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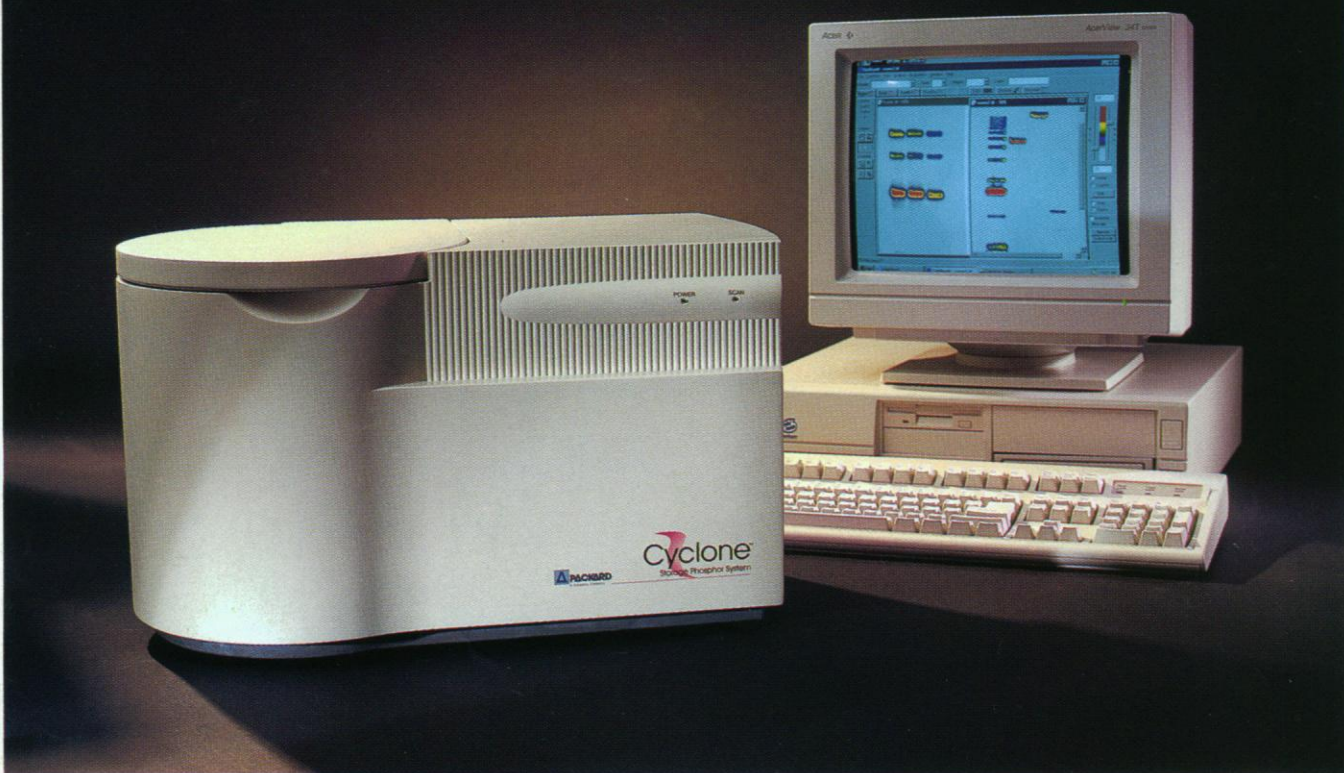
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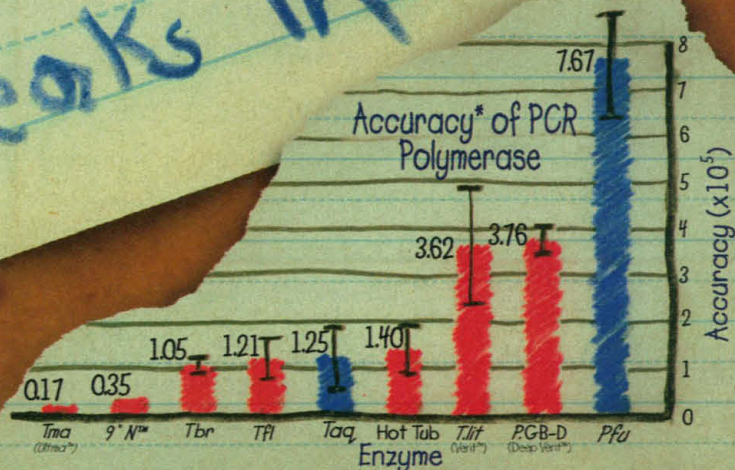
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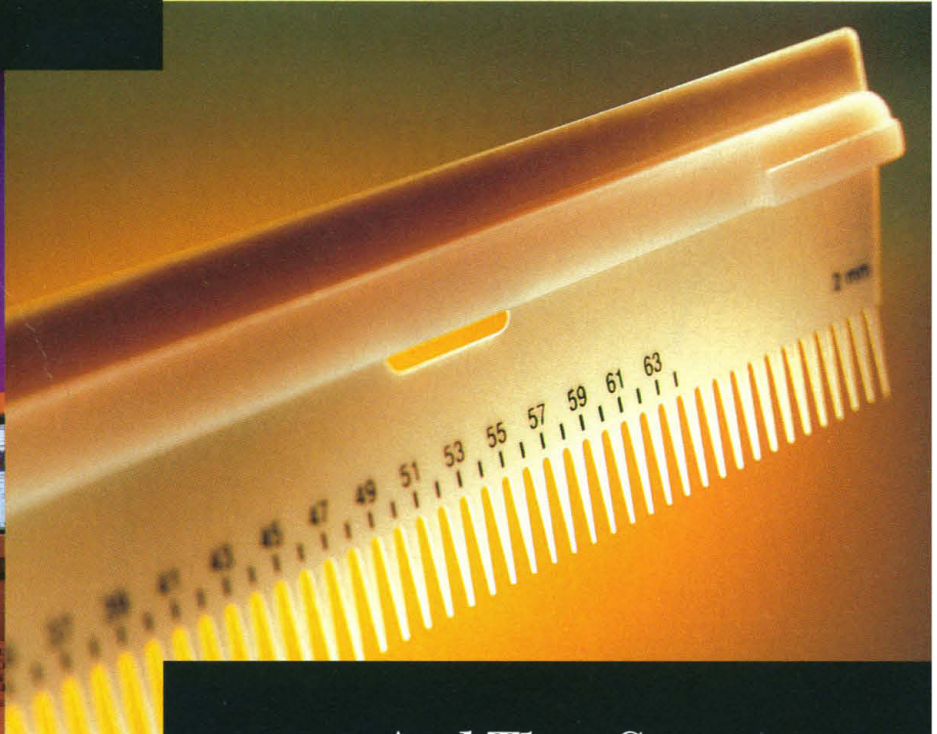
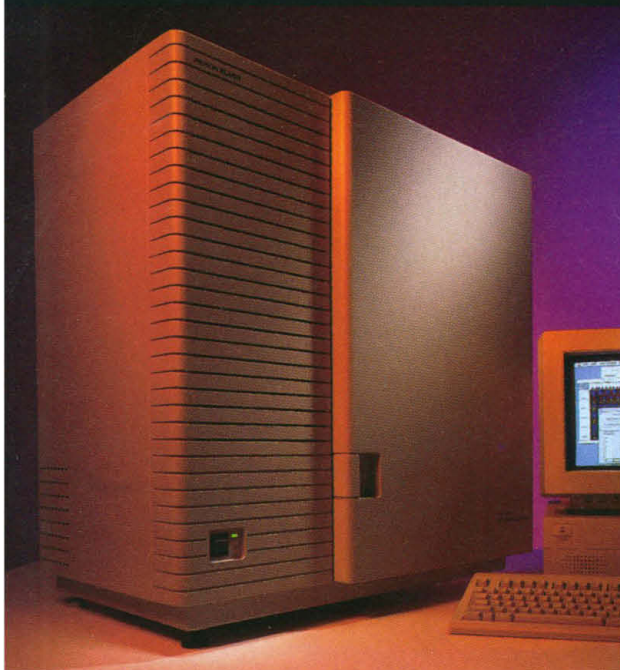
