



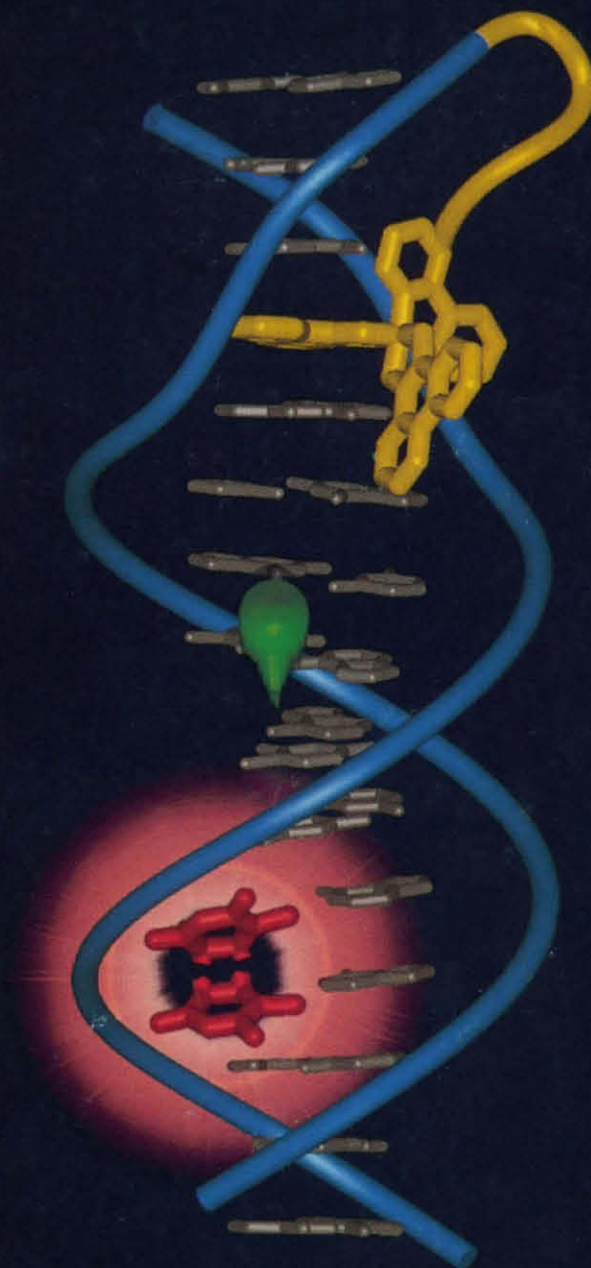
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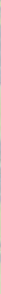
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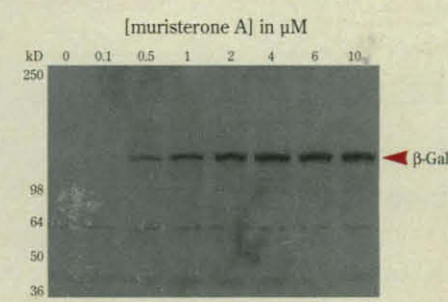


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1. No, D. *et al.* (1996) *Proc. Natl. Acad. Sci. USA* **93**: 3346-3351.

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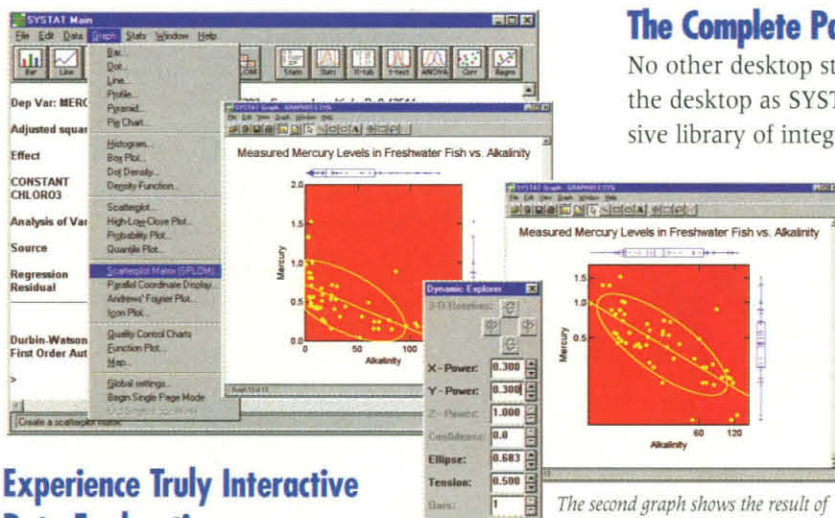
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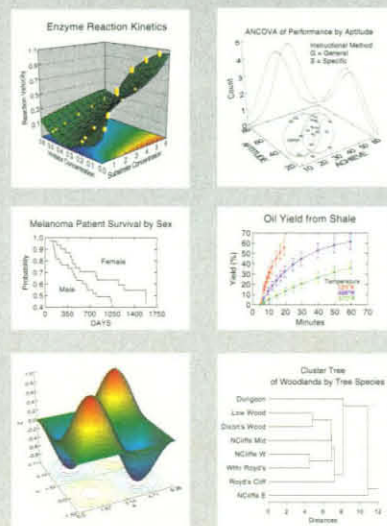
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COVER

The thymine dimer is a DNA lesion caused by exposure to ultraviolet light. Shining visible light on a rhodium complex stacked in DNA leads to repair of this lesion by electron transfer. In the DNA assembly illustrated, where the rhodium (yellow) is tethered and stacked 26

angstroms from the thymine dimer (red), repair is still effected by long-range electron transfer (green). In this reaction, the stacked DNA base pairs act as a conduit for chemistry at a distance. See page 1465 and the News story on page 1420. [Image: P. J. Dandliker]



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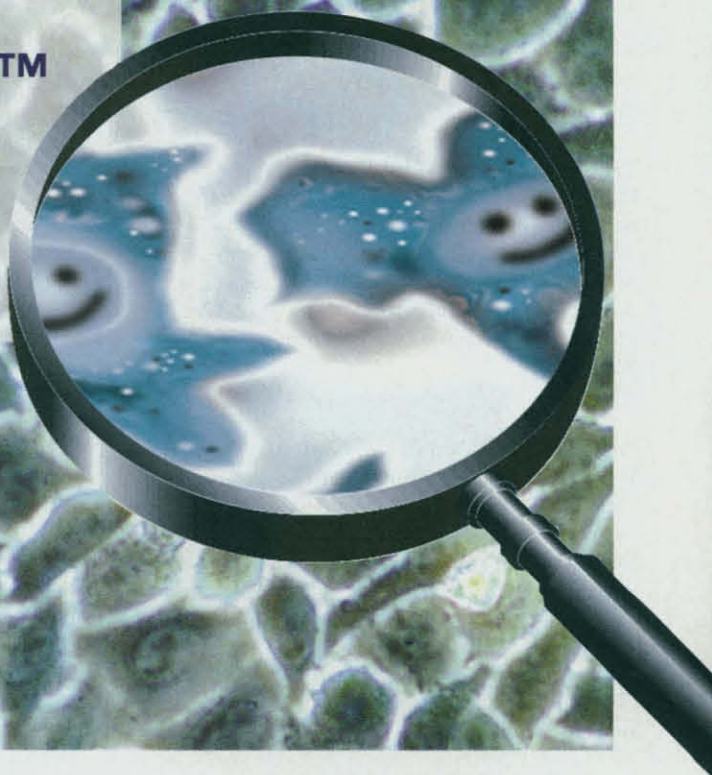
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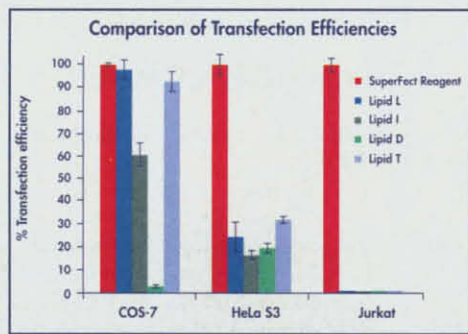
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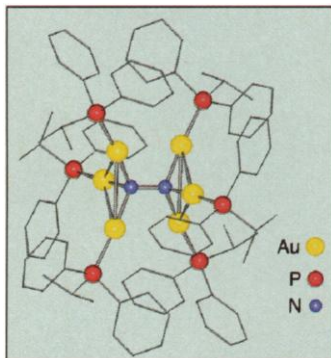


THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Fixating on nitrogen

Two reports shed new light on nitrogen (N_2) fixation by transition metal complexes (see the Perspective by Leigh, p. 1442). In the presence of hydrogen (H_2), the efficiency of nitrogenase enzymes is reduced, apparently by displacement of the N_2 without chemical transformation. Fryzuk *et al.* (p. 1445) studied a zirconium complex containing N_2 and found that a bridging complex involving H_2 can be formed, showing that transformation of N_2 can result from the addition of H_2 . Shan *et al.* (p. 1460) show that N_2 can be housed within six gold



atoms inside a "cage" formed by two sets of three gold atoms, a binding geometry that has little precedent in N_2 chemistry. Although the chemistry of this system is quite different (nitrogenases do not contain gold), this result may help resolve how the N_2 molecule is accommodated in the nitrogenase cluster.

Controls wetness

Polymer scientists often combine different polymers to tailor surface properties, such as adhesion and wetting, but in some cases segregation of one component that can lead to dewetting and delamination. Mansky *et al.* (p. 1458) grafted copolymers onto a silica sub-

Dwelling on the negative in optical computing

Optical computing and image processing can both benefit from methods that directly record decreases in light intensity, but most measurements record only positive values. Lewis *et al.* (p. 1462) prepared a high-quality optical film containing the protein bacteriorhodopsin (bR), which can interconvert between two photoproducts with either blue or yellow light. Achromatic lenses are used to focus the blue and yellow light differently so that the amounts of photoproducts formed can represent mathematically the difference of two Gaussian functions or can be used to detect the edge of an object. The photoproducts have different charge states, so it should be possible to record the images electrically.

strate to form 5-nanometer-thick "brushes." These consisted of polystyrene (PS) and poly(methylmethacrylate) (PMMA) assembled randomly onto the growing chain by living polymerization methods. An optimal PS-PMMA ratio was found that had equal affinities for both polymers.

First in flight?

The oldest known flying reptile is *Coelurosauravus jaekeli*, which lived during the Permian more than 250 million years ago. It evidently flew by gliding and had an unusual wing structure that was thought to be formed by elongated ribs. Frey *et al.* (p. 1450; see the news story by Wuethrich, p. 1419) describe a complete skeleton of this reptile found in Germany that shows that the wings were supported by long bony rods of dermal origin and a long tail.

Ocean mixing

An important question in understanding the carbon cycle and ocean nutrient supply, and in climate modeling, is the extent that deep waters upwell and reach the surface. One

tracer for this process is carbon isotopes because old deep waters are depleted in carbon-14, which forms in the upper atmosphere. Examination of carbon ratios in coral provides a record of exchange over time. Druffel (p. 1454) shows that corals from Bermuda record decadal shifts in carbon-14-carbon-12 ratios that evidently reflect brief episodes of mixing between surface and deeper waters.

Complex metabolism

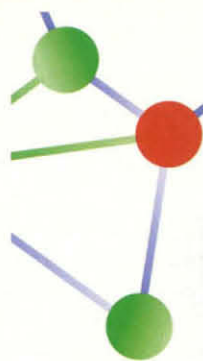
Insulin modulates the activity of many metabolic enzymes by promoting their dephosphorylation, a process mediated by protein phosphatase 1 (PP1). Printen *et al.* (p. 1475) identified a protein in insulin-sensitive tissues that binds to the catalytic subunit of PP1 and targets it to glycogen. This new protein, called PTG, also forms complexes with phosphorylase kinase, phosphorylase α , and glycogen synthase—the key enzymes involved in hormonal regulation of glycogen metabolism. The authors suggest that PTG may act as a molecular scaffold, assembling these enzymes onto the glycogen particle for localized reception of hormonal signals.

Algae origin

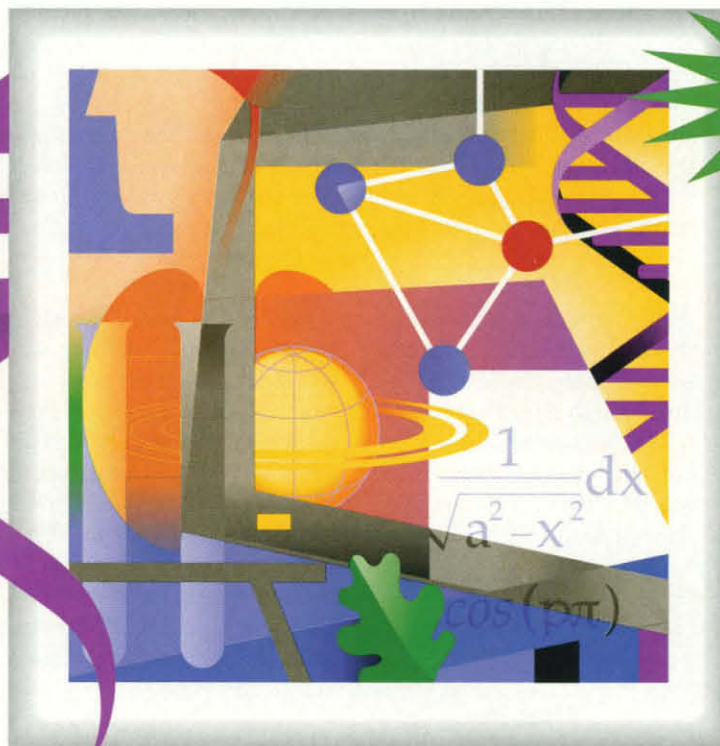
Apicomplexan parasites (such as the malaria parasite), in addition to nuclear and mitochondrial genes, contain a 35-kilobase circular DNA molecule. Kohler *et al.* (p. 1485; see the news story by Vogel, p. 1422) used in situ hybridization to localize this DNA molecule in another organism, *Toxoplasma gondii*, to a discrete organelle surrounded by four membranes. These results, in combination with a phylogenetic analysis, indicate that this structure is a plastid related to green algal photosynthetic plastids. This organelle was likely captured directly from a green alga. Although its function is still unknown, its unusual nature may make it a useful therapeutic target.

HIV-1 and immune hyperactivity

A consequence of infection with human immunodeficiency virus-type 1 (HIV-1) is chronic hyperactivation of the immune system, a state that maintains infection because HIV-1 cannot infect resting T cells. Ott *et al.* (p. 1481) show that infection of peripheral human blood leukocytes in vitro with HIV-1-stimulated production of interleukin-2 (IL-2) when the cells were activated by T cells through the CD3 and CD28 receptors. Secreted IL-2 could cause noninfected cells to be more responsive toward activation in confined environments such as the lymph nodes. The same IL-2 response occurred in cells costimulated by CD3 and CD28 that expressed the HIV-1 transcriptional activator Tat; the second exon of Tat interacts with the CD28 pathway to stimulate IL-2 transcription.



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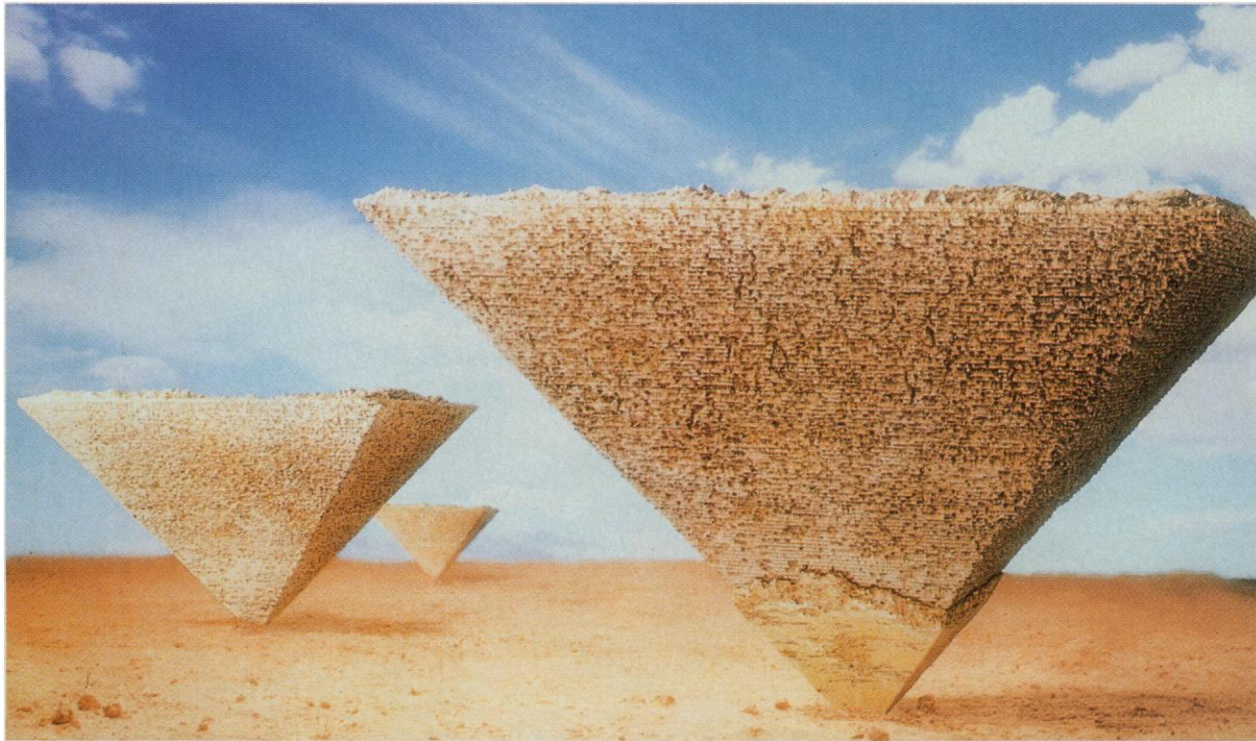
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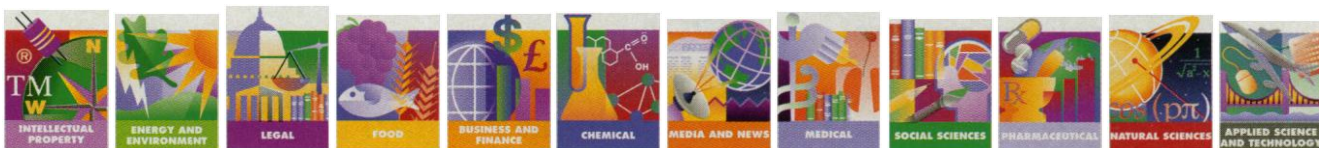
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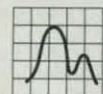
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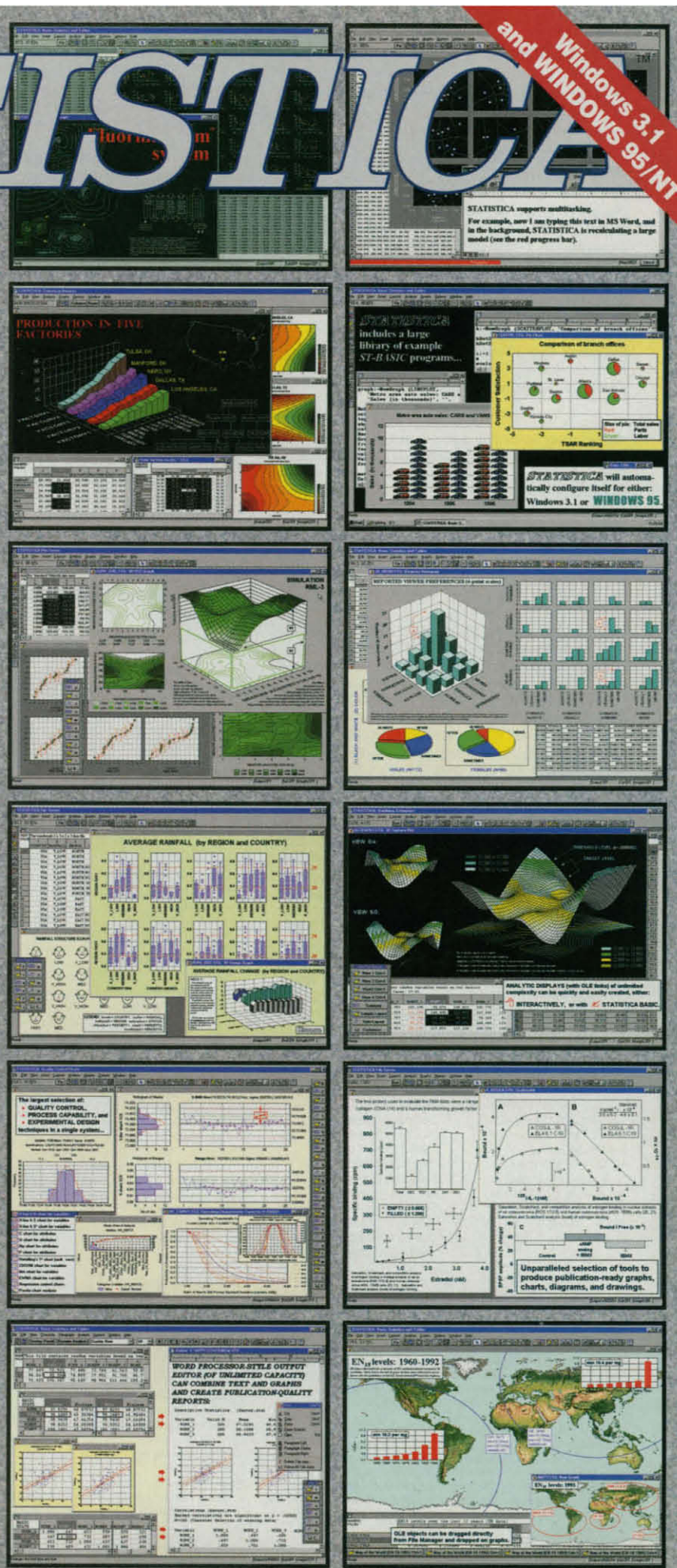
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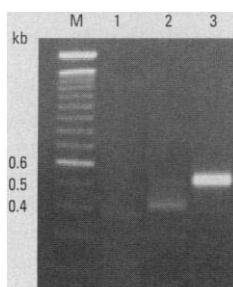
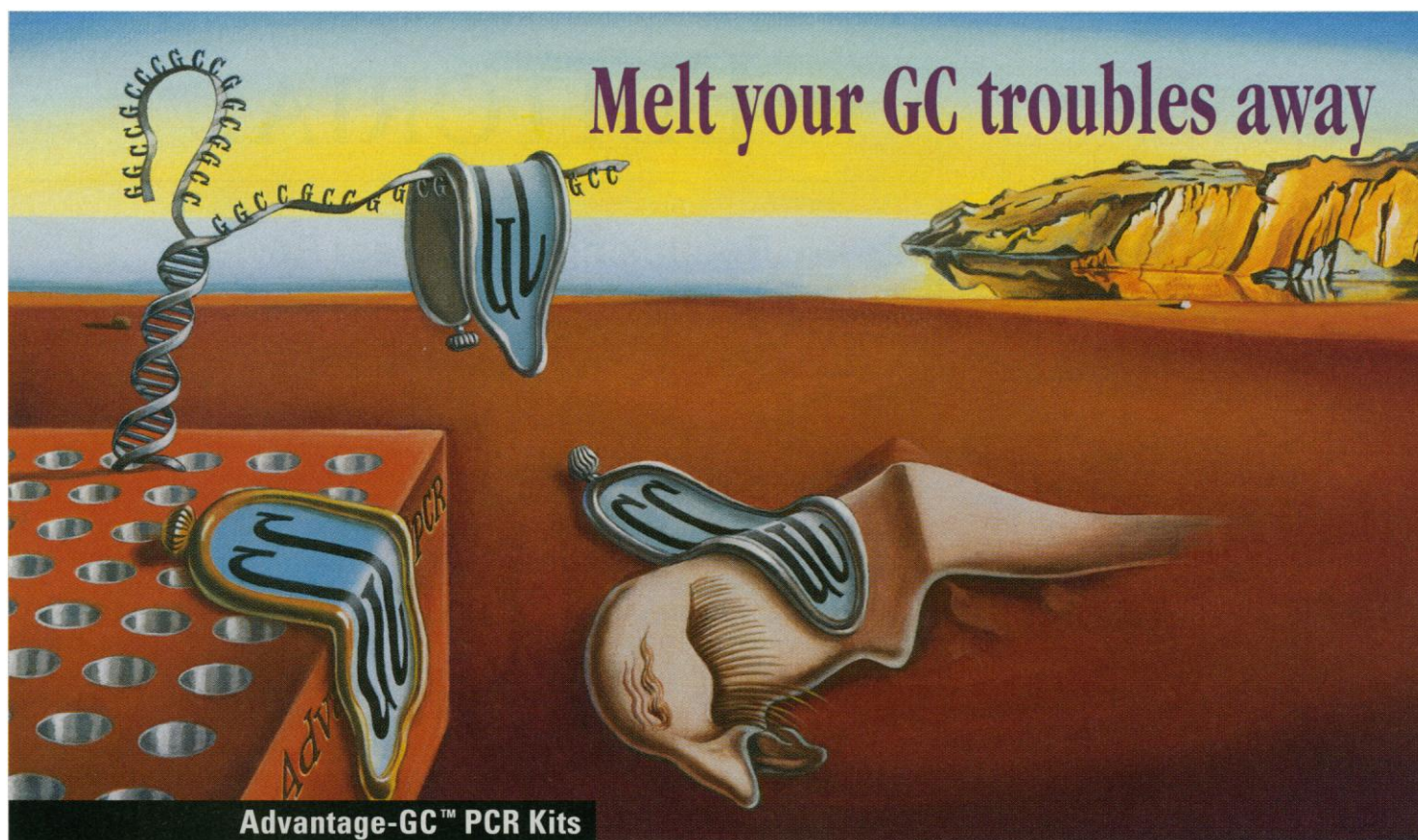
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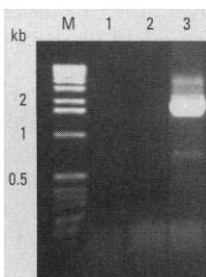
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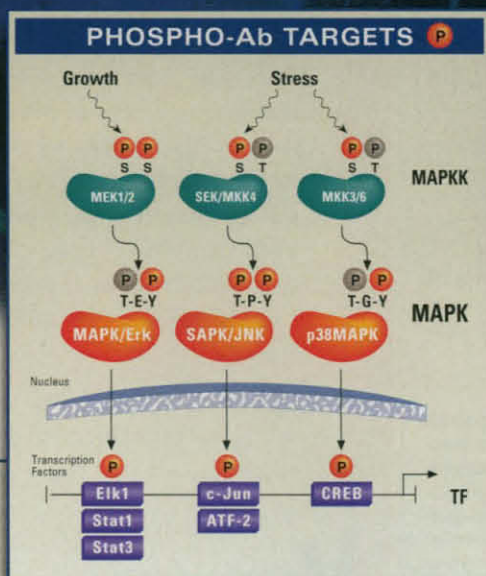
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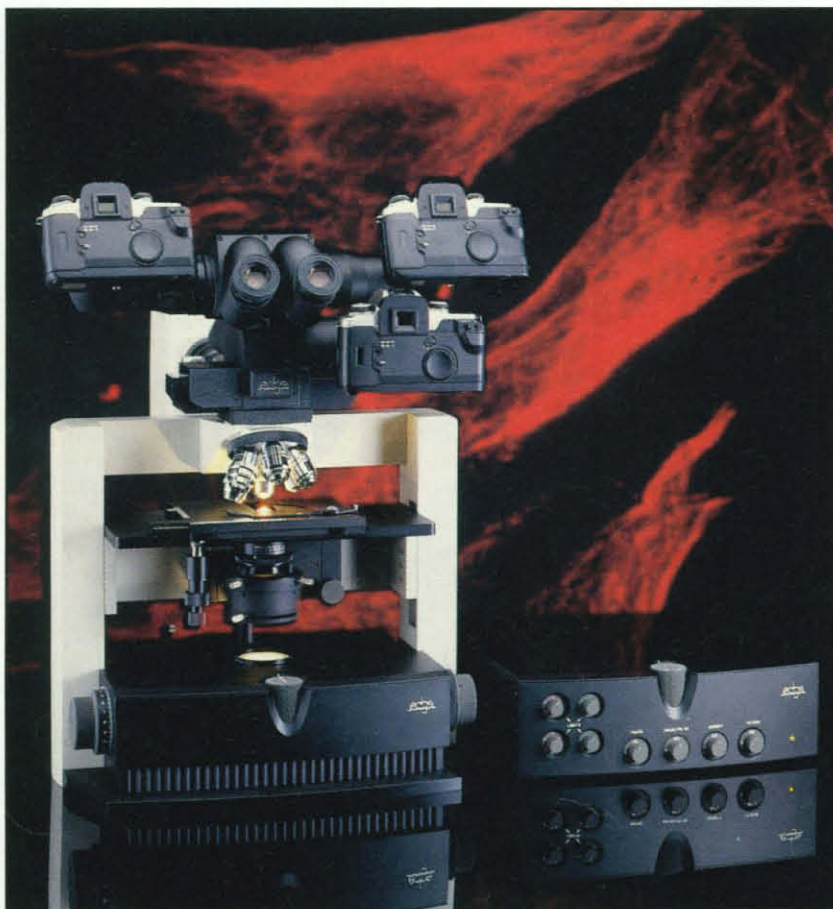
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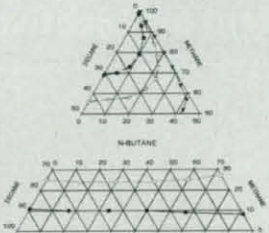
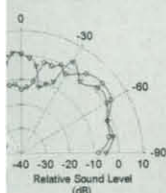
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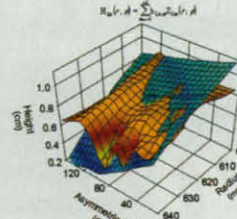
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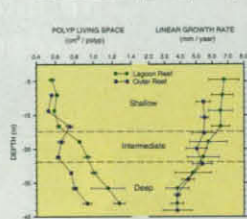
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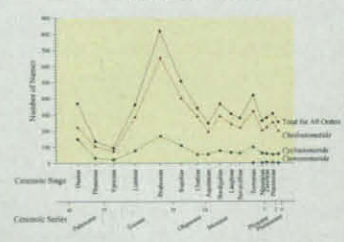
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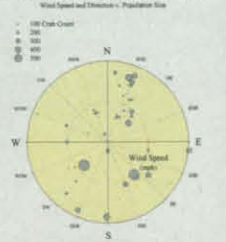
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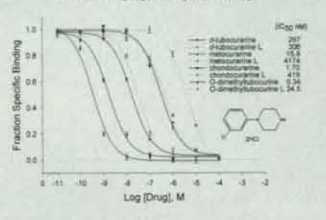
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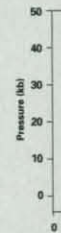
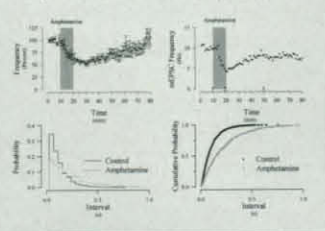
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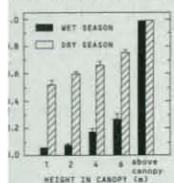
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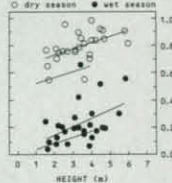
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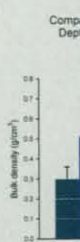
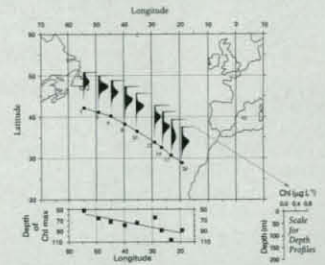


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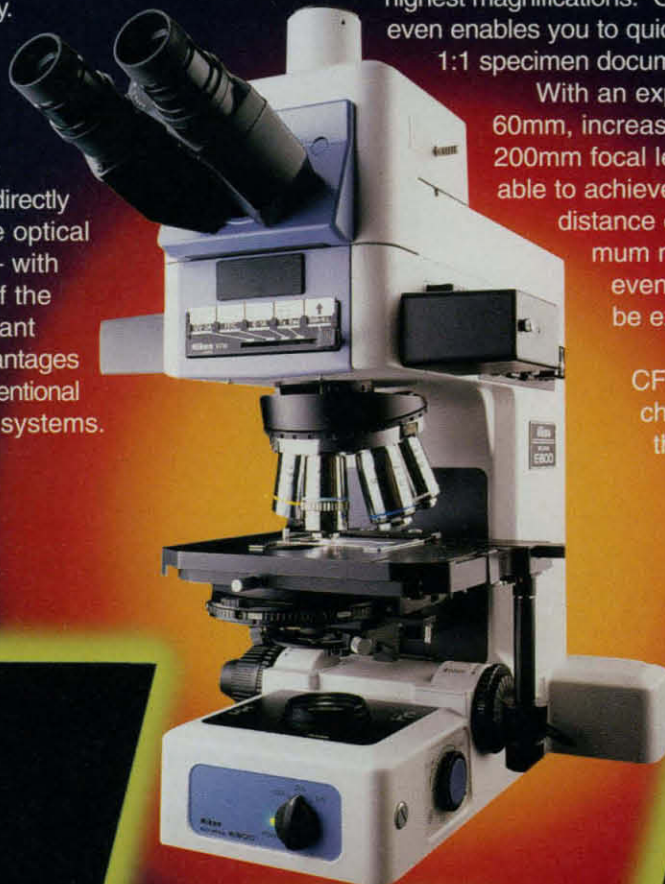
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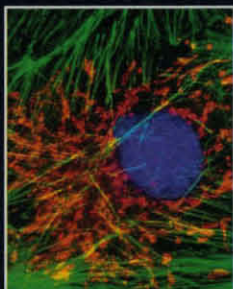
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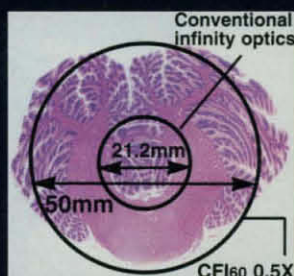
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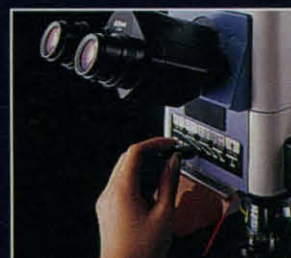
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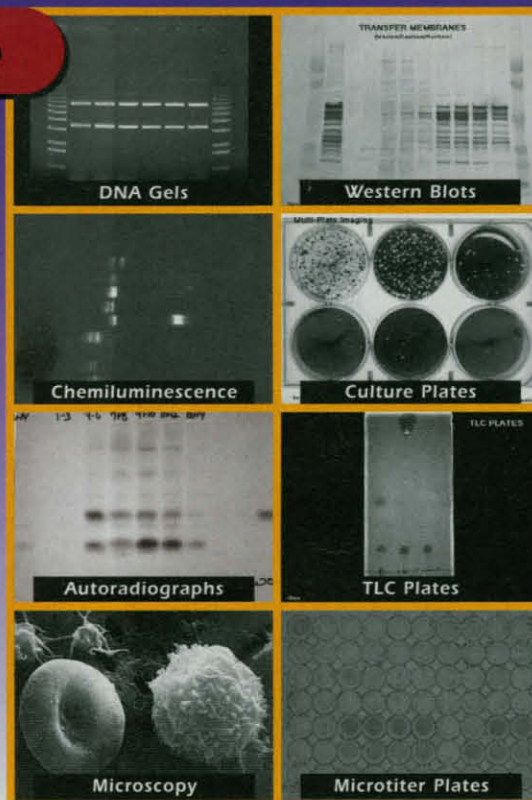
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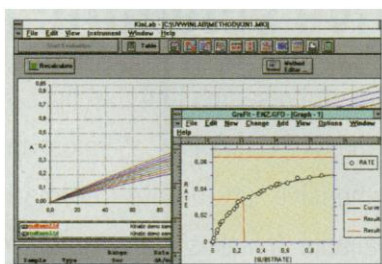
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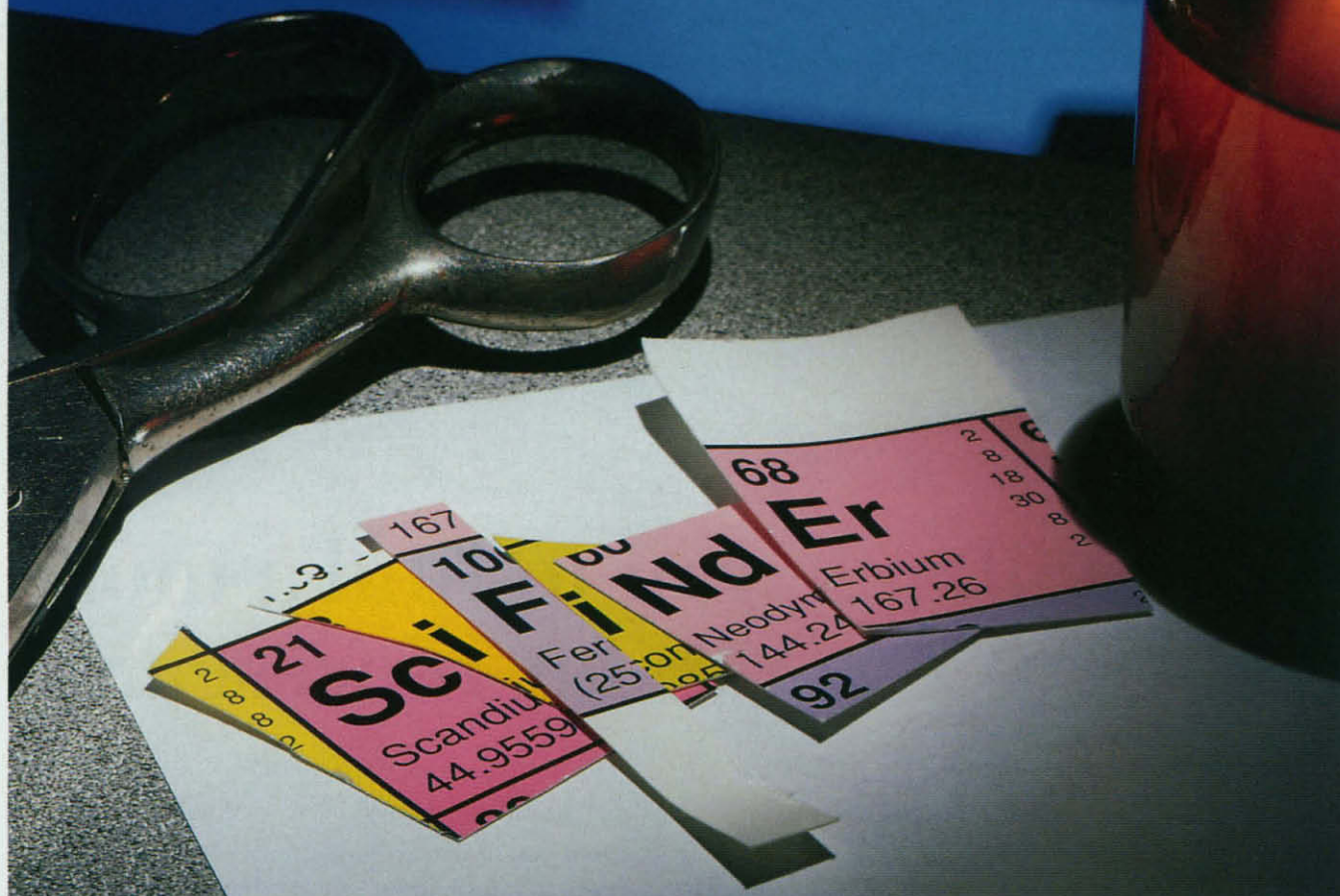
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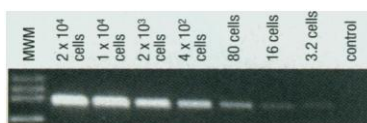
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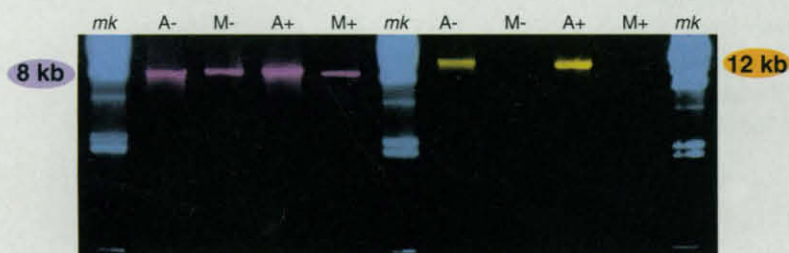
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A+ AMV RTase reaction followed by RNase H treatment
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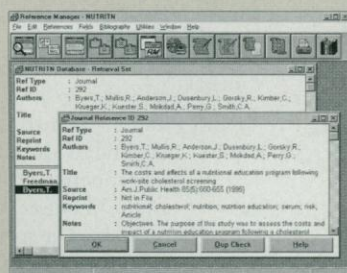
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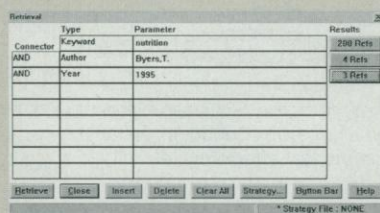
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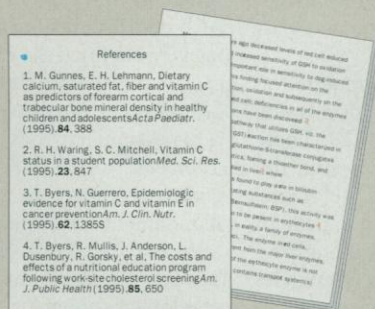
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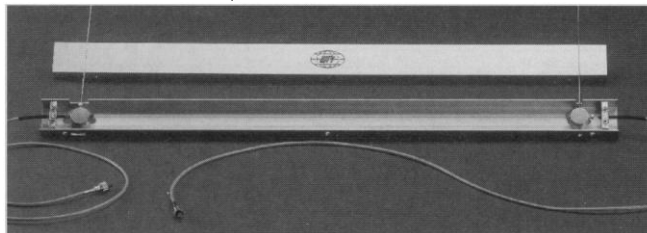
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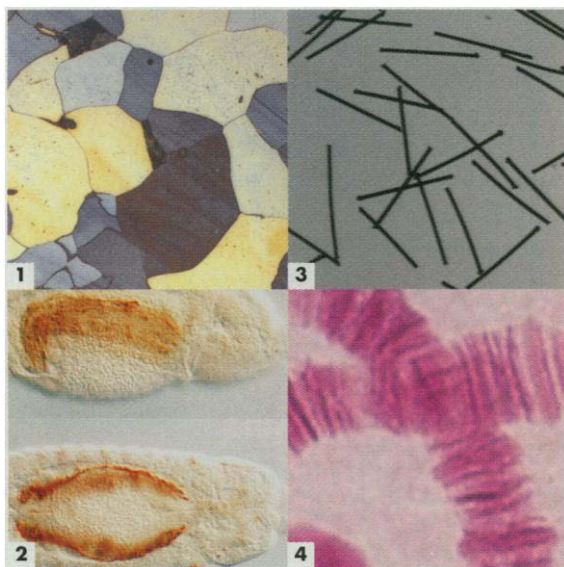


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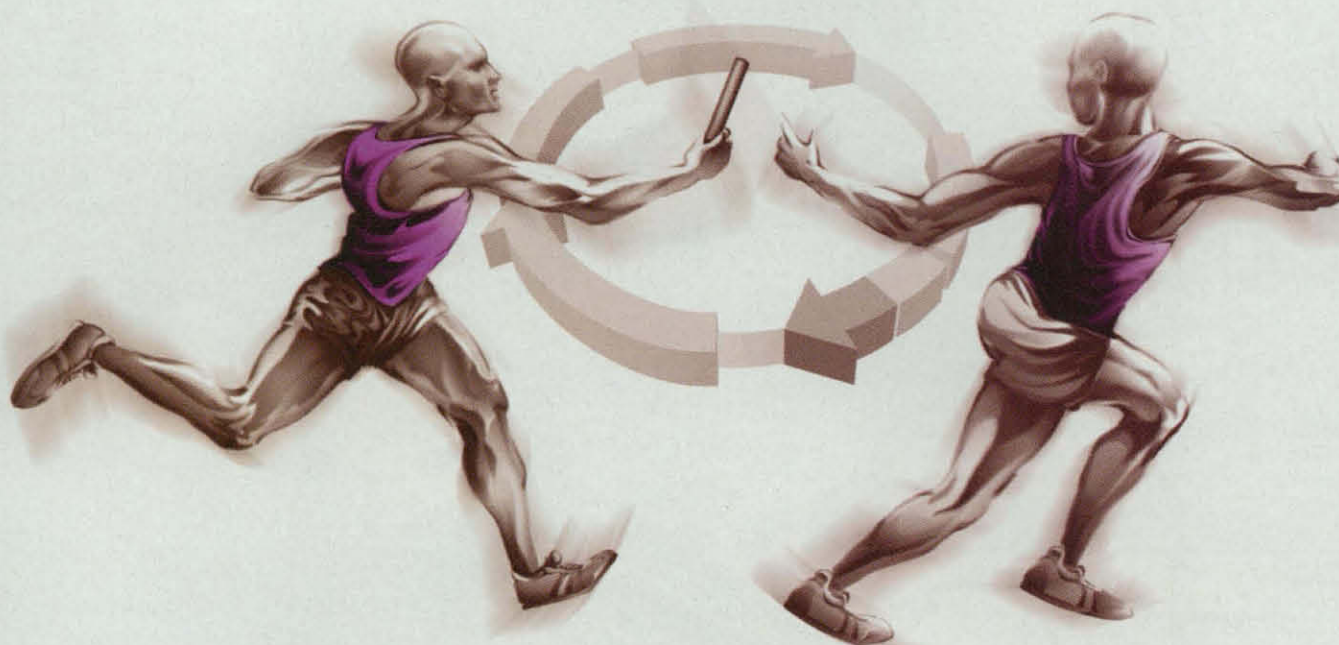
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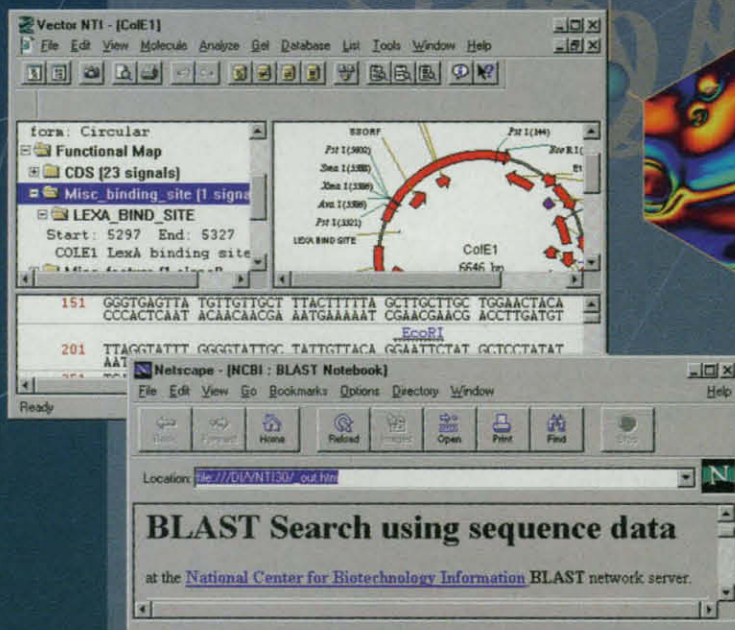
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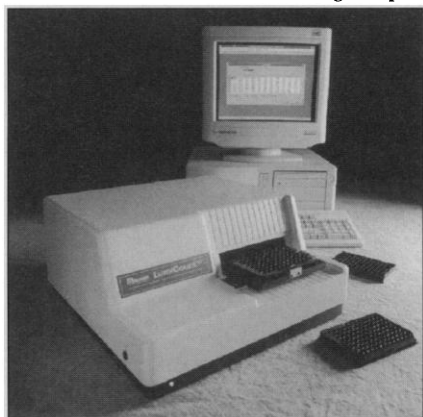
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ton integration to fine-tune its sensitivity to the light levels of each assay. It contains a heated plateholder; software controls the temperature from ambient to 40°C. **Packard Instrument.** For information call 800-323-1891 or circle 139 on the reader service card.

Rolling Wave Rotator

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NMP41/7, a protein that appears to be the same as that designated NuMA by some researchers. NMPs make up the internal structural framework of the nucleus and are associated with DNA replication, RNA synthesis, and hormone receptor binding. Normally, the nuclear matrix is highly insoluble in vitro, but, during apoptosis, soluble NMPs are released and can be detected in culture supernatant and other fluids. Therefore, the measurement of soluble NMPs is an early marker for the quantification of programmed cell death. **Amersham International.** For information call 800-323-9750 or circle 141 on the reader service card.

Phosphoramidites for Oligonucleotide Work

The N-Linker-CX Phosphoramidite allows for more efficient oligonucleotide labeling with amines. It contains a spacer arm with a cyclohexyl ring that effectively improves the rigidity of the molecule, thus preventing steric hindrance of the bulky dimethoxytrityl group with the oligonucleotide chain. The result is exceptionally high coupling efficiency ($\geq 99\%$) for multiple additions and for maximal yield of the oligonucleotide. Triethylene Glycol (TEG) Spacer Phosphoramidite can be used to insert a 9-atom spacer in an oligonucleotide. With this longer chain, the derivatized structure exhibits greater stability for use in probe-based applications. The oligonucleotide length can be varied by addition of multiple TEG Spacer Phosphoramidites. **BioGenex.** For information call 510-866-2587 or circle 142 on the reader service card.

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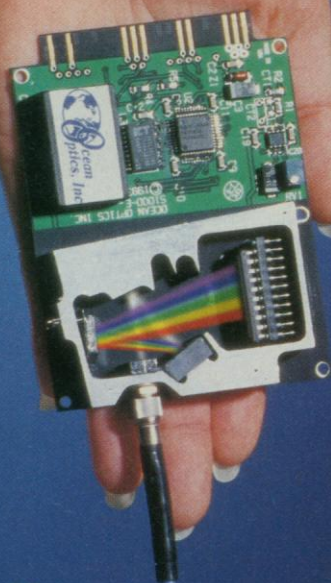
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PRODUCTS & MATERIALS

a magnet. The target protein can then be eluted with imidazole, low pH, or EDTA. Separation can be carried out in minutes from cell lysates with rapid magnetic separation. **Vector Laboratories.** For information call 415-697-3600 or circle 143 on the reader service card.

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Bottletop Filtration

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binding Millipore Express membrane for flow rates up to 1.5 L/min. **Millipore.** For information call 617-275-9200 or circle 148 on the reader service card.

Literature

Specialty Biochemicals and Polymers is a brochure offering some 400 carbohydrates and functionalized biopolymers. Services available include custom synthesis, custom formulation, bioconjugation, coating, encapsulation, and material characterization. **CarboMer.** For information call 800-239-7129 or circle 149 on the reader service card.

Advances in Cellular Research is a 336-page catalog describing more than 900 antibodies, assays, peptides, proteins, and probes. Products include reagents for the study of cancer, the cell cycle, intracellular communication, neuroimmunology, proteases, receptors and ligands, and structural proteins. It includes a comprehensive methods and protocol section and a technical tips section. **Calbiochem.** For information call 617-577-9333 or circle 150 on the reader service card.

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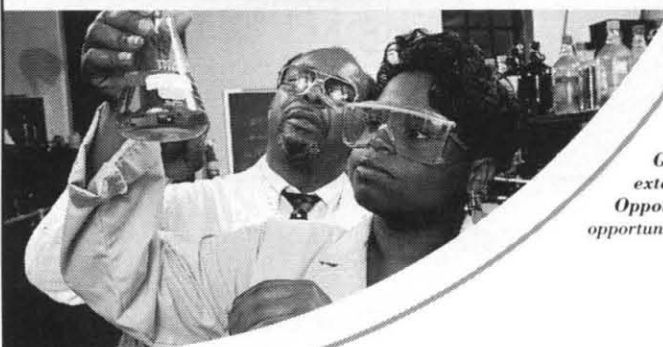
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