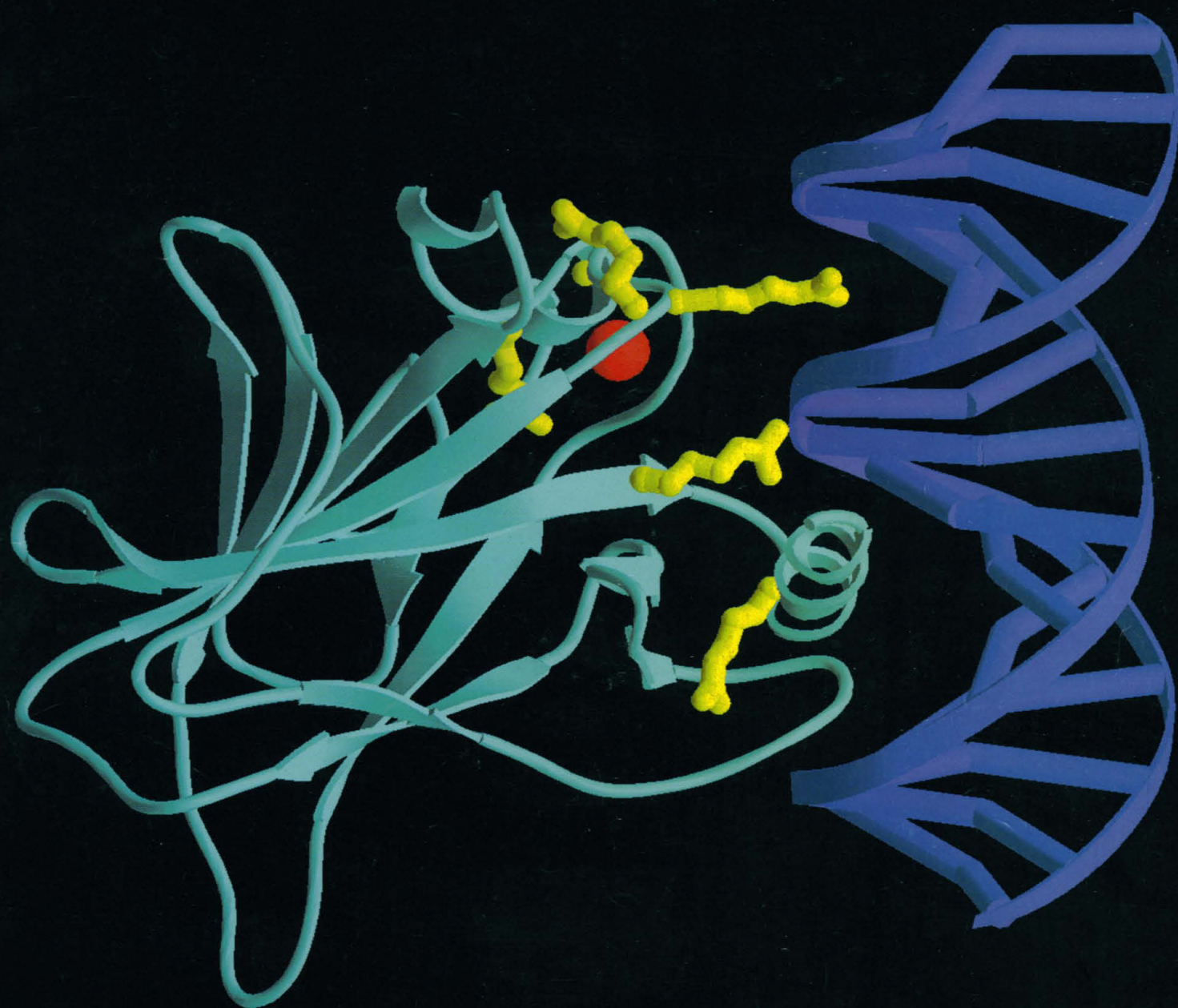


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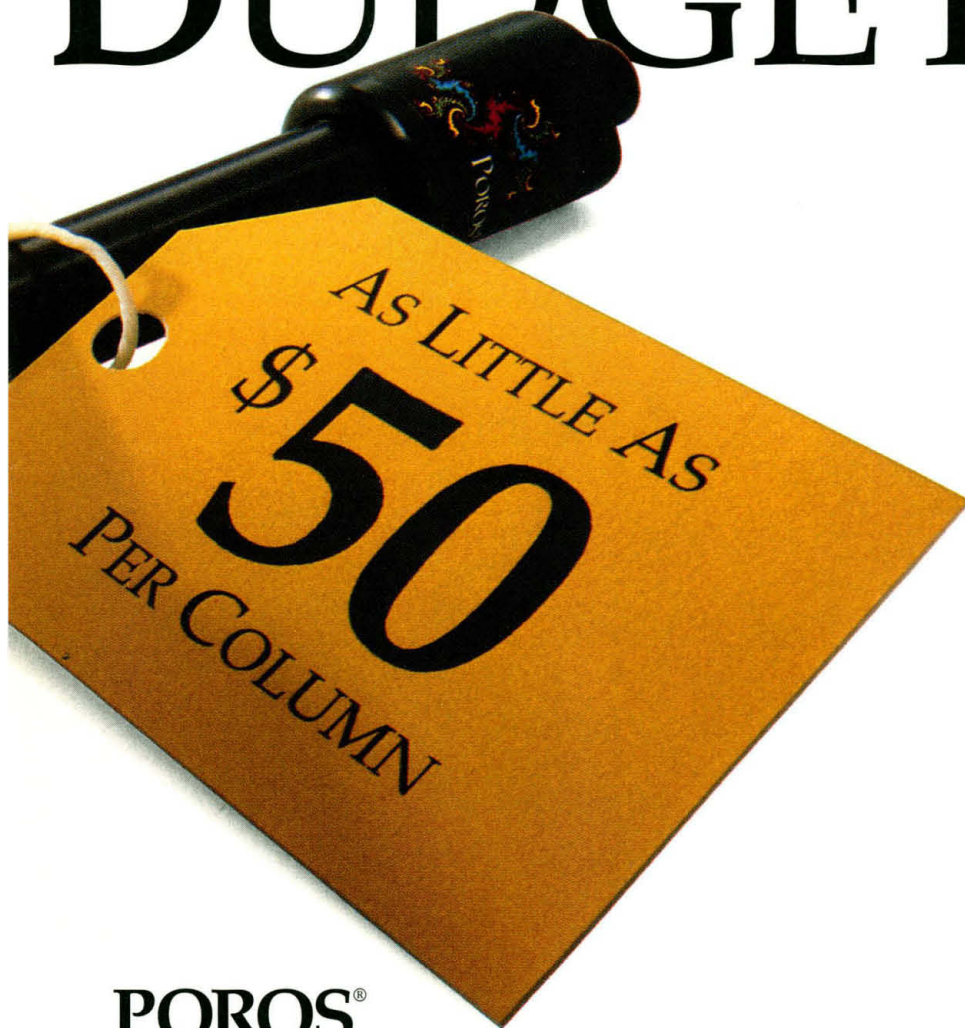
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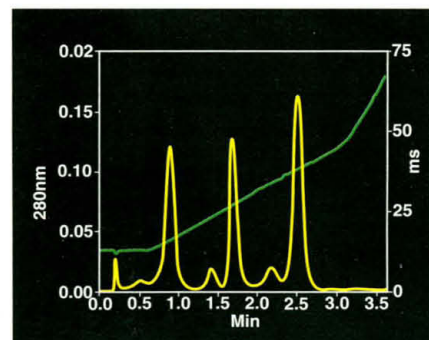
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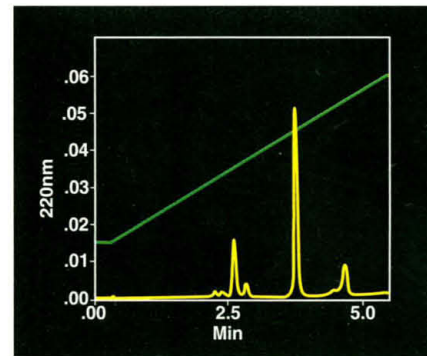


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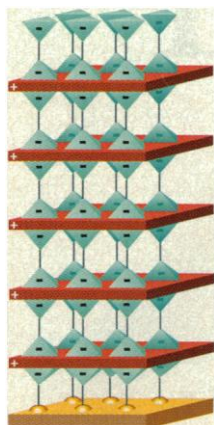
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Self-assembling
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To thick through thin

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The crystal structure of a p53 tumor suppressor-DNA complex reveals that the majority of the tumorigenic mutations occur at or near the protein-DNA interface. The computer drawing shows the core domain of p53 in light blue, the six most frequently mutated amino

acids in yellow, the zinc atom in red, and the DNA in blue. See page 346, the Report on page 386, and the Perspective on page 334. [Photo: Y. Cho and N. P. Pavletich]



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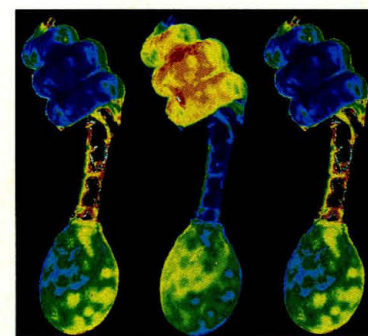
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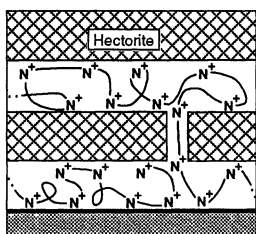
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Sustained buildup

Multilayers of nanometer-thick films have potential uses in optics, microelectronics, and sensor applications, but creating such structures can be difficult. Self-assembled films are often structurally disordered, and thick Langmuir-Blodgett films can be unstable. Kleinfeld and



Ferguson (p. 370) formed well-ordered multilayers from alternating layers of a polyelectrolyte and of hectorite, a mica-type layered silicate. These layers rapidly self-assembled when the substrate was dipped into aqueous solutions and could be grown to thicknesses greater than 0.2 micrometers.

Breaking strong bonds

Homogeneous catalysis, in which the catalysts are in solution rather than on a solid support, has been demonstrated for numerous reactions, but activation of C-F bonds by this route has proved difficult. Aizenberg and Milstein (p. 359) show that a rhodium(I) silyl complex can abstract fluorine atoms from aromatic C-F bonds at room temperature. This reaction was used in a catalytic cycle in which hydrogen was exchanged for fluorine in fluorobenzenes.

Nanotransitions

Solids can undergo phase transitions in which subtle atomic rearrangements occur. Tolbert and Alivisatos (p. 373) gained

When things were cooler in the Middle East

How did changes in climate, notably at the end of the Pleistocene, affect prehistoric cultural development and settlement patterns? Henry (p. 336) reconstructs these relations for about 70,000 years in southern Jordan, an area where uplands, piedmont, and lowlands harbored distinct biotic and climatic zones. From about 70,000 to 13,000 years ago, long-term camps were maintained in the lowlands and inhabited during the winter; ephemeral camps were occupied at high elevations during the summer. Upon the onset of Holocene warming, this pattern was reversed as the long-term winter camps were moved to high elevations.

insight into such processes by studying the first-order solid-solid phase transition in nanocrystals of CdSe, which transform with increasing pressure from wurtzite to a rock salt structure. Transition pressures increased as the nanoparticles decreased in size. Such results place limits on the size of the nucleation domains that form during the transition in bulk.

Pinpointing lifetimes

Variations in the fluorescence lifetimes of molecules can reveal information about their dynamics. Xie *et al.* (p. 361) and Ambrose *et al.* (p. 364) have taken this technique to its single molecule limit to avoid the blurring caused by large ensembles of molecules. Incident laser light is introduced through a fiber optic so that a dye molecule adsorbed on a surface can be irradiated on a subwavelength scale. A near-field microscopic probe then collects the emitted light from that same molecule at a resolution beyond the diffraction limit. The fluorescent lifetimes (typically nanoseconds) depend on the distance of the probe from the molecule and reflect the quenching of the excited state due to the presence of the probe's metal surface. In addition, Xie *et al.* could detect intensity jumps on the

order of seconds that reflect variations in the absorption cross sections of individual molecules.

Structures of p53

Two of the domains of the tumor suppressor p53 implicated in human cancers and cell transformation have been structurally characterized. Cho *et al.* (p. 346; see cover) present the crystal structure of the core domain of p53 (residues 102 to 292) in a complex with a DNA binding site. Clore *et al.* (p. 386) present the nuclear magnetic resonance structure of the oligomerization domain, residues 319 to 360 (see the Perspective by Friend, p. 334).

The heart of p53

About 30 to 50 percent of patients who have undergone coronary angioplasty subsequently develop restenosis, a vessel narrowing caused by excessive proliferation of smooth muscle cells. Speir *et al.* (p. 391; see news story by Marx, p. 320) found that a subset of human restenosis lesions harbor human cytomegalovirus (HCMV) and accumulate high levels of the tumor suppressor protein p53. One of the HCMV gene products, IE84, binds to p53 and abolishes its function as a trans-

criptional activator in transfection assays. Such HCMV-mediated inhibition of p53 may contribute to restenosis.

Mutation creation

Adaptive mutations are those that arise in nongrowing cells in the absence of selection. Rosenberg *et al.* (p. 405) and Foster and Trimarchi (p. 407; see news story by Culotta, p. 318) examined the mutations that arise by adaptive means in bacteria and find that they differ from spontaneous mutations that arise during growth in the absence of selection. The adaptive reversal of a +1 frameshift mutation occurred by -1 deletions in regions of mononucleotide repeats. This type of mutation is similar to that observed in hereditary colon cancer cells and may arise through polymerase errors that remain uncorrected after mismatch repair.

Growth via gastrins

Gastrin is a peptide hormone that is posttranslationally processed to an active form that is amidated at its COOH-terminus. This form promotes secretion of gastric acid. Seva *et al.* (p. 410) report that a processing intermediate, glycine-extended gastrin, is also biologically active. The glycine-extended form stimulated proliferation of a tumor-derived pancreatic acinar cell line but was relatively ineffective in inducing gastric acid secretion. Furthermore, the proliferative effects of the glycine-extended form of gastrin and amidated gastrin appeared to be mediated by activation of distinct receptors. Thus, posttranslational processing may modulate the physiological actions of gastrin.

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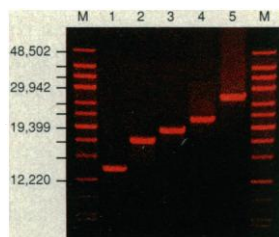
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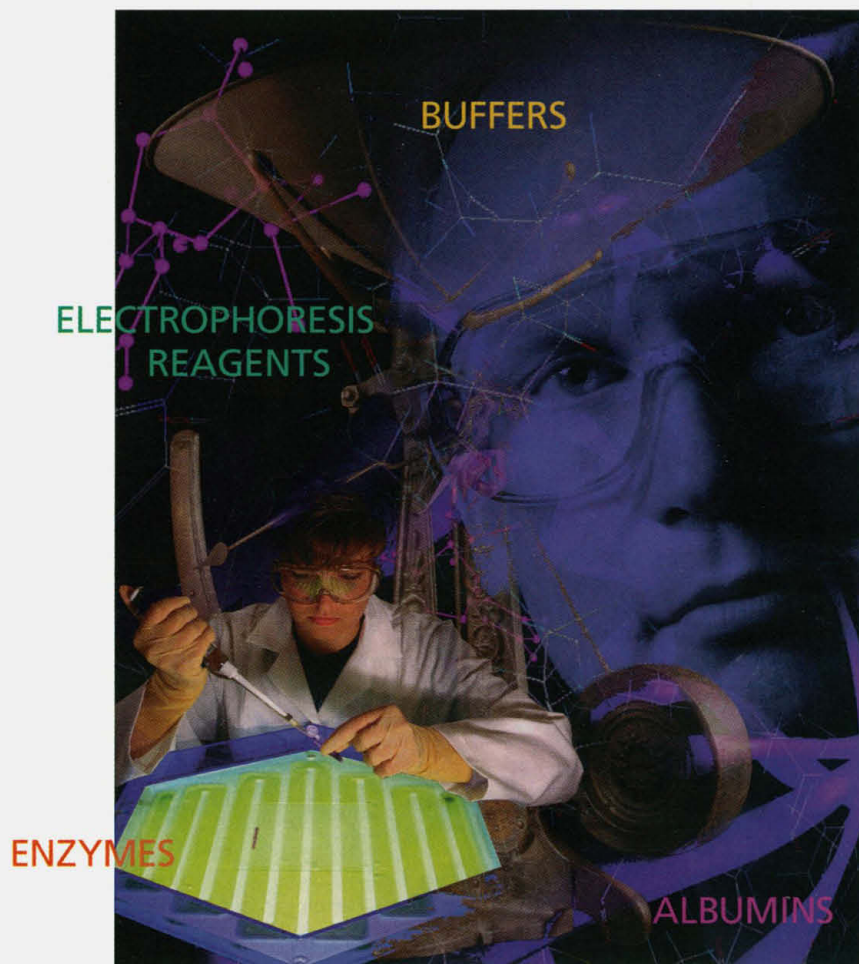


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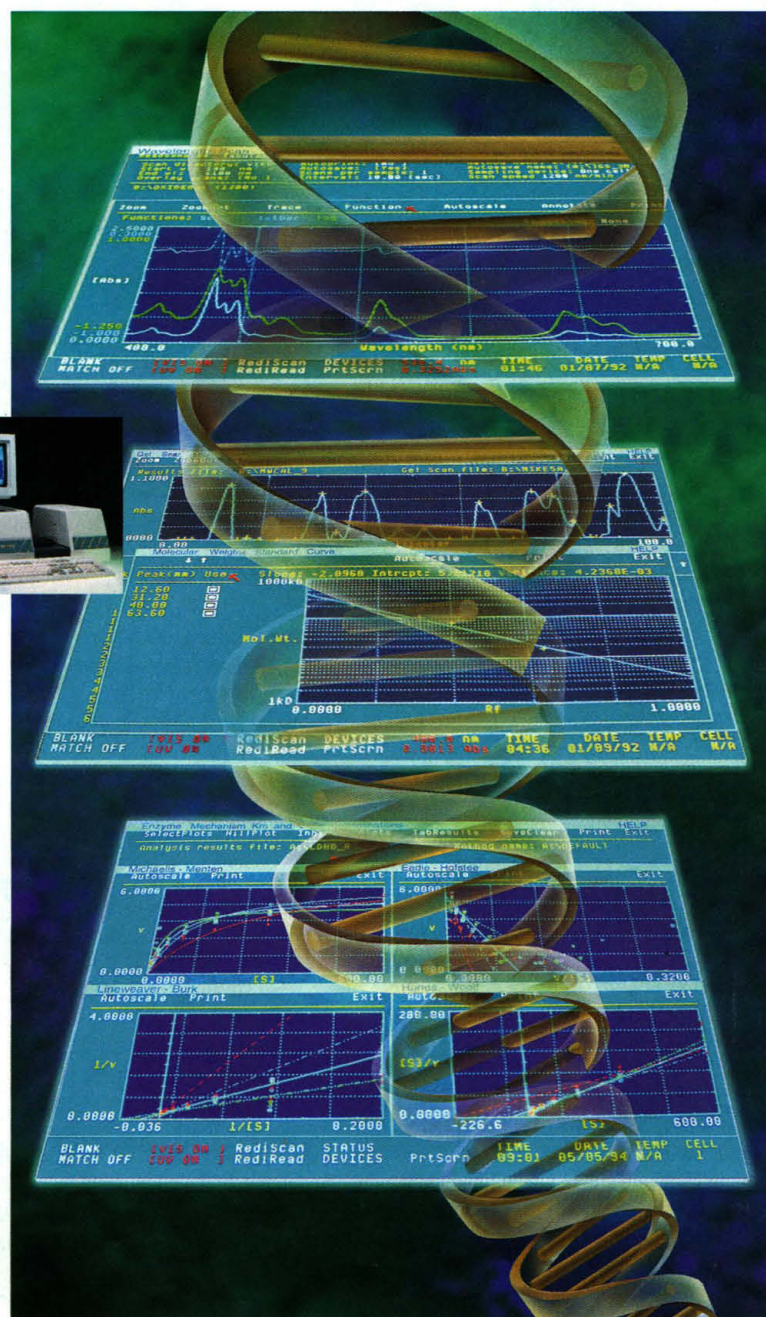
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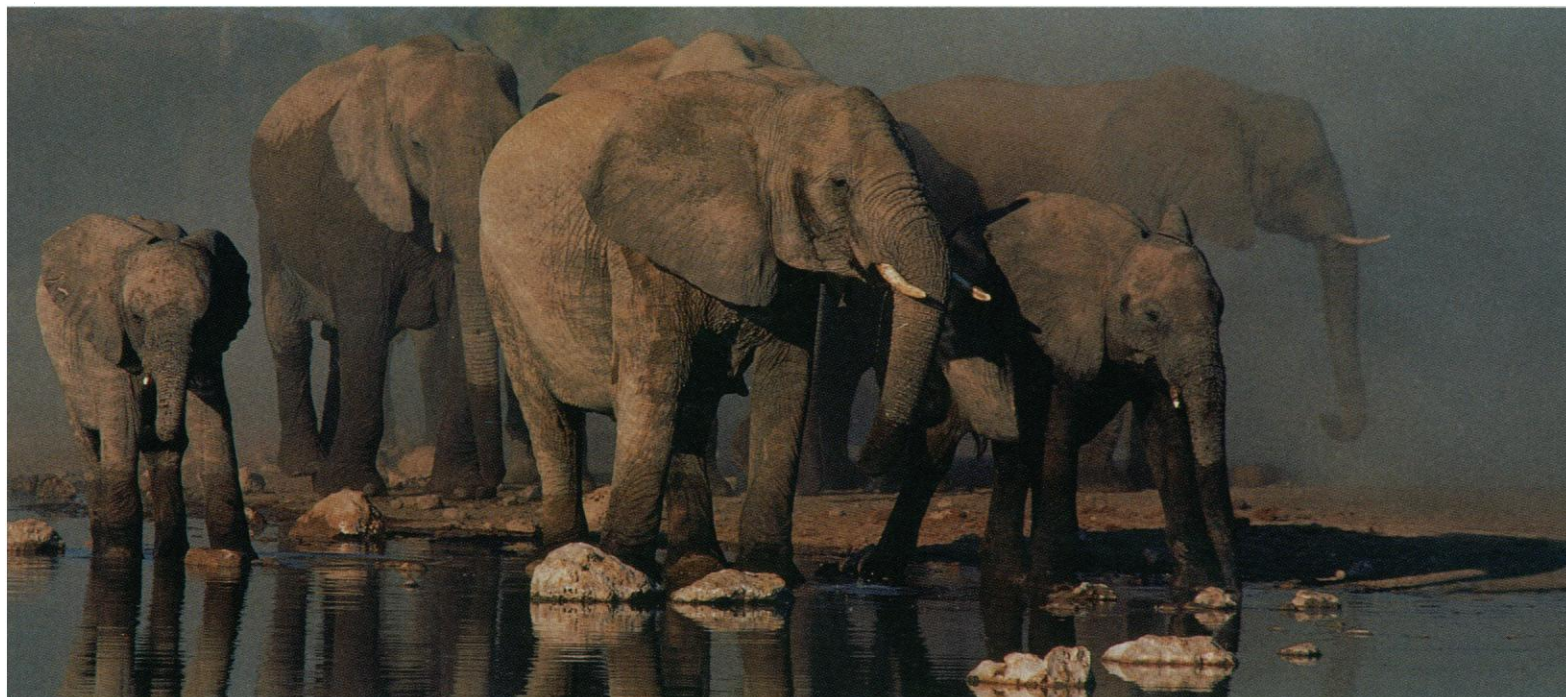


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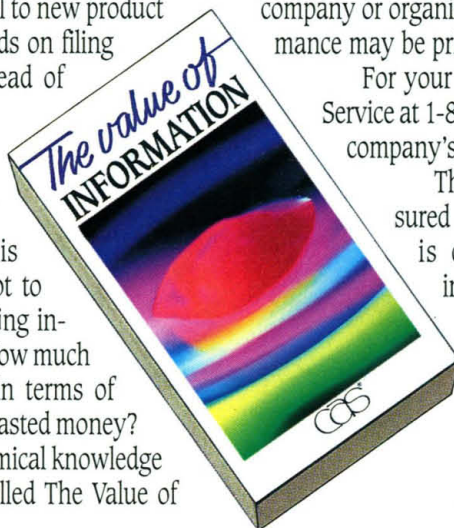
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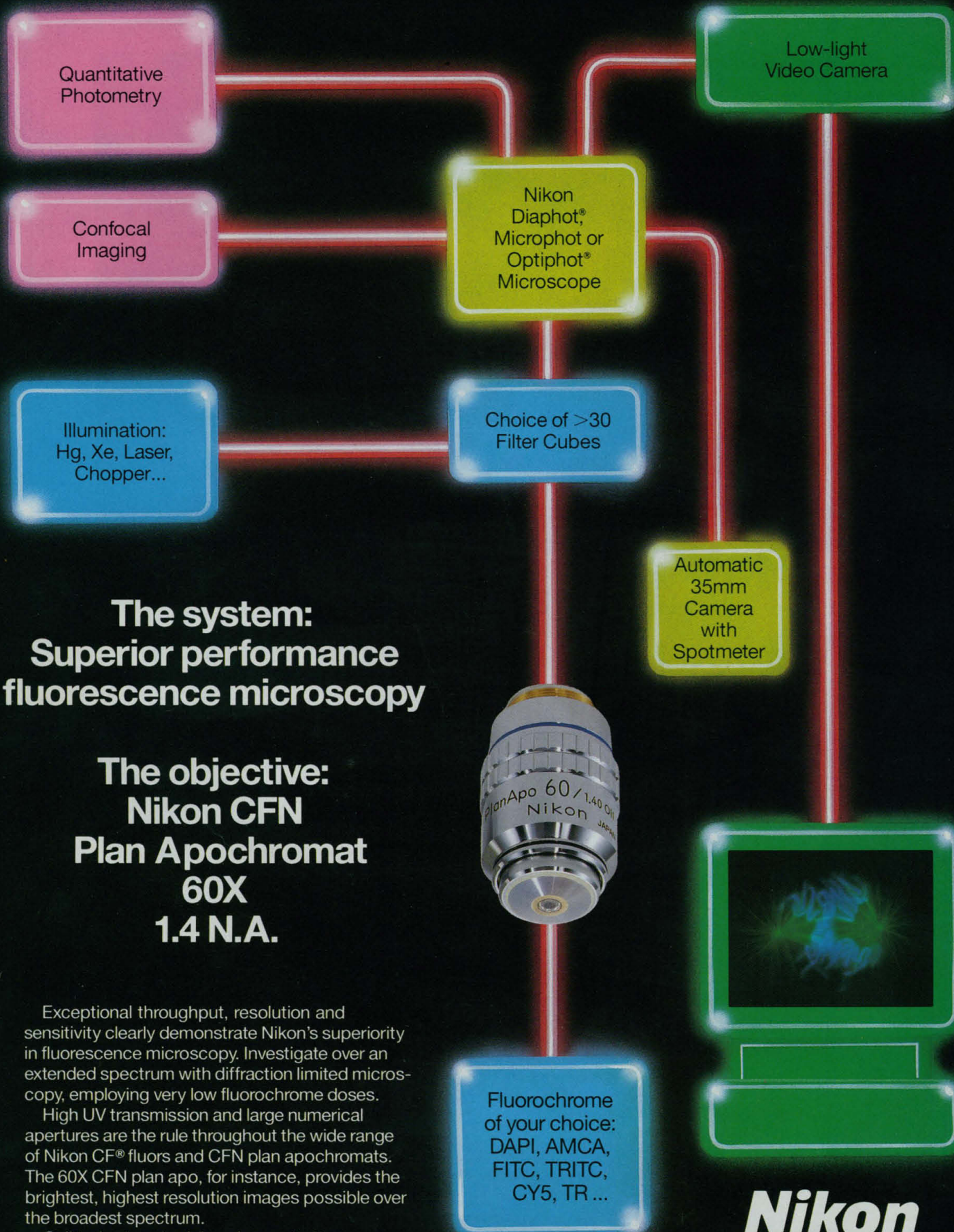
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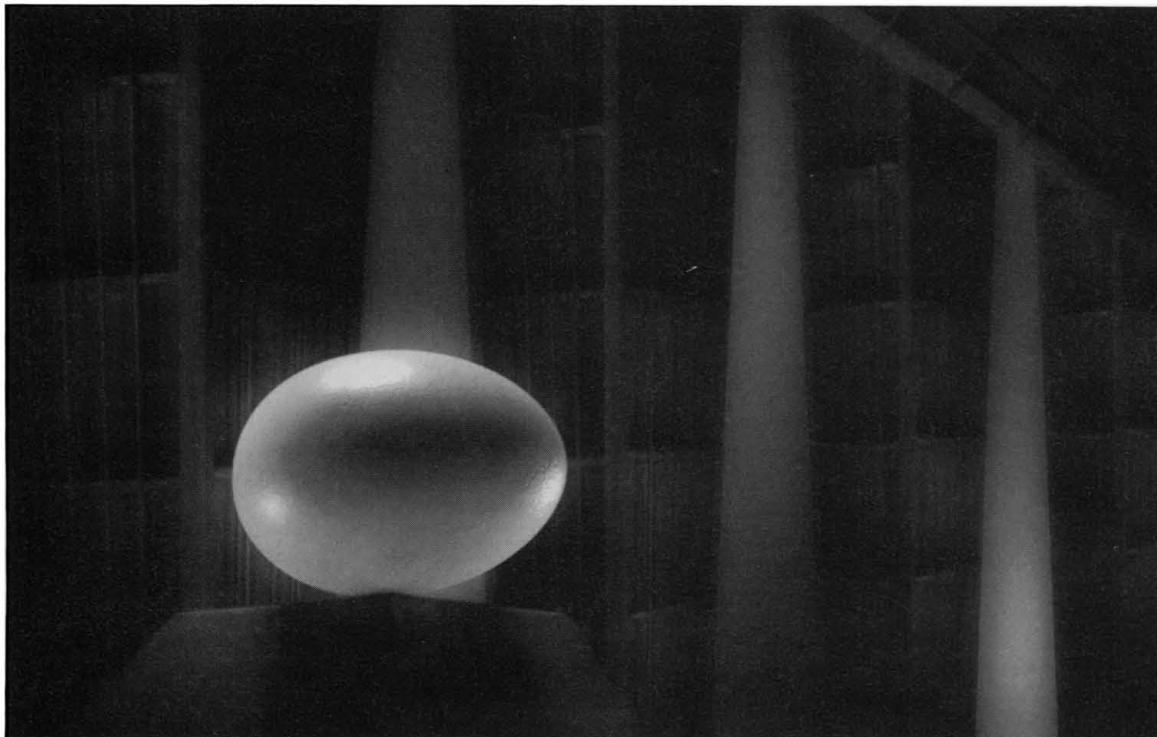
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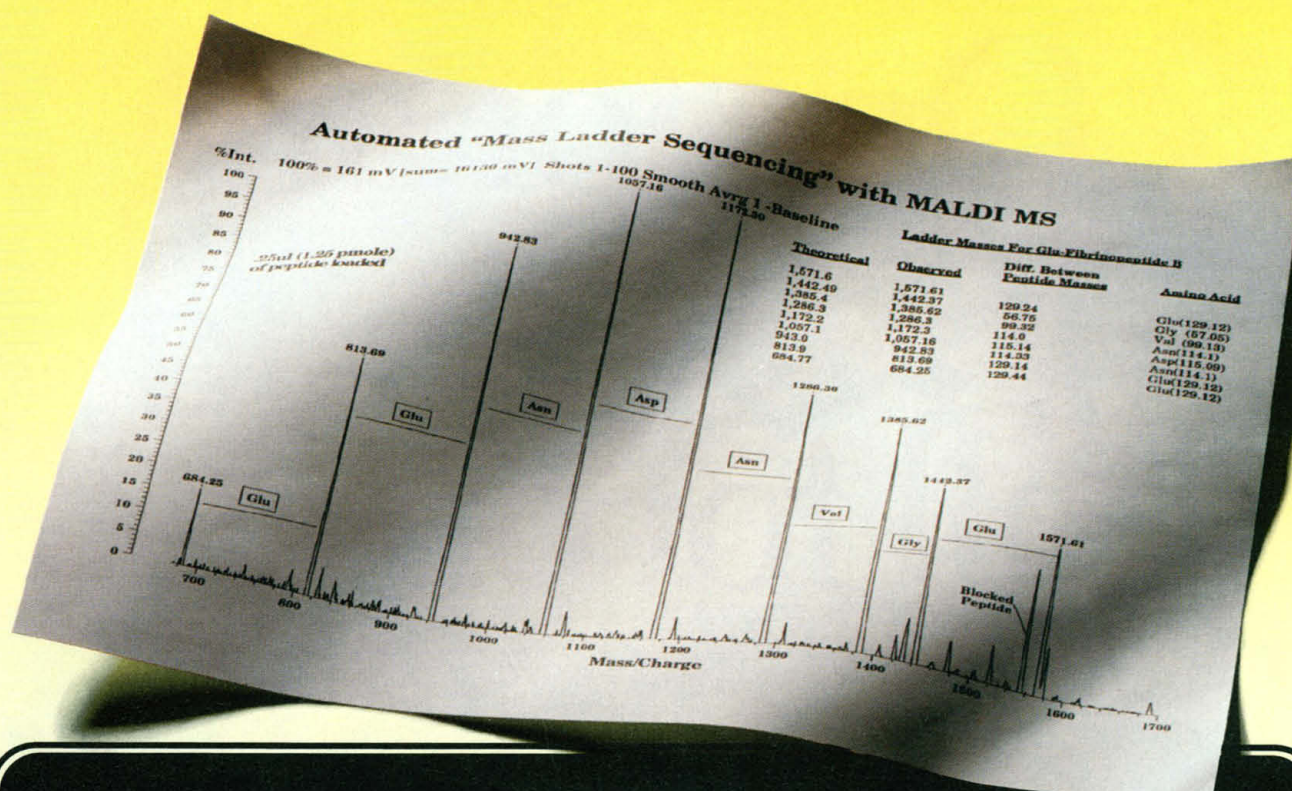
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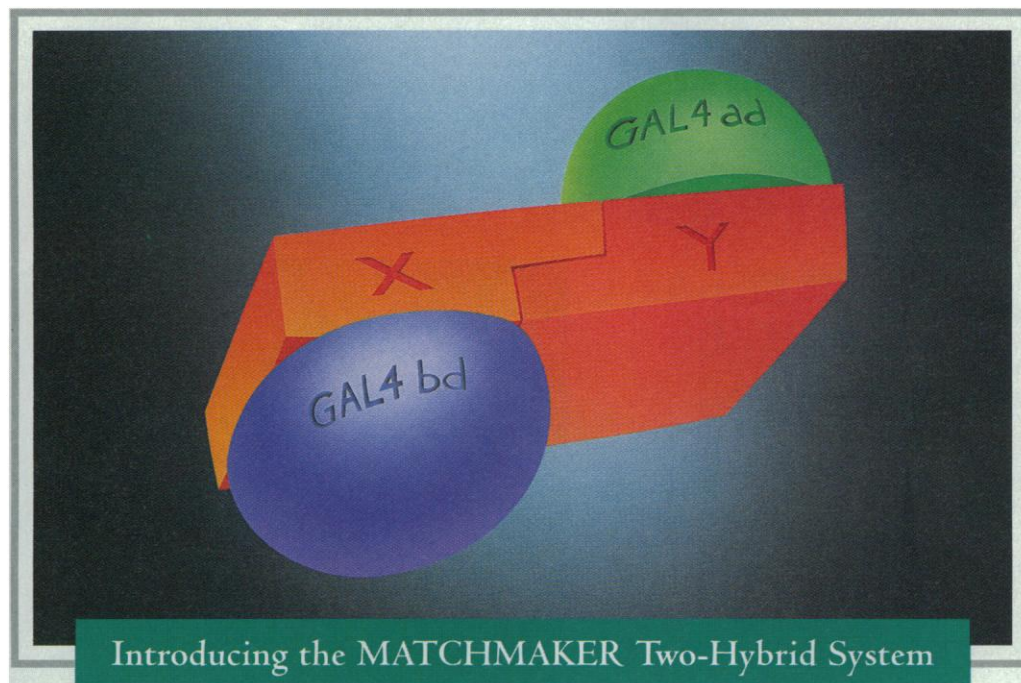
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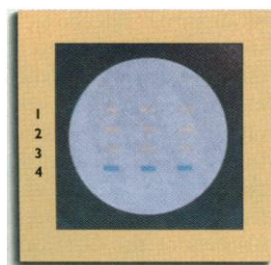
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