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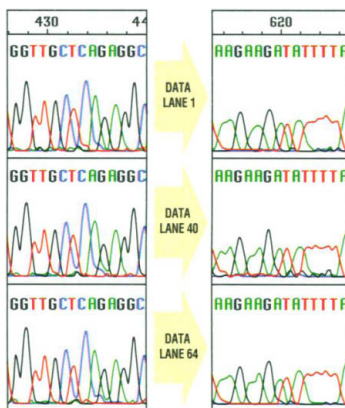
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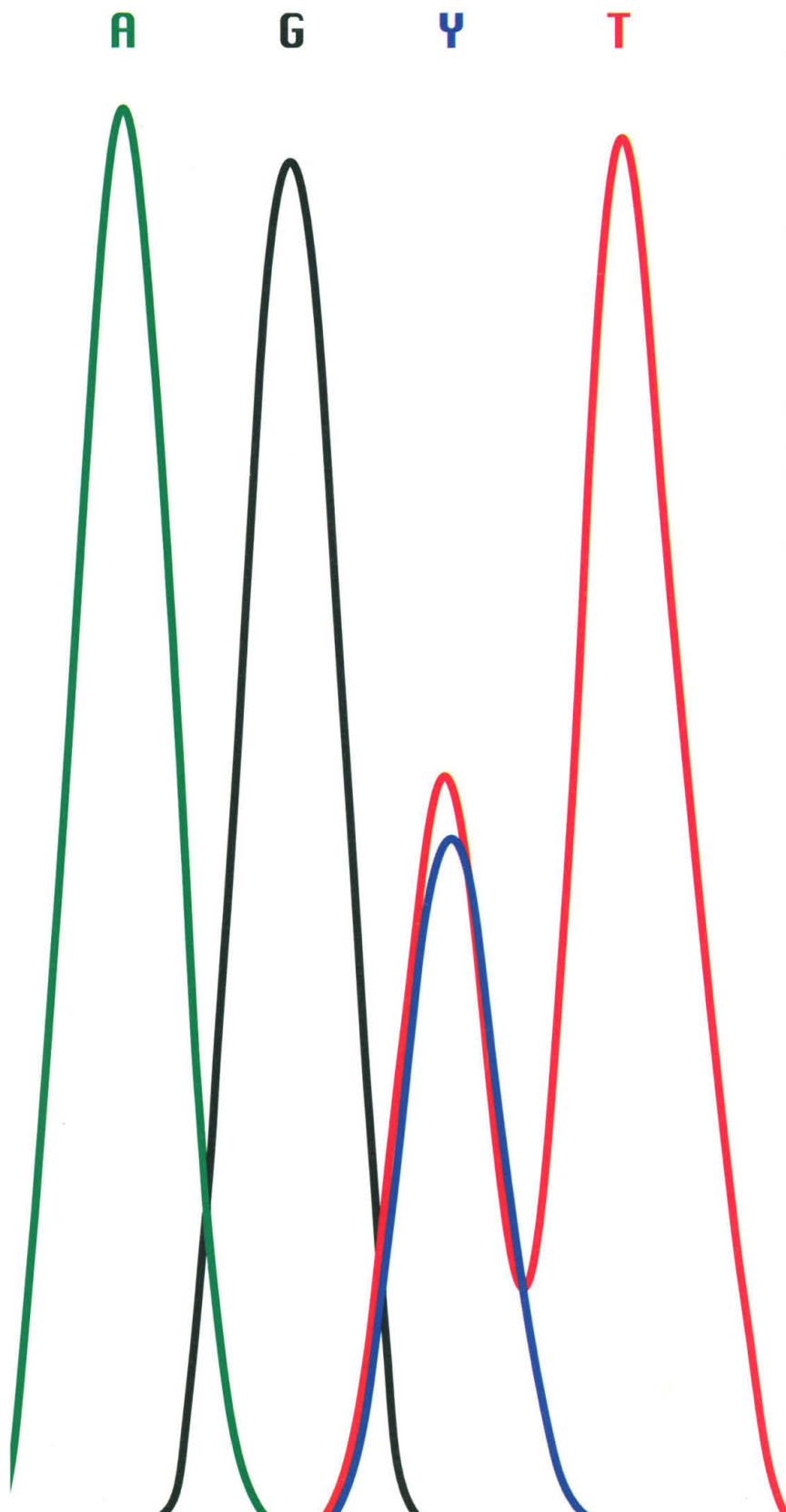
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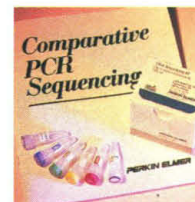
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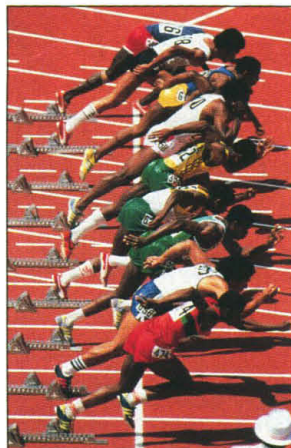
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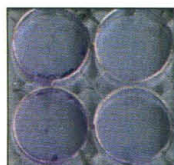
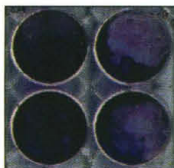
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One reason start times  
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Combating  
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## COVER

False-color view (width ~1000 km) of Jupiter's satellite Europa obtained by NASA/JPL's Galileo spacecraft. Fractures in the icy crust and mottled areas are in reddish hues, indicating the presence of non-ice materials. The icy plains (blues) subdivide into units with different bright-

nesses at infrared wavelengths, probably due to differences in ice grain size. Observations of Jupiter and its moons by Galileo are reported in the special section beginning on page 377 and the News story on page 341. [Image processed by Paul Geissler, University of Arizona]



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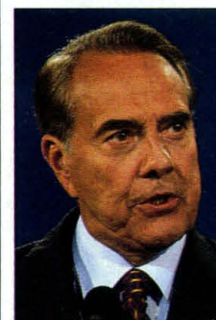
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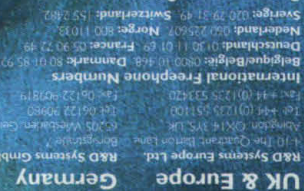
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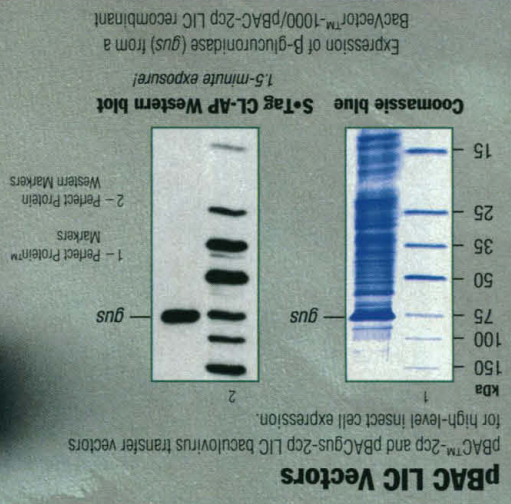
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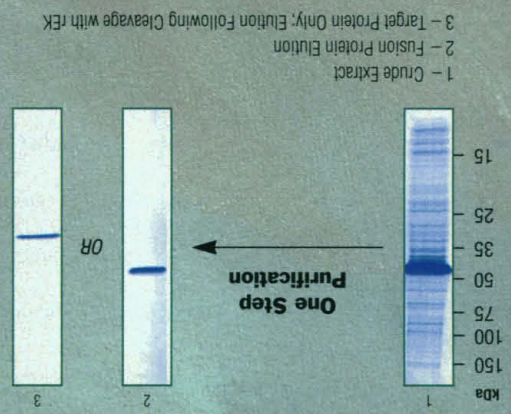
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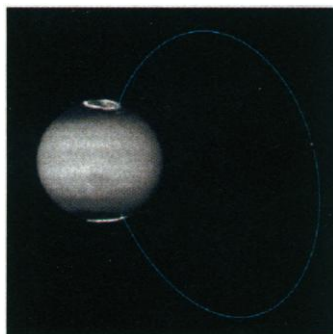
PET-30 and PET-32 LIC feature T7 driven expression in *E. coli*.





## Jupiter's lights

Spatially and temporally resolved ultraviolet images of the northern and southern jovian auroras have been obtained from the Hubble Space Telescope and the International Ultraviolet Explorer. Clarke *et al.* (p. 404) and Ballester *et al.* (p. 409) found that the main auroras are highly variable, unlike Earth's, indicating that Jupiter's magnetosphere is



driven by Jupiter's rotation and controls the auroras' morphology, rather than auroral ovals being controlled by the solar wind. Clarke *et al.* also note that the footprint emission from Jupiter's moon Io is not variable in the aurora images, lending support to the idea that Io has a magnetic core that controls its imprint on the jovian auroras.

## Atoms at work

Automotive exhaust catalysts, like many industrial catalysts, consist of transition metals supported on insulating materials such as alumina, and have inhomogeneous surfaces that are usually rough and complex. These features make their detailed characterization very difficult. One of the unsolved questions is the exact configuration of the metal atoms and their interactions with the support material. Nellist and Pennycook (p. 413; see the Per-

## Galileo at Jupiter

A special section (beginning on p. 377) focuses on observations from the Galileo Orbiter of Jupiter and the satellites Io, Europa, and Ganymede (see the news story by Kerr, p. 341). The remote sensing teams (Belton *et al.*, Carlson *et al.*, and Orton *et al.*) used images obtained at several wavelengths to suggest the following: (i) The Great Red Spot is a shallow atmospheric storm; (ii) Io is actively erupting; (iii) Ganymede is covered by a thin layer of ice with fractures related to a possibly fluid layer beneath the surface; and (iv) Europa has sets of fractures that may be related to degassing or venting of gaseous rocky mixtures from below its icy surface. The magnetometer (Kivelson *et al.*), particle and plasma wave experiments (Frank *et al.*, Gurnett *et al.*, Garrard *et al.*, and Williams *et al.*), and the dust detector (Grün *et al.*) focused on the complex electromagnetic interactions between Io and Jupiter.

spective by Jefferson, p. 369) used Z-contrast microscopy, a form of scanning transmission electron microscopy, to resolve the atomic configuration of platinum dimers and trimers and a small rhodium raft on an alumina support. Such information is crucial for understanding the reactivity of heterogeneous supported catalysts.

## Anti-tumor virus

Human adenoviruses encode a protein (E1B 55K) that binds to and inactivates the host-encoded tumor suppressor protein p53, an interaction that is essential for efficient virus replication. Many human cancers are deficient in p53, and Bischoff *et al.* (p. 373; see the news story by Pennisi, p. 342) have developed a therapeutic strategy that takes advantage of this p53 defect. A mutant adenovirus that does not produce E1B 55K can infect and kill p53-deficient tumor cells 100 times more efficiently than can normal cells containing functional p53. Injection of the mutant virus into p53-deficient human tumors grown in mice caused substantial reductions in

tumor size and, in some cases, complete tumor regression. These results suggest that mutant adenoviruses may be useful for treatment of certain human cancers.

## p53—the smoking gun?

Benzo[a]pyrene, a component of cigarette smoke, is one of the most potent mutagens and carcinogens known. In studies with cultured human cells, Denissenko *et al.* (p. 430) have looked at the effect of BPDE (the carcinogenic metabolite of benzo[a]pyrene) on P53, a tumor suppressor gene that is mutated in about 60% of human lung cancers. The BPDE-induced damage in P53 occurred preferentially at nucleotides that are mutational hotspots in lung cancer. This study provides a direct link between a defined cigarette smoke carcinogen and human cancer mutations.

## Response LACKing

Certain strains of mice infected with *Leishmania major* develop a rapid protective response, but

others develop a severe, ultimately fatal infection. Julia *et al.* (p. 421) show that the early T cell response to infection is crucial to the outcome. In susceptible strains, the response is dominated by a single antigen, known as LACK (*Leishmania* homolog of receptors for activated C kinase). This response is mediated by TH2 cells and is the mouse's downfall. If the immune system of susceptible mice is blinded to the LACK antigen (by expressing LACK in the thymus, so that LACK-reactive T cells do not develop), then TH1 responses develop to other *Leishmania* antigens, converting the susceptible mouse to a healer phenotype.

## Reacting on cue

How do we decide to make a movement in response to a stimulus? What has been known since the time of Helmholtz is that reaction times are long and variable, and that neuronal conduction velocities do not account for the length and variability of times. Hanes and Schall (p. 427; see the news story by Barinaga, p. 344) examined changes in firing rates as monkeys were deciding to initiate eye movements and found neurophysiological support for the variable rate model. This model suggests that the variability in reaction time is due to the variability in how rapidly the neuronal rate of firing reaches a fixed threshold, at which point movement is initiated. In another experiment in which the monkeys received countermanding instructions while the firing rate was increasing, movement was not initiated if the firing rate did not actually cross the threshold level.



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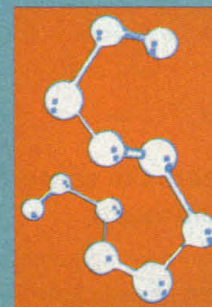
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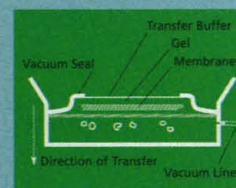
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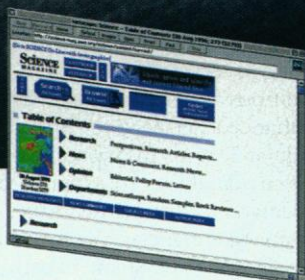
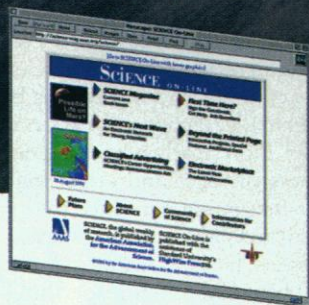
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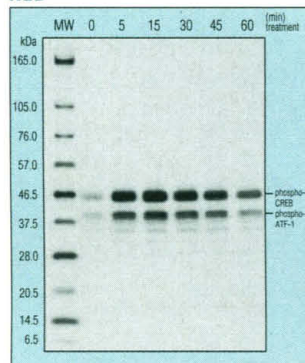
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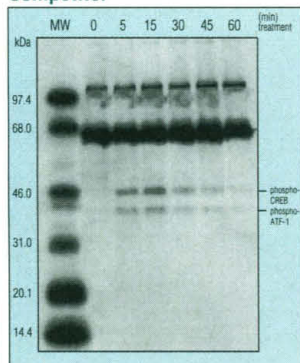
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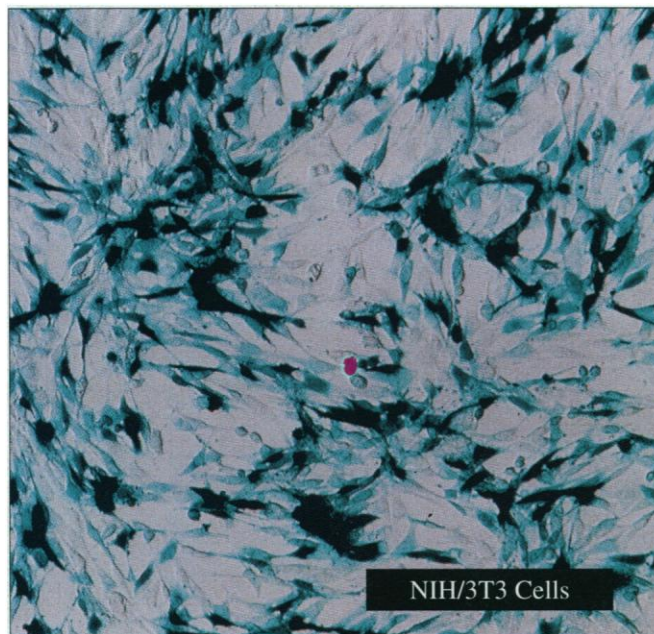
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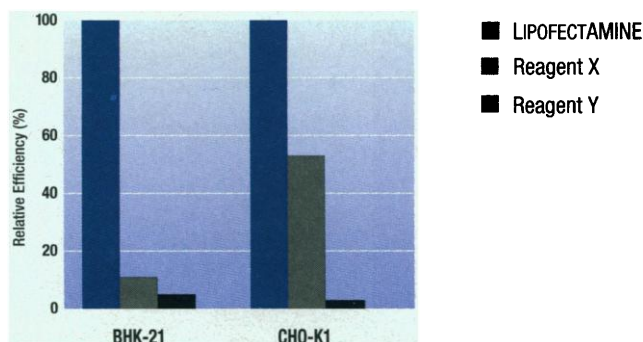
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**FIGURE 1.** Relative transfection efficiencies of LIPOFECTAMINE Reagent and two cationic lipid reagents from other suppliers. The amount of reagent and DNA were optimized according to manufacturers' recommended conditions. Peak activities are shown normalized relative to LIPOFECTAMINE Reagent.

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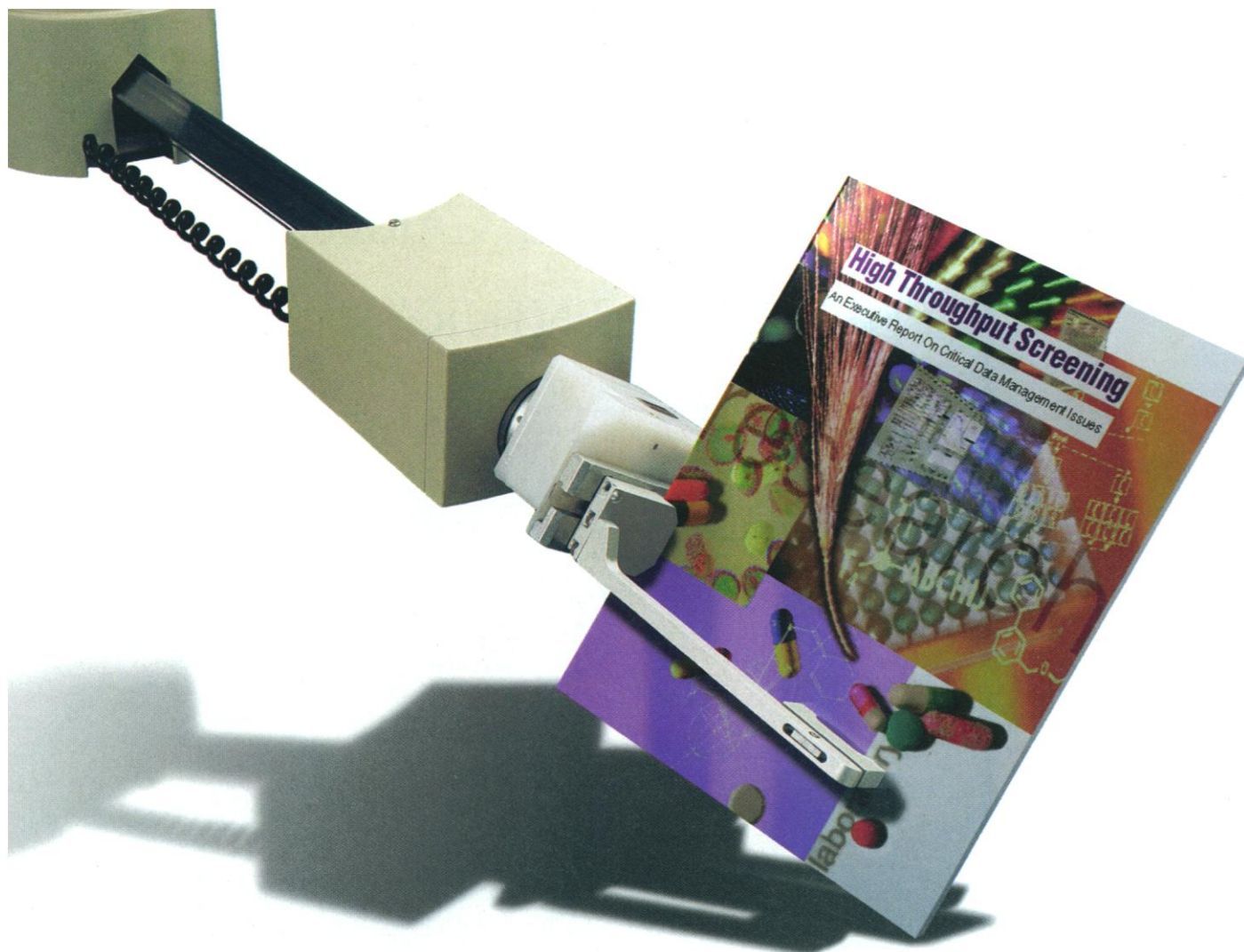
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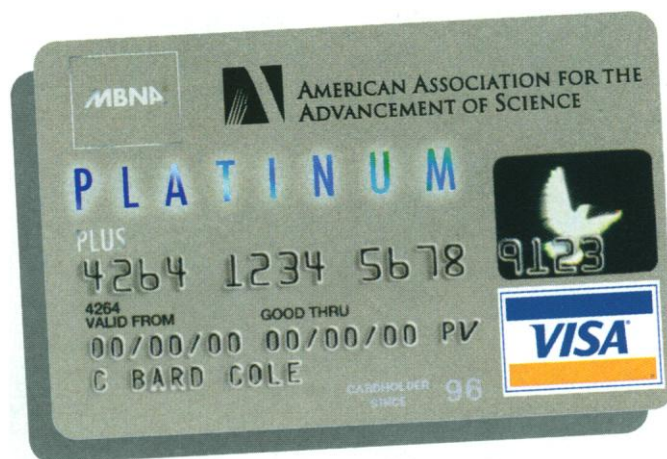
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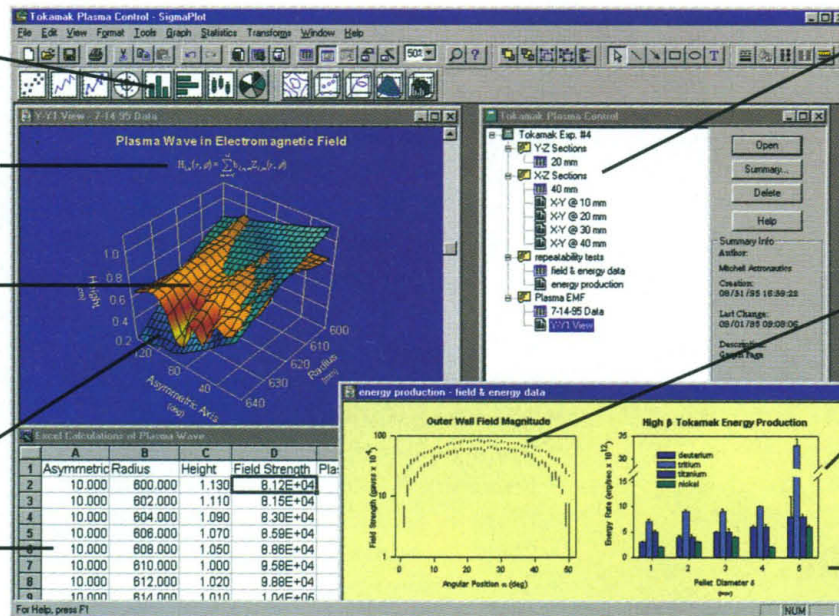
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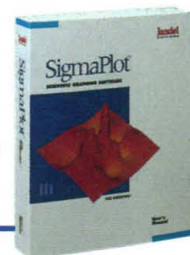
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