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13 SEPTEMBER 1996
VOL. 273 • PAGES 1461–1624
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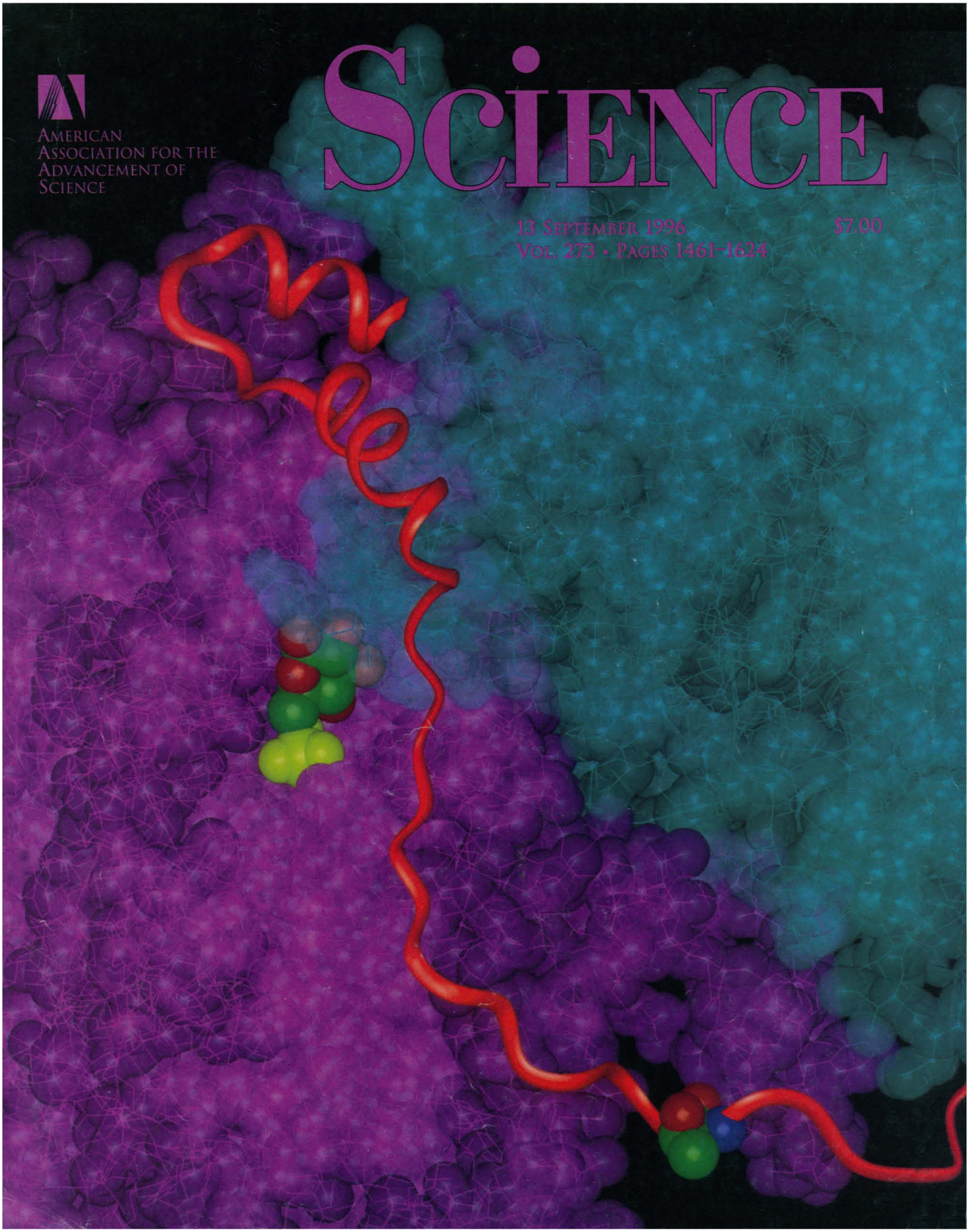

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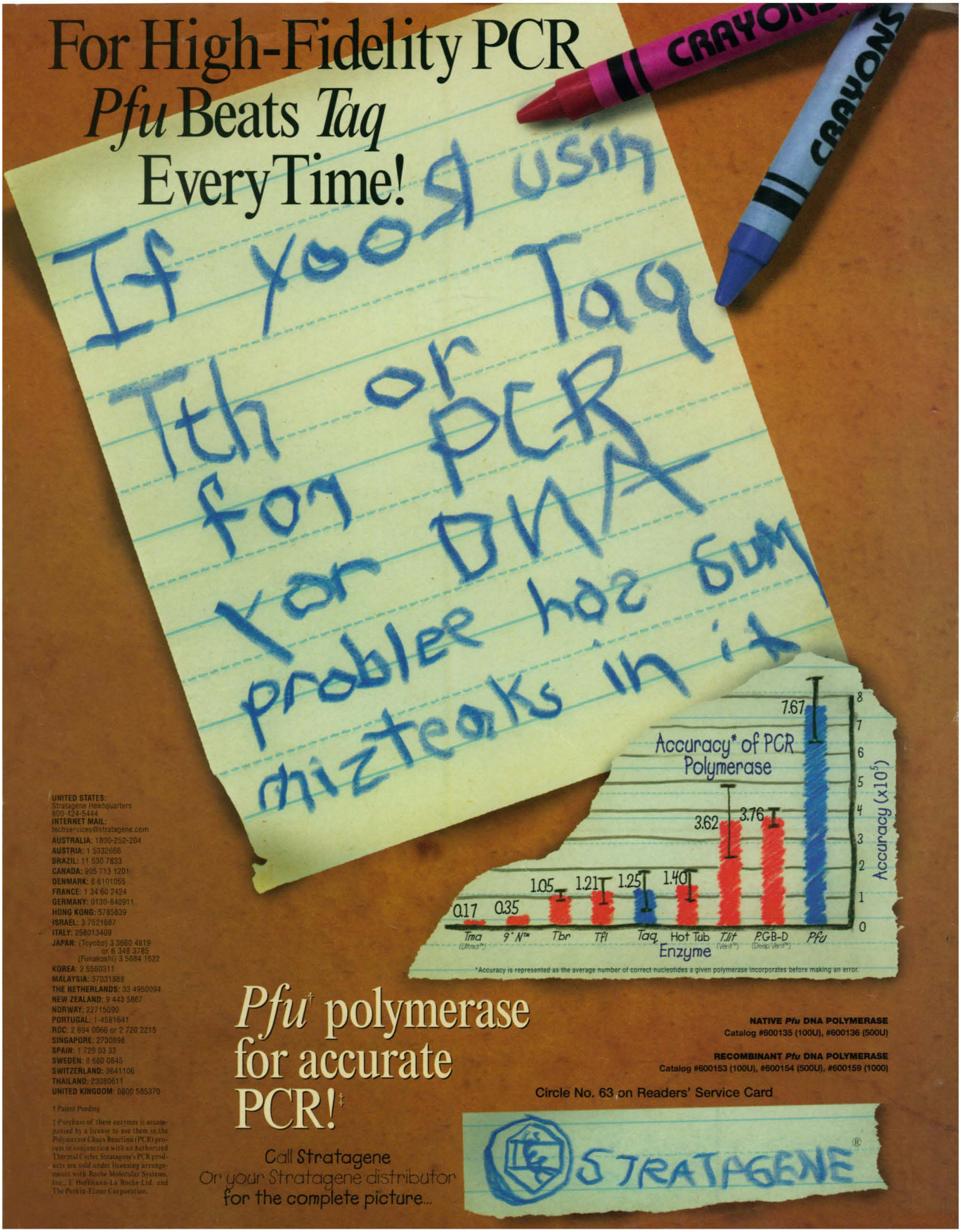
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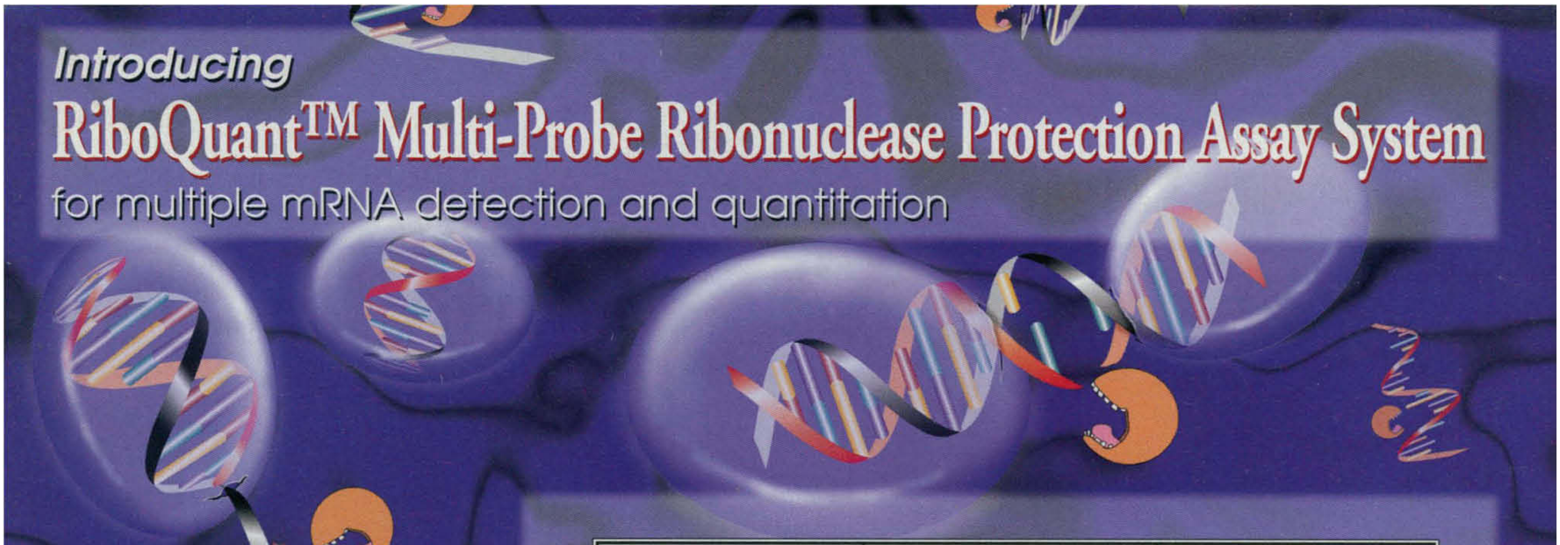

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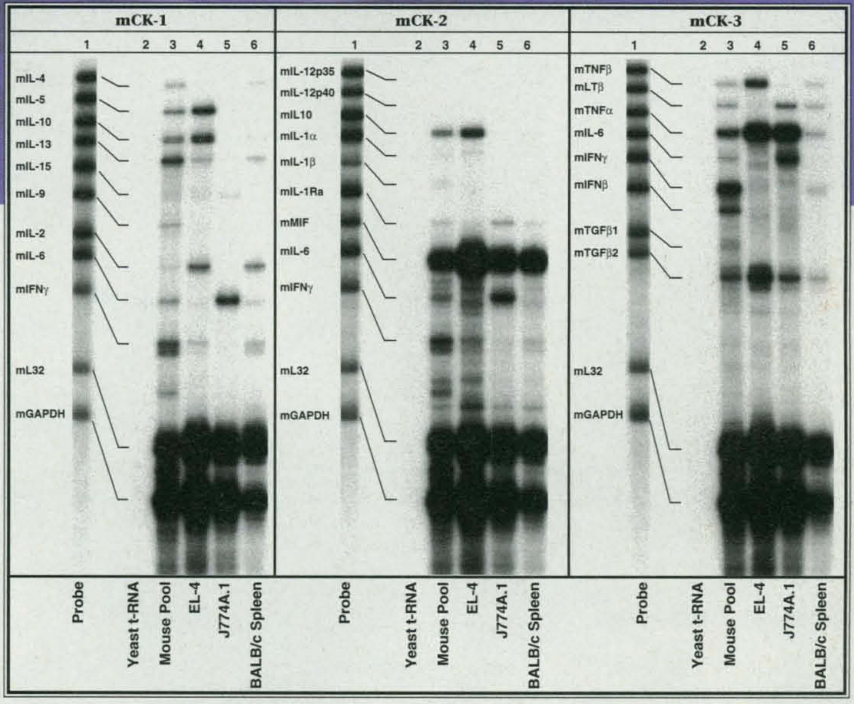

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ISSN 0036-8075
13 SEPTEMBER 1996
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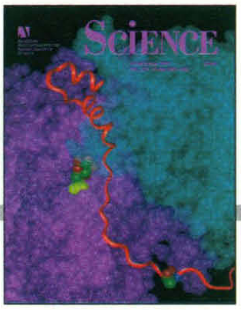
COVER

Subunit contact region (subunits are purple and turquoise) of the unphosphorylated, inactive yeast enzyme glycogen phosphorylase, shown with bound inhibitor glucose-6-phosphate (atom cluster at middle left, phosphate colored light green). After phosphorylation of a threonine residue (atom cluster at bottom right), the amino-terminal segment (red ribbon) refolds and then interferes with inhibitor binding and activates the enzyme. See page 1539. [Image: Kai Lin and Peter K. Hwang]



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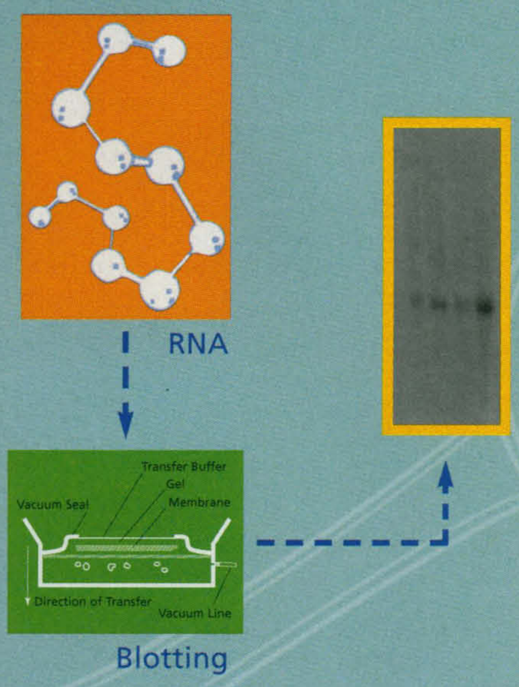

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THIS WEEK IN SCIENCE

■

edited by PHIL SZUROMI

Simple chlorine reactions

The reaction of chlorine atoms with molecular hydrogen is a prototype for a host of chlorine reactions, including ones in atmospheric chemistry, and its mechanism has been investigated for more than 150 years. Despite this interest, determining the details of the potential energy surface governing the nuclear motions in this reaction has proved to be both an experimental and theoretical challenge. Alagia *et al.* (p. 1519) have performed a high-resolution crossed molecular beam experiment to determine angular distributions and time-of-flight spectra for the reaction and have obtained good agreement with calculated cross sections from a recently described potential energy surface.

■

Deep melts in the mantle

Just above the core-mantle boundary, compressional waves seem to slow down. Williams and Garnero (p. 1528) modeled the seismic observations using reasonable compositional and elastic properties for phases at this depth. They suggest that an intermittent partial melt zone explains the estimated 10% drop in velocity. Such a deep melt zone has profound implications for the thermal and chemical structure of the reactive boundary layer between the silicate mantle and the fluid, iron-rich outer core.

■

Fire and flood

Two reports highlight the role of natural disasters in maintaining ecosystem function (see the Perspective by Tilman, p. 1518). Leach and Givnish (p. 1555) recensused prairie remnants that were originally surveyed in the 1940s and 1950s and found a rapid loss of herbaceous species, many of which are threatened or endangered. The observed pattern of species loss is consistent with suppression of the frequent fires that are thought to have helped maintain open prairies. The effect of flooding disturbance on food webs in rivers is modeled and experimentally evaluated by Wootton *et al.* (p. 1558). Reducing flooding disturbance leads to increases in predator-resistant grazers, undermining the food web of economically important stream salmonids.

Early El Niños

El Niño events seem to have affected climate, ocean temperatures, and thus coastal biota. This is the case particularly in the Pacific but perhaps globally for at least much of the historical record. The onset of El Niños during the Holocene, however, has been uncertain. Sandweiss *et al.* (p. 1531) present evidence from faunal assemblages at coastal archaeological sites along the west coast of South America indicating that El Niños began about 5000 years ago. Sites inhabited prior to 5000 years ago contained predominantly warm-water species characteristic of stable, warm tropical water, whereas younger sites include temperate species.

■

Limits on light

Optical limiters pass low levels of light but block transmission at high intensities. Their uses include protecting sensors from intense laser pulses, but improvements are needed in order to use them for protecting the human eye. Perry *et al.* (p. 1533) combined two approaches to produce an improved organic optical limiter. They derivatized phthalocyanine complexes with heavy atoms to increase the absorption of the triplet excited state of the molecule. They also varied the concentration of these molecules along the optical path to maintain high saturation of the excited state without damaging the material.

■

Endangered species surrogates

The study of endangered species faces the problem that endangered species are, by definition, rare. Can information obtained from the study of a more common species be applied in a meaningful way to similar but endangered species? This approach runs the risk that the two species may differ in critical ways, which would make any of the conclusions suspect. Wahlberg *et al.* (p. 1536) have developed a spatially realistic metapopulation model by using data collected on a common species of butterfly; the model was successfully used to predict the distribution of a congeneric, endangered species. This "surrogate species" approach may promise to be a useful tool for conservation biology.

■

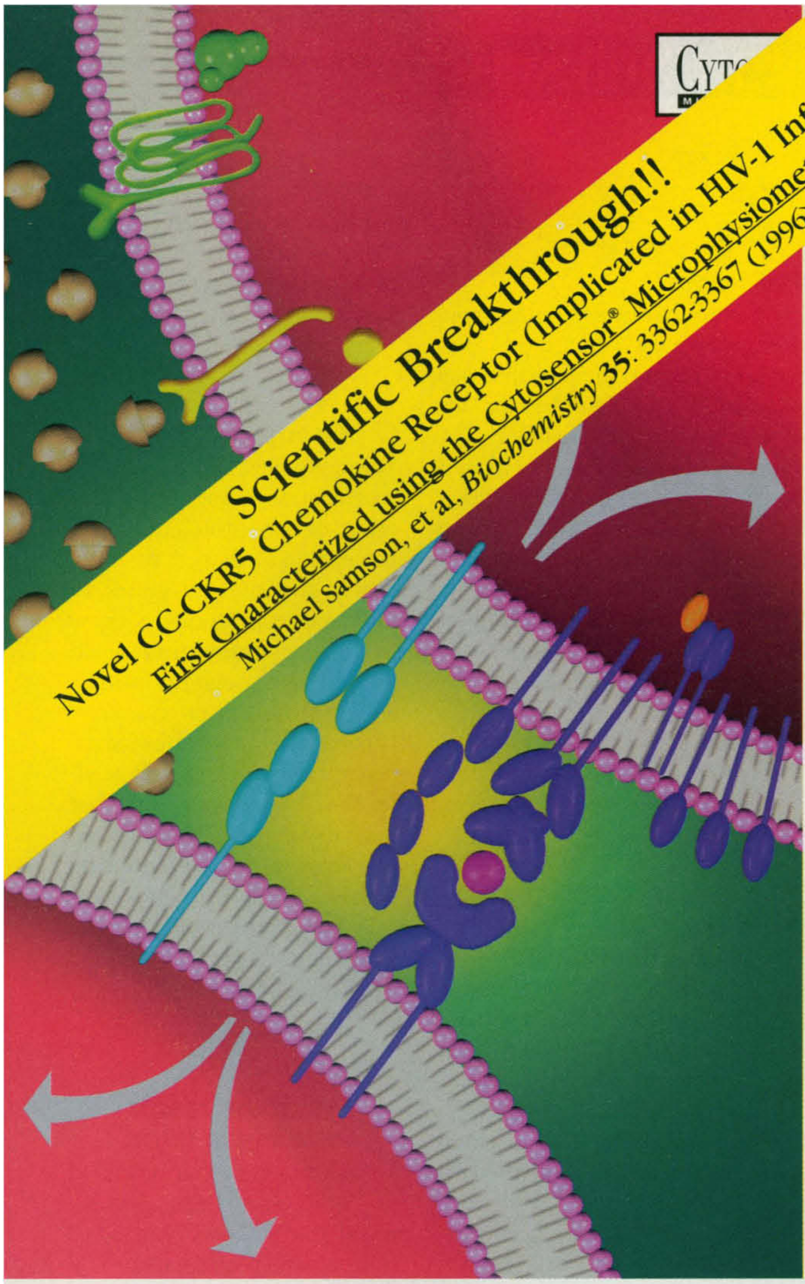
Group dynamics

Some physical stimuli contain a continuously varying parameter, such as wavelength, yet perception of these stimuli occurs in groups or categories. In human speech, sounds that vary in voice onset time are grouped into distinct categories, within which variation of the onset time does not interfere with perception. Wyttenbach *et al.* (p. 1542) now demonstrate that crickets can perform this complex behavior, differentiating between lower frequency calls from other crickets and higher frequency sounds that are used by bats to locate prey.

■

With the result already in mind

Visualization of the intended outcome has been recommended to athletes as an aid to training and performance. The rehearsal and mental simulation of motor processes have been thought to improve subsequent execution of the skill. From the study of patients with unilateral cortical lesions, Sirigu *et al.* (p. 1564) suggest the involvement of the parietal cortex in simulated movements of the hand and fingers. These patients were selectively impaired in predicting the time required for movements in comparison to the performance of a patient with a lesion in the primary motor cortex. Whether the parietal area interprets the outgoing motor signals or contributes stored movement representations remains to be resolved.



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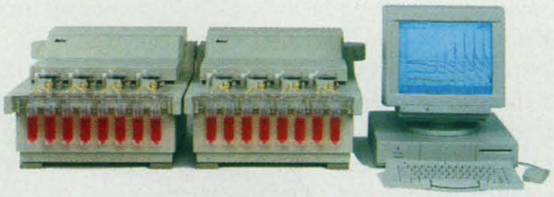

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1. *Science* **257**: 1906 (1992) 2. *Cancer Research* **55**: 5642 (1995) 3. *PNAS* **92**: 2750 (1995)

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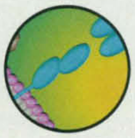

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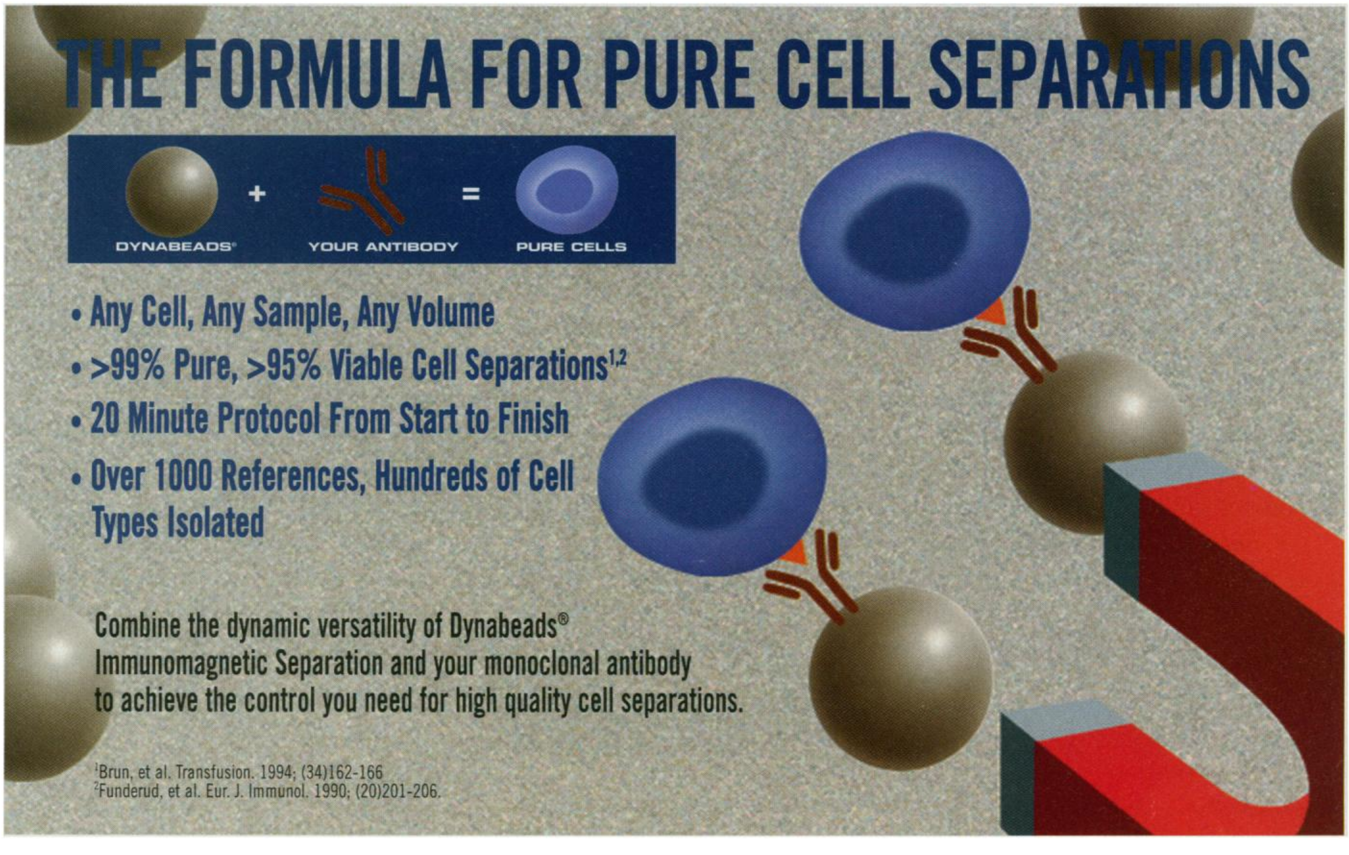

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[1] Brun, et al. Transfusion. 1994; (34)162-166
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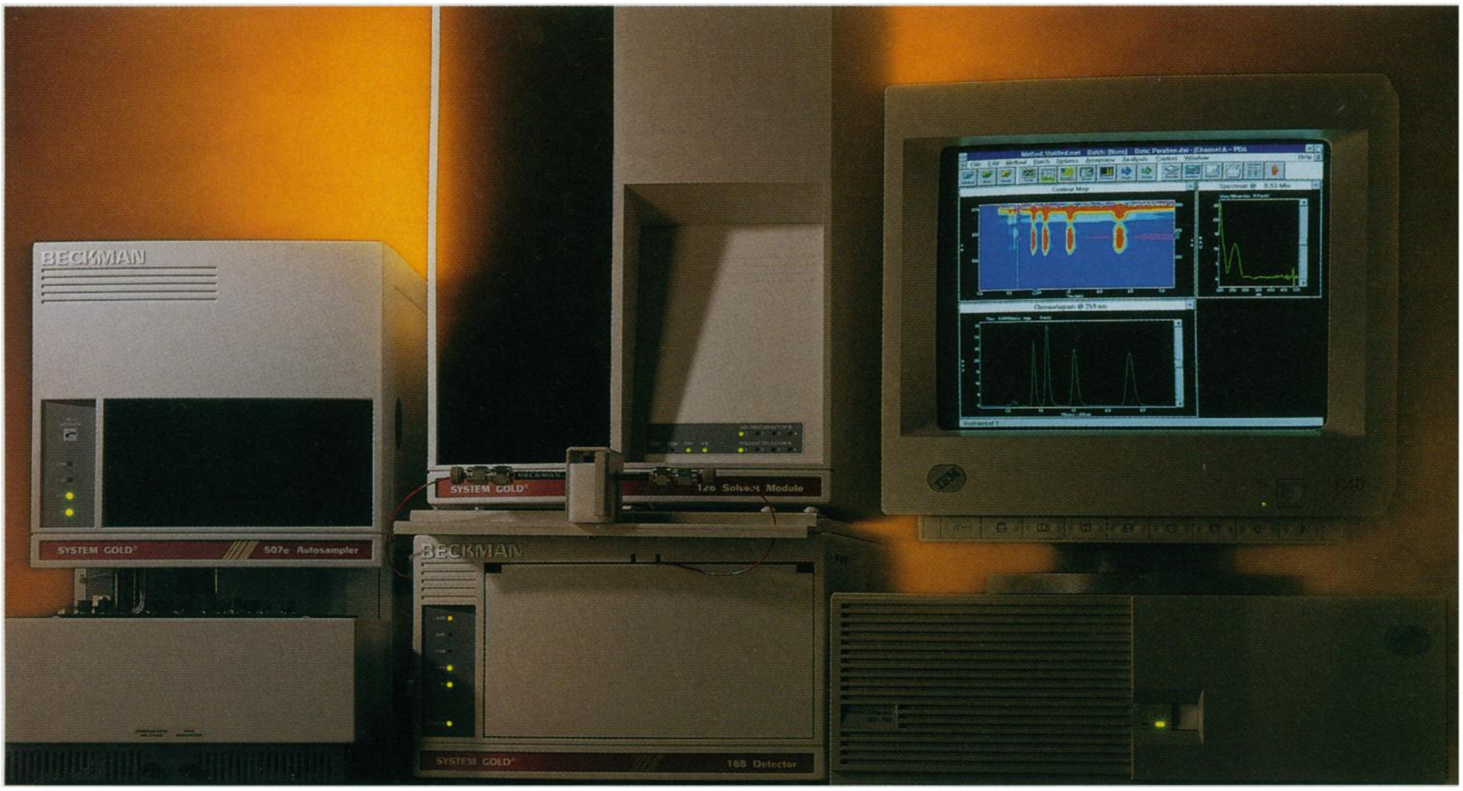

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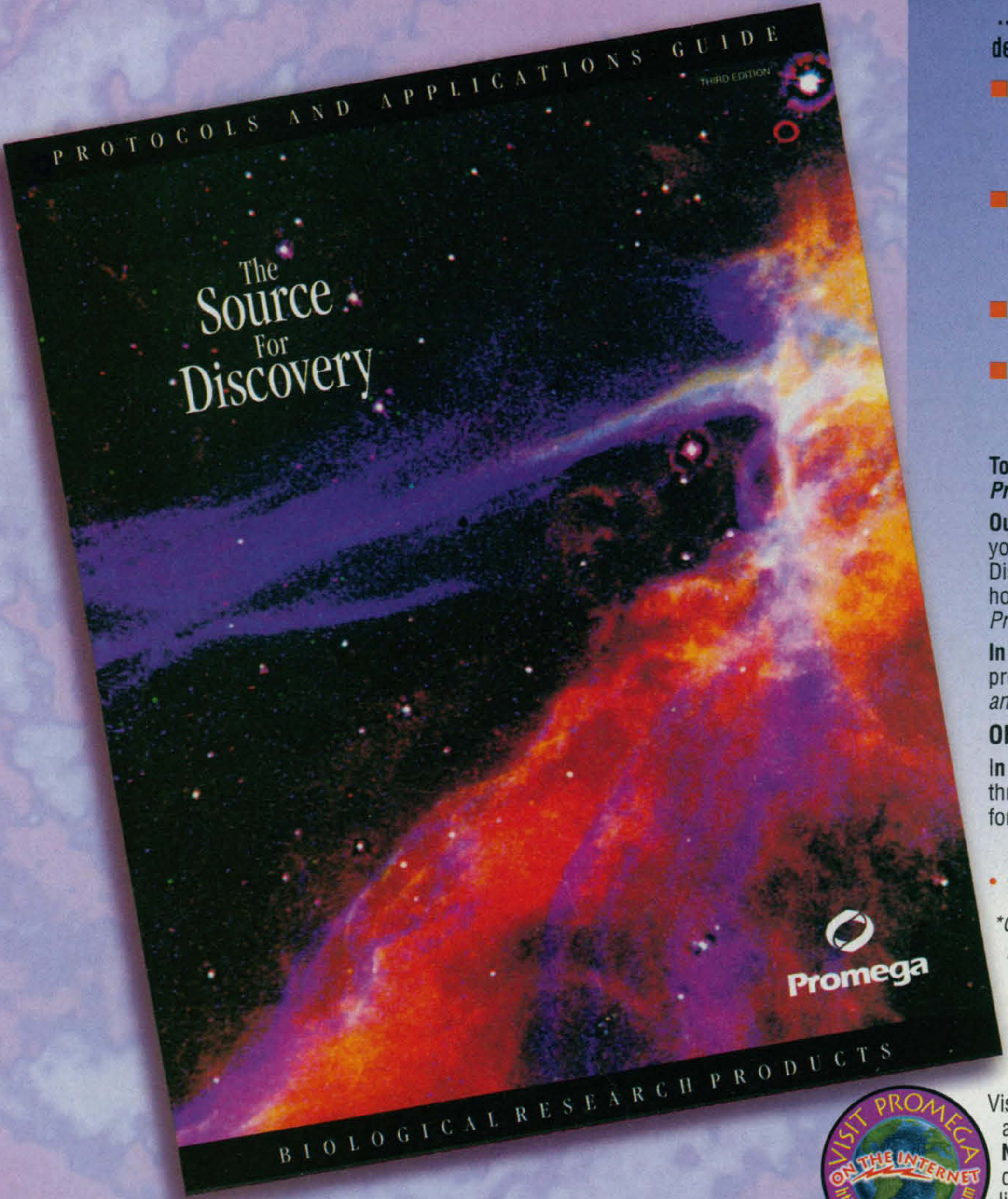
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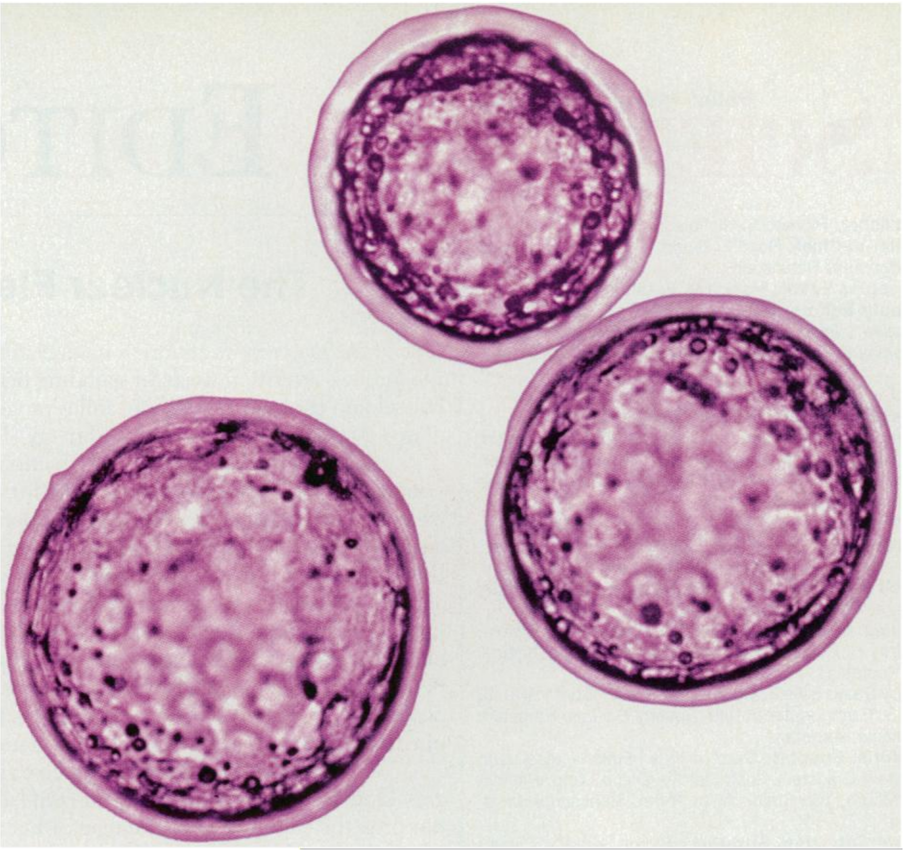

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