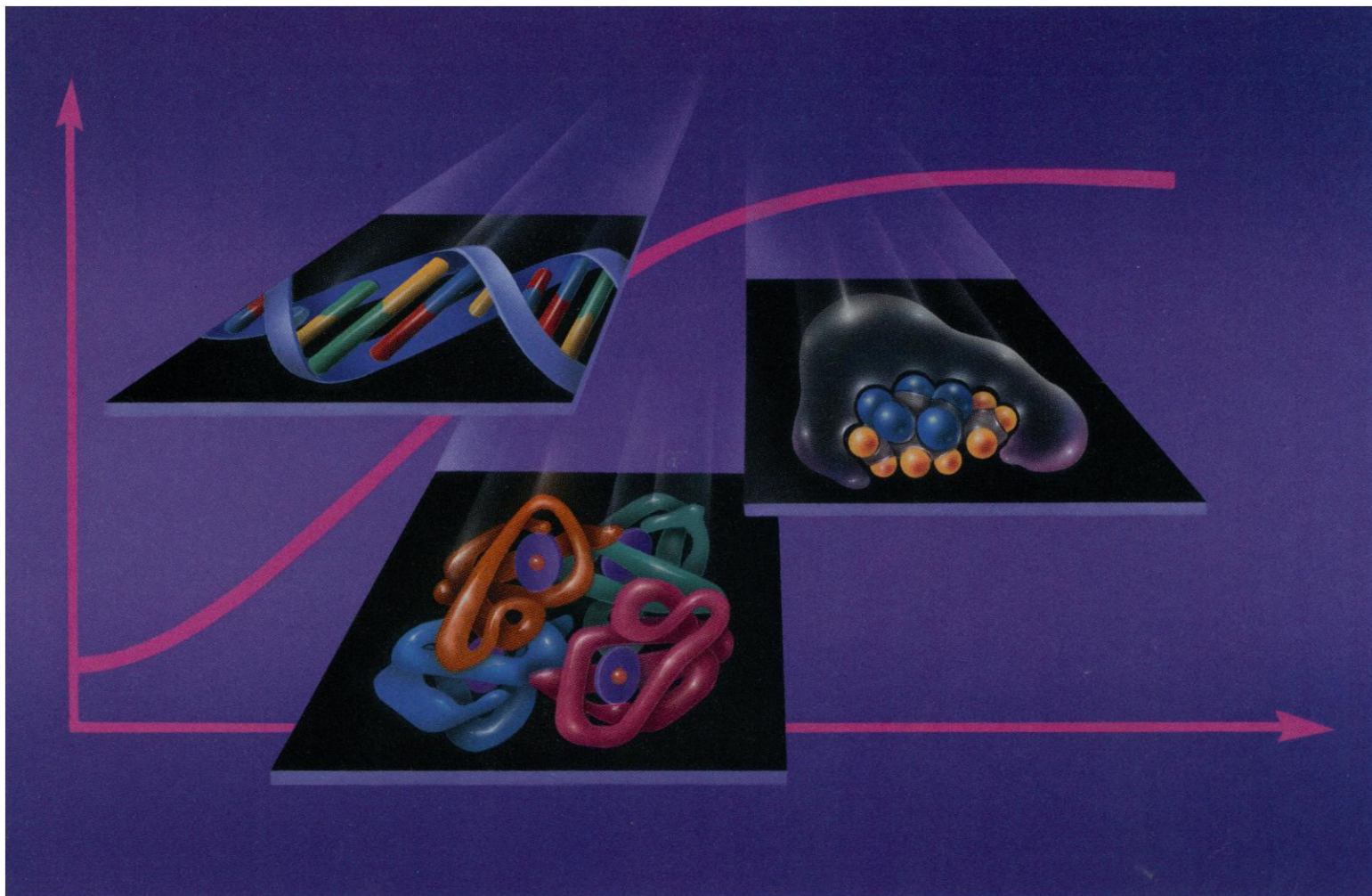
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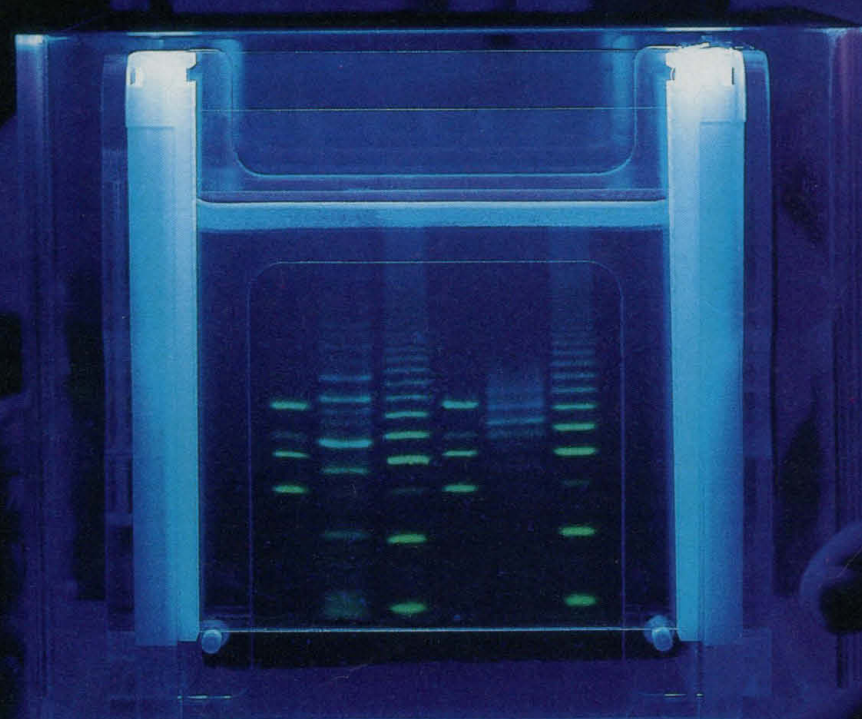
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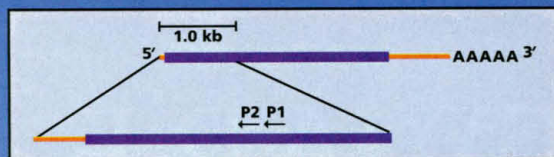
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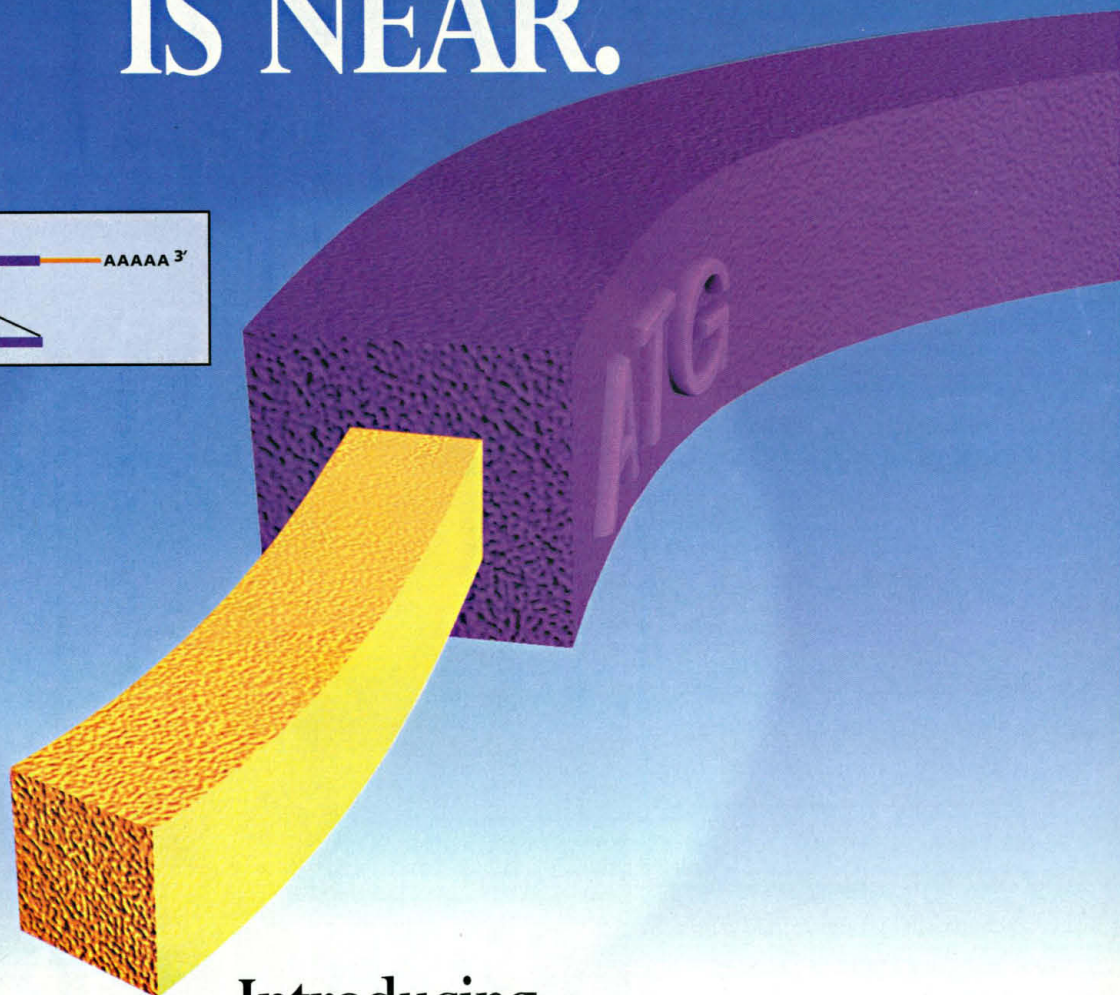
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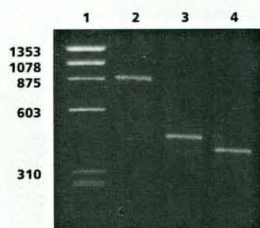
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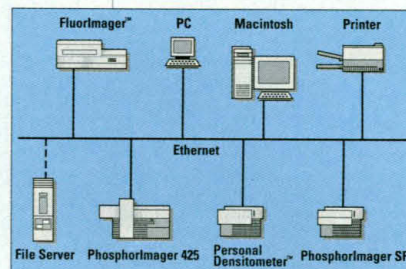
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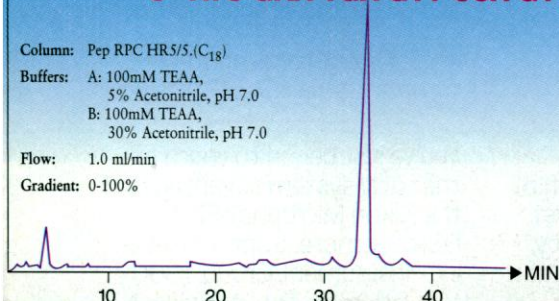
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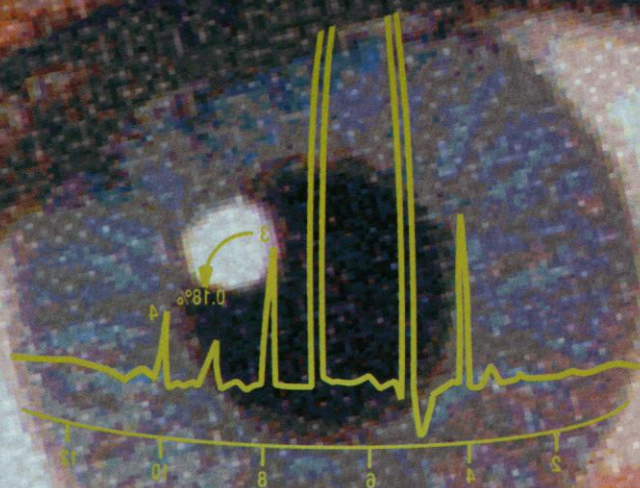
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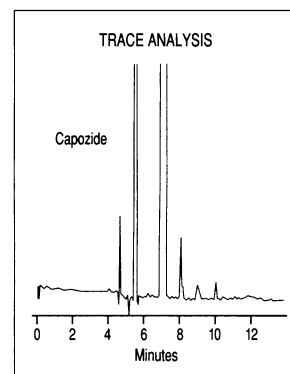
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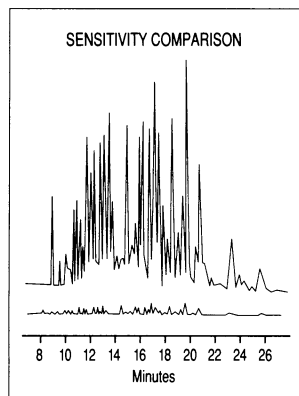
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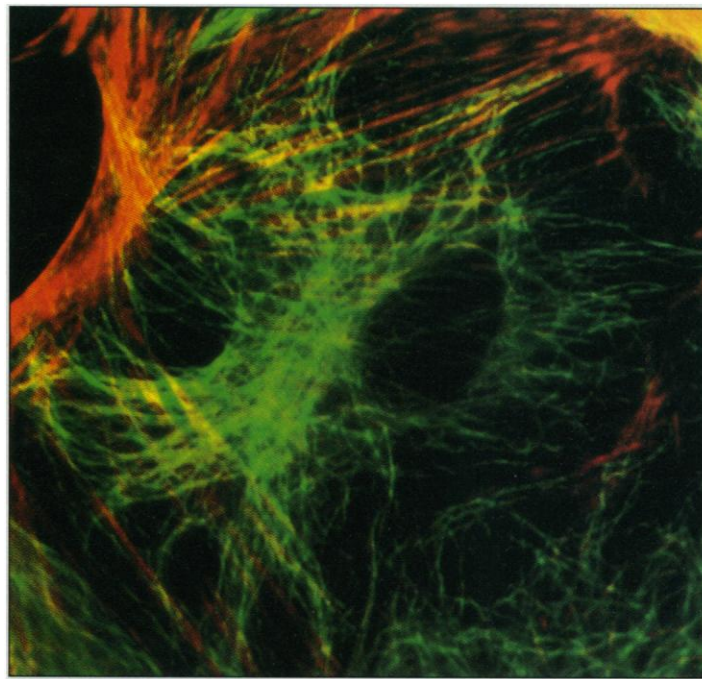
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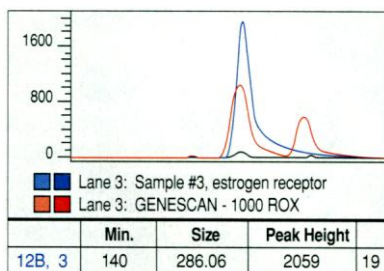
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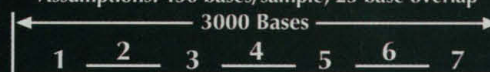
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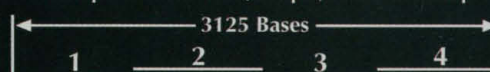
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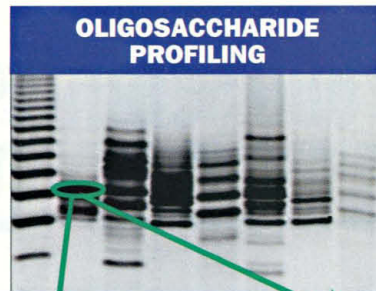
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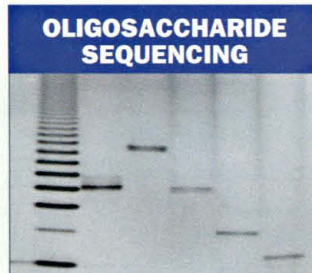
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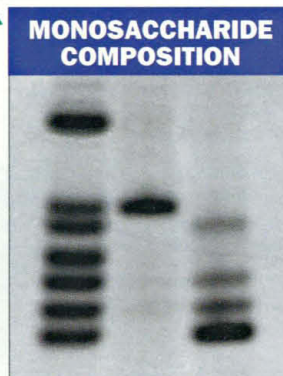
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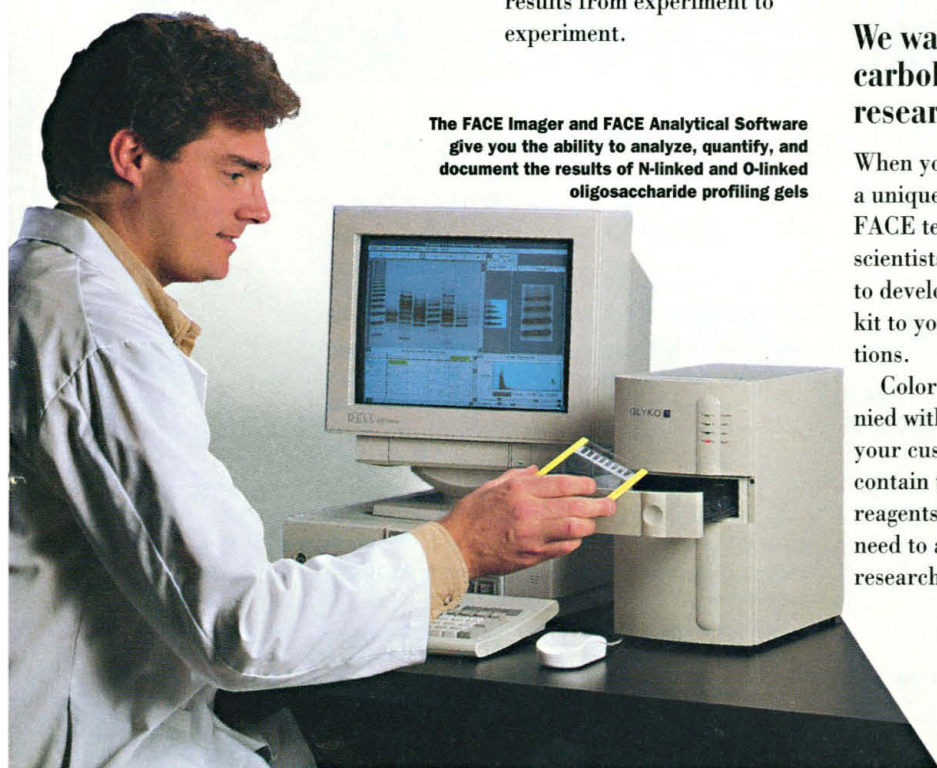
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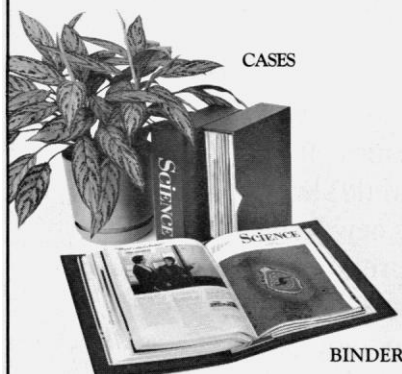
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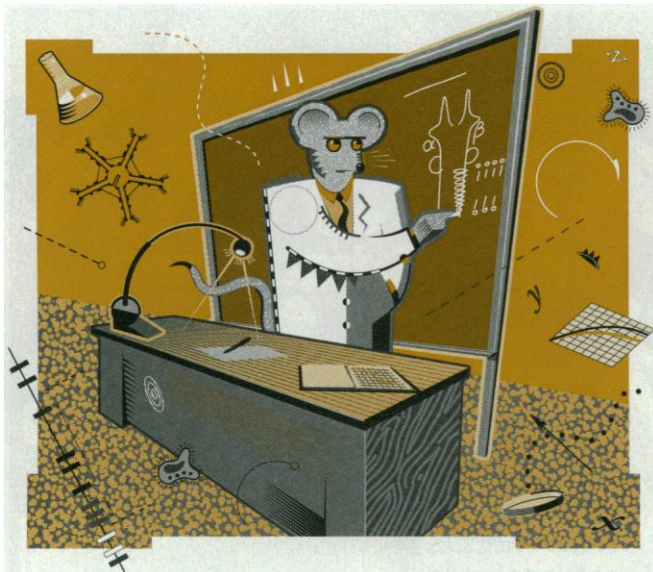
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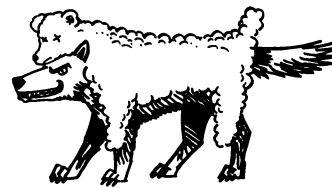
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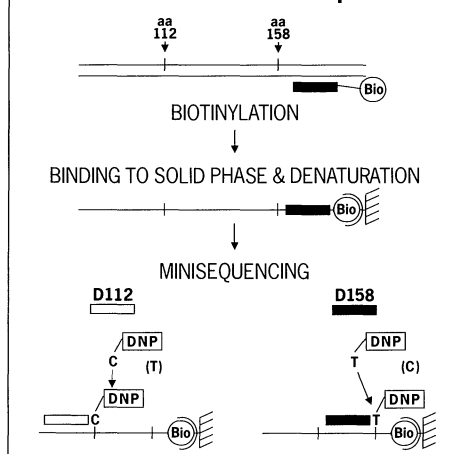
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