

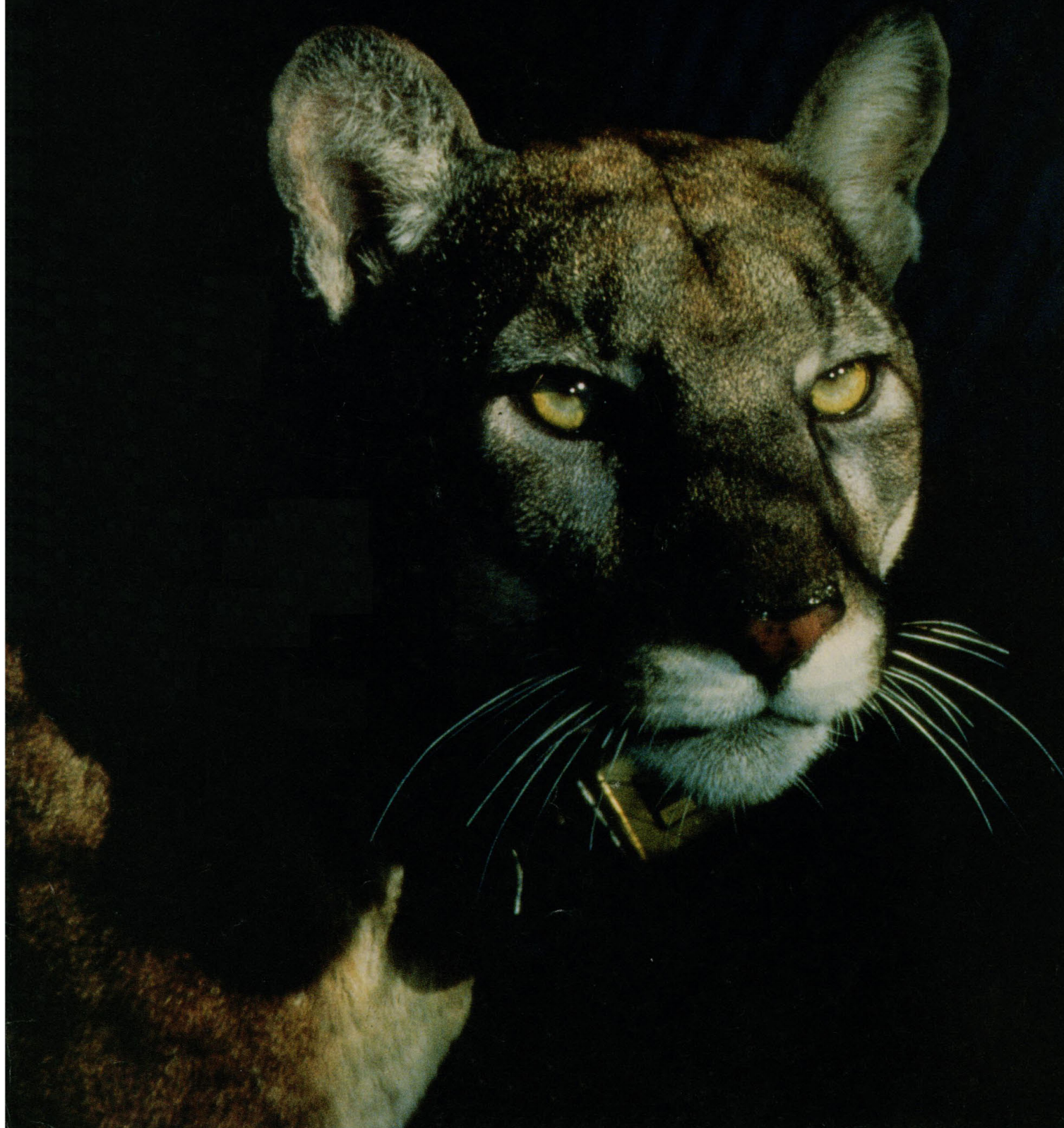
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COVER The Florida panther (*Felis concolor coryi*) is a critically endangered cougar subspecies. A captive breeding program designed to improve the panther's chances of survival (see Research News, page 1178) has proved controversial—in part because the panther population may have interbred with South American cats released in the wild, raising questions of what constitutes a species (see Perspective, page 1187). [Photograph by William A. Greer, Florida Game and Fish Commission]

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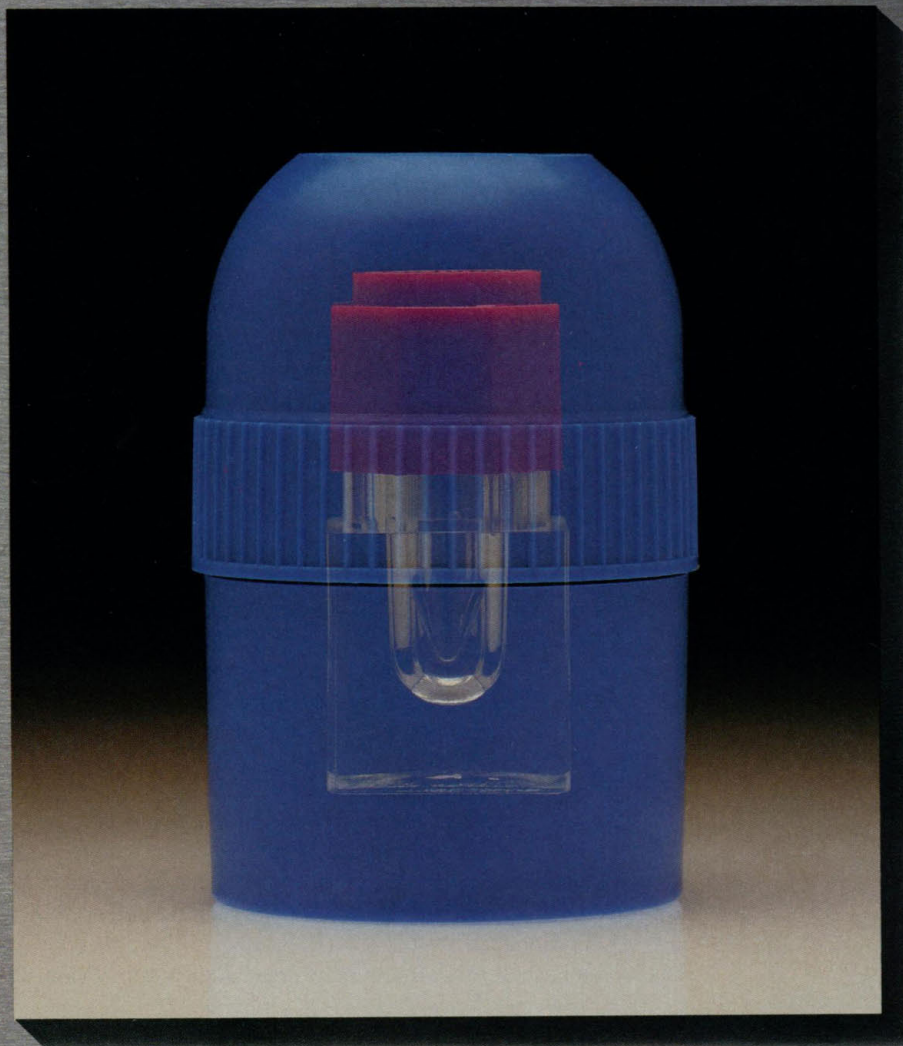
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This Week in SCIENCE

Scanning, tunneling, and maneuvering

THE electric field produced by the tip of the scanning tunneling microscope can be used for moving atoms around on room-temperature surfaces so as to create new structures that do not occur naturally under equilibrium conditions (page 1206). Whitman *et al.* demonstrate this new approach to atomic engineering on two semiconducting substances, gallium arsenide and indium antimonide. At each of the surfaces, adsorbed cesium atoms that had been deposited previously were induced by the electric field to diffuse into the region beneath the tip. Gradients in the electric field, acting on the dipole moment of the cesium atoms, apparently exert a force that draws the adatoms to the tip and results in the creation of novel cesium structures. This technology appears to be suited to the fabrication and study of many new types of surface nanostructures that will form at room temperature with different combinations of surface atoms and semiconductors or metals.

Immune tolerance in transgenic animals

STUDIES with transgenic mice are providing new insights into how immune tolerance to self antigens is achieved (page 1223). The transgenic animals carry the gene that encodes the hen egg protein lysozyme, and they express this gene much as they would an endogenous gene. When such animals were tested for their ability to produce antibodies to lysozyme, both T cell and B cell populations proved to be tolerant to lysozyme in most individuals. The exception to this occurred when serum lysozyme levels were extremely low (less than 10^{-10} M); under these conditions, the B cell population sometimes escaped tolerance whereas the T cell population still became tolerant. This difference in low zone tolerance induction may reflect fundamental differences in what is required for the two cell populations to recognize antigen. Adelstein

et al. speculate that in some autoimmune diseases the B cell compartment may fail to become tolerant to a self antigen that is present in low amounts. If other conditions exist to support antibody production, such B cells may be induced to make the autoantibodies of disease.

Gelsolin and motility

THE cellular protein gelsolin, which participates in the assembly and disassembly of the cytoskeletal protein actin, directly affects cell motility. When genes for gelsolin are transferred into and expressed by cells of a fibroblast cell line, gelsolin production increases and concurrent changes are observed in the speed of movement of the cells (page 1233). Two assays were used to evaluate changes in cell motility: one, a chemotactic assay, assessed the movement of cells in vitro toward a serum gradient and the other monitored the closure of an artificial wound by cells migrating toward the wound. Cunningham *et al.* note that enhanced cell motility paralleled increased gelsolin expression over a certain range but that if the cells begin to produce too much gelsolin damage to their architecture and integrity may be irreparable. This work raises the possibility that gelsolin genes could be inserted into host cells in vivo as a way of augmenting wound healing clinically.

Clues to fragile X syndrome

NEXT to Down syndrome, the most common "chromosomal" form of mental retardation, with an incidence of 1 in 1500 newborn males, is associated with the presence of a fragile X chromosome. Affected X chromosomes tend to break easily in the fragile chromosomal region Xq27.3. Heitz *et al.* have focused more closely on this site (page 1236). They have prepared yeast artificial chromosomes containing cloned DNA that covers the fragile site and have identified a suspect "CpG" island in the DNA. The CpG

island is considered a molecular indicator of a possible candidate gene that may be involved in expression of the syndrome. In patients with fragile X syndrome, specific sites in this CpG island appeared to be excessively (atypically) methylated. As more information is obtained about the susceptible breakpoints in the fragile site and what causes their breakage some of the enigmatic features of the syndrome may be clarified. One puzzling aspect of fragile X syndrome is the pattern of inheritance: presence of a fragile X chromosome does not necessarily lead to mental retardation and it is thought that some "imprinting" (perhaps methylation?) that occurs in the donor parent may determine whether an individual carrying a fragile X chromosome will develop the disease phenotype.

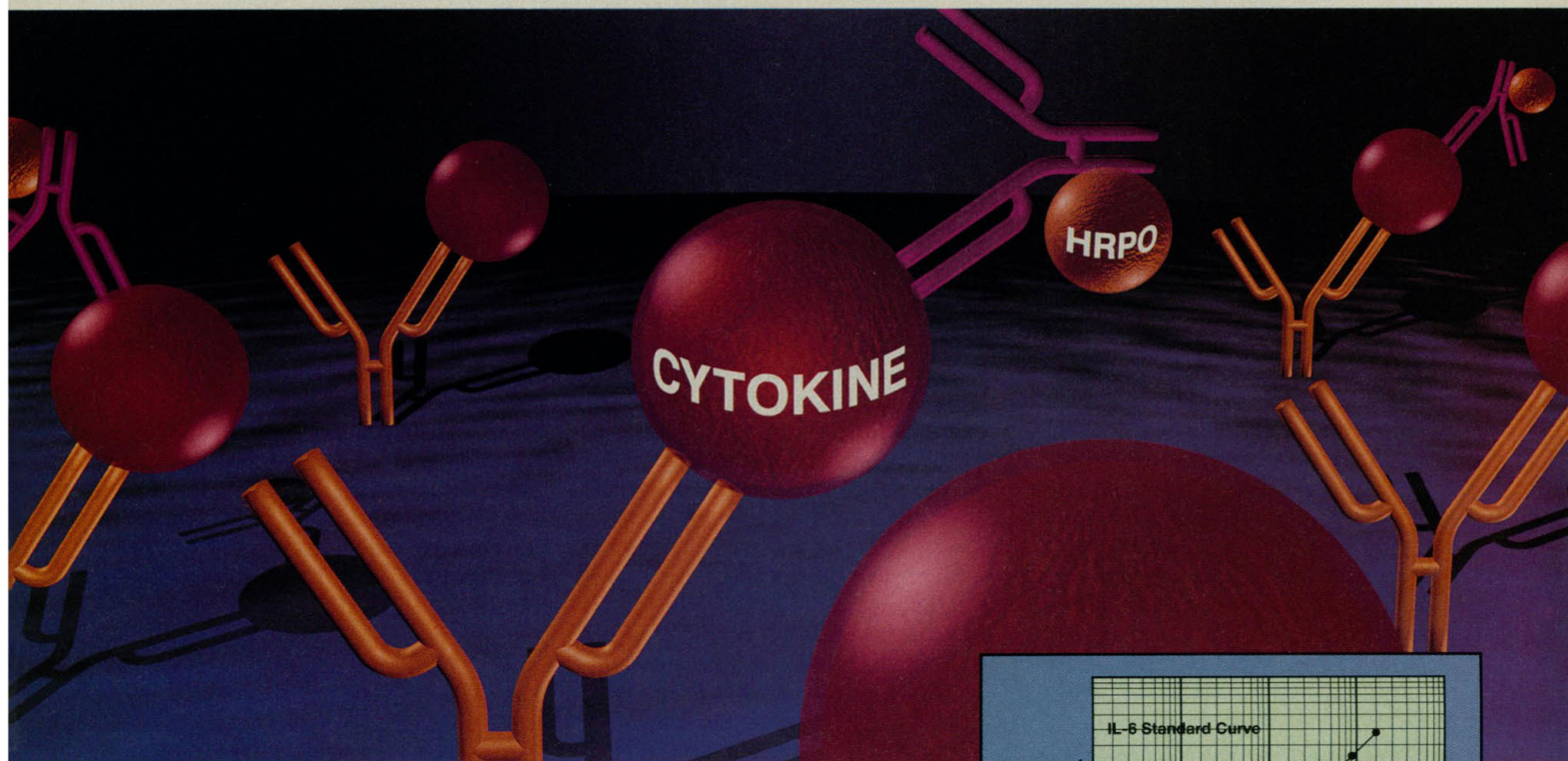
V4 function

ALTHOUGH the extrastriate area V4 of the primate brain has been known to be involved in processing visual information, exactly what it does has not been clear. Schiller and Lee have tackled this issue by training monkeys to do a variety of visual tasks, then removing portions of the V4 area from the monkeys' brains, and thereafter assessing the effects of this removal on the monkeys' visual abilities (page 1251). Detection and discrimination of brightness, size, shape, color, pattern, motion, and depth perception of visual stimuli were all evaluated. After area V4 was removed, the monkeys had a surprising deficit: they were no longer able to pick out "lesser" stimuli from "greater" ones. For example, objects that were less intense or smaller than surrounding objects could not be selected. In addition, the monkeys could not generalize what they learned with one type of visual stimulus to a similar type. The experiments indicate that the role of area V4 in visual processing is unexpectedly complex and is not merely one of responding to color, pattern, or other simple attributes of visual stimuli.

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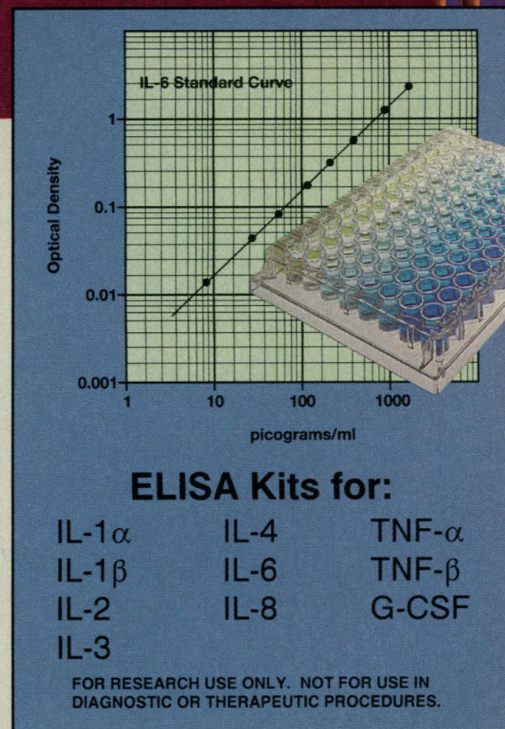
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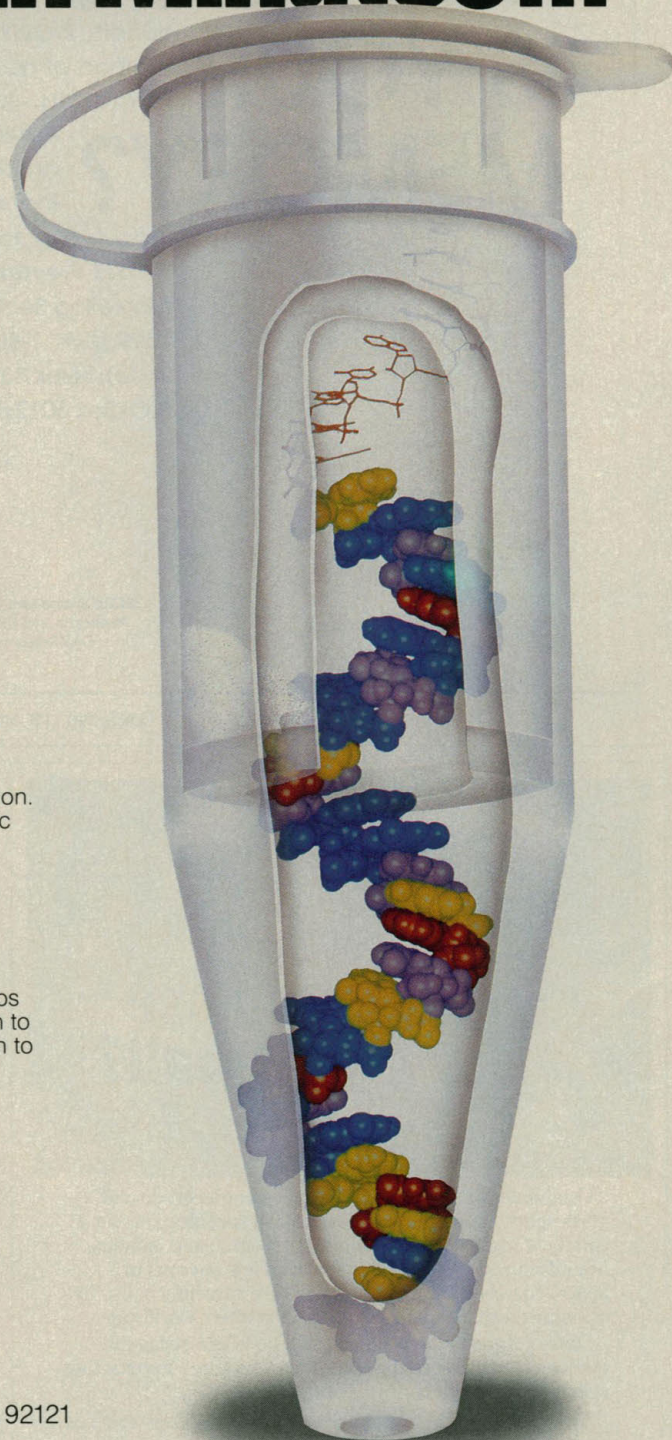


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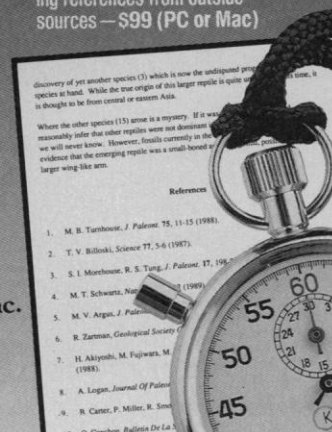
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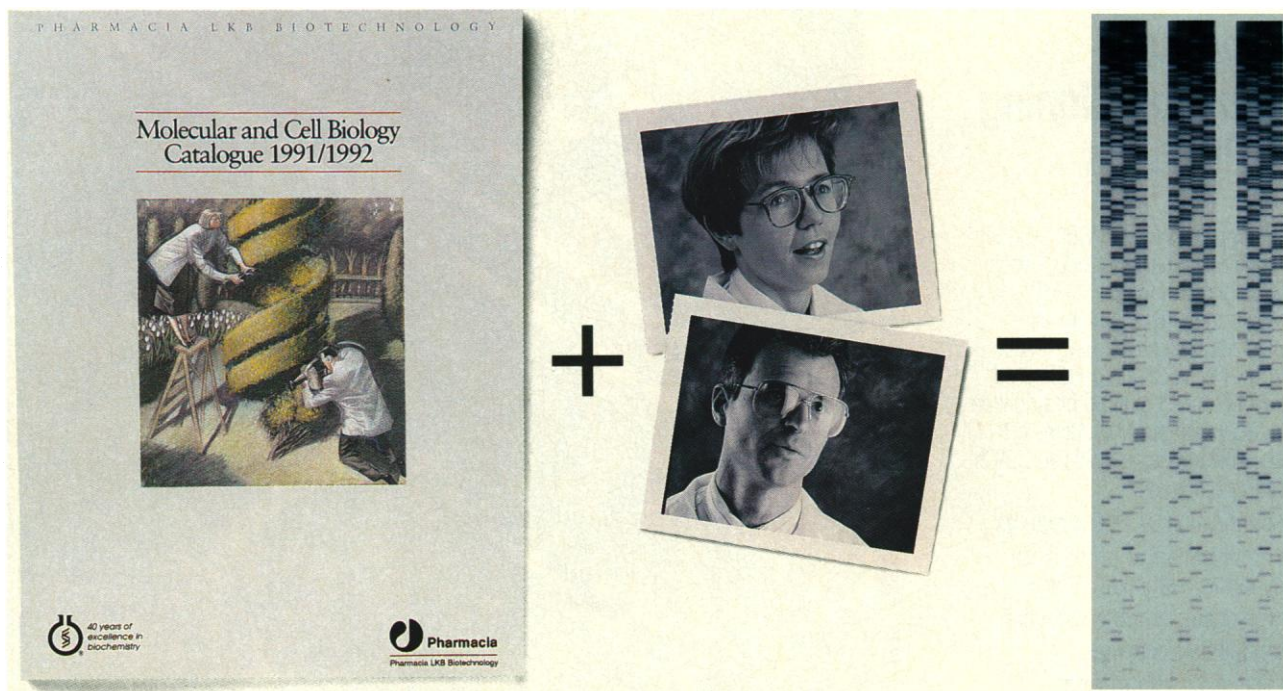
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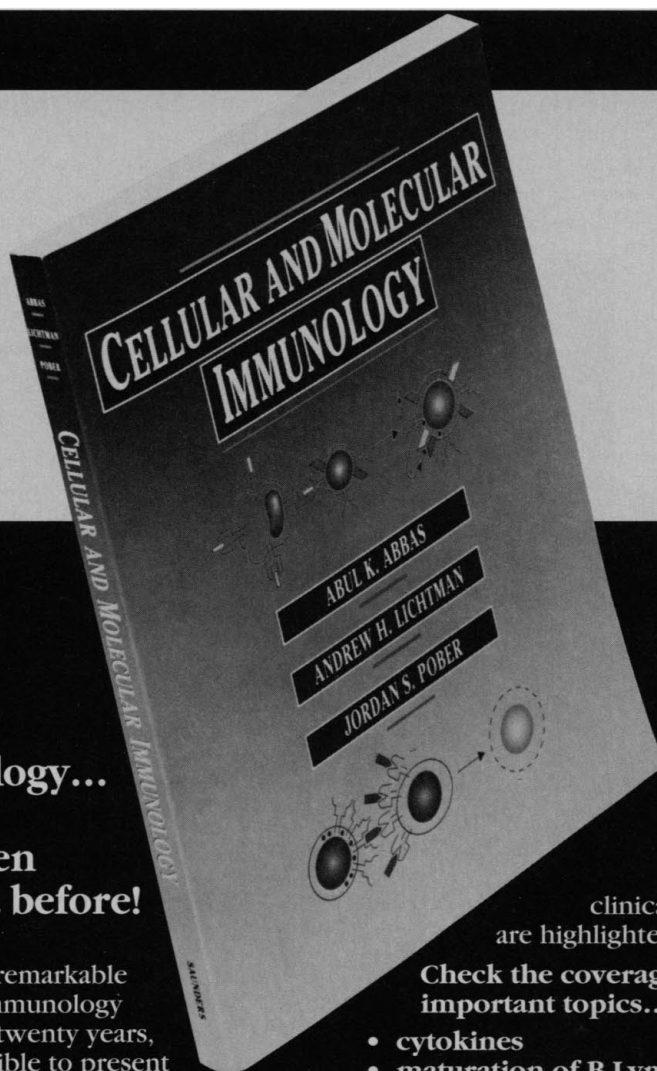
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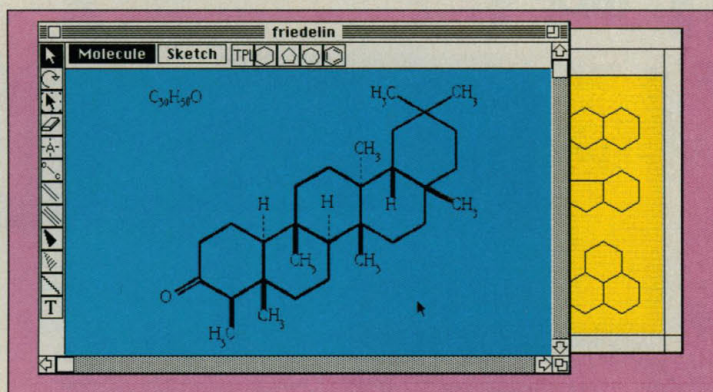
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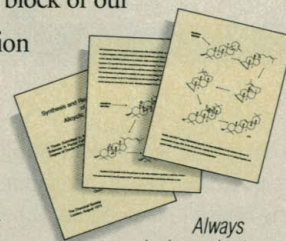
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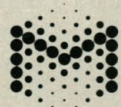
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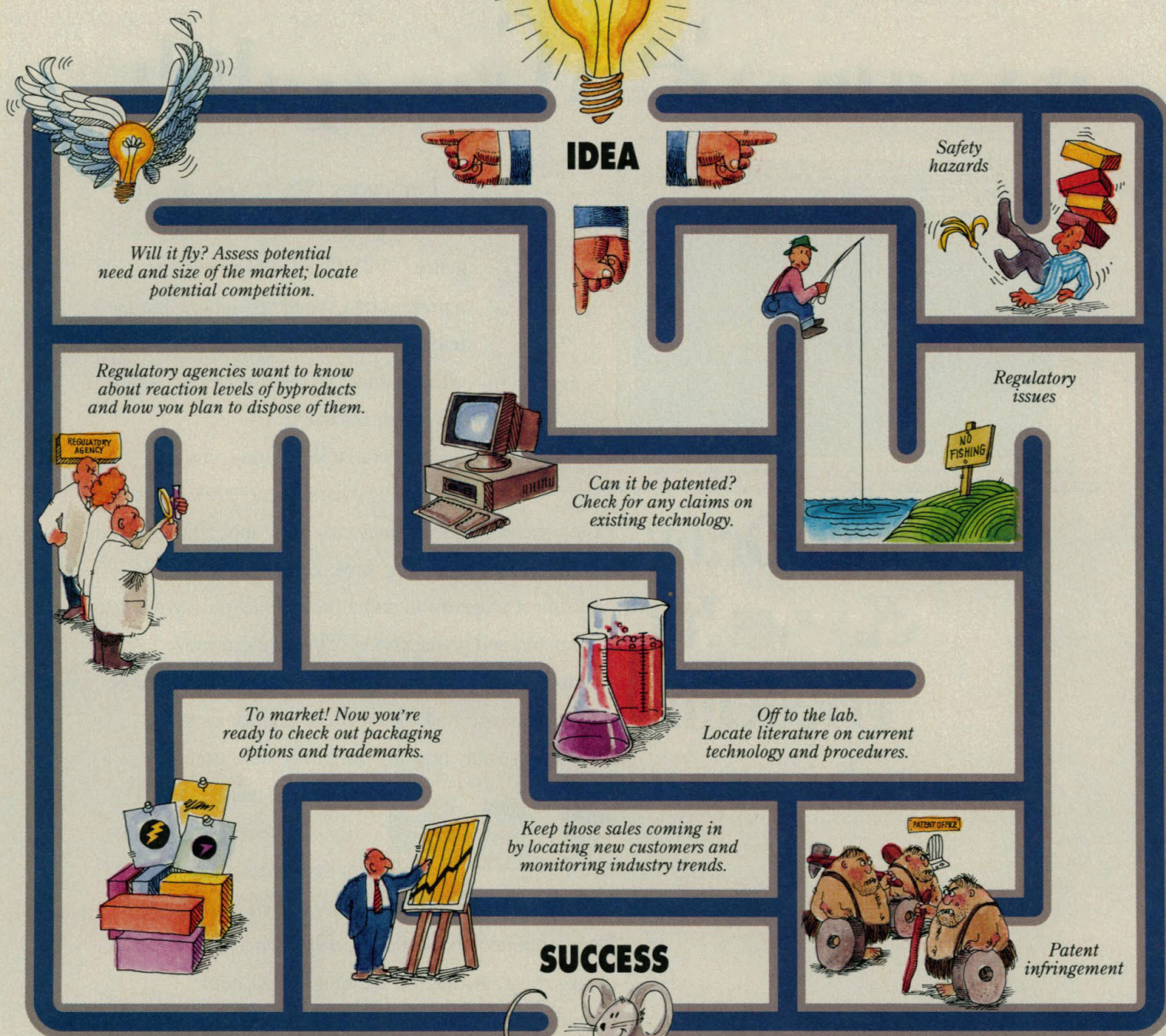


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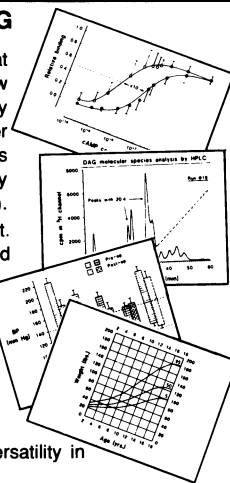
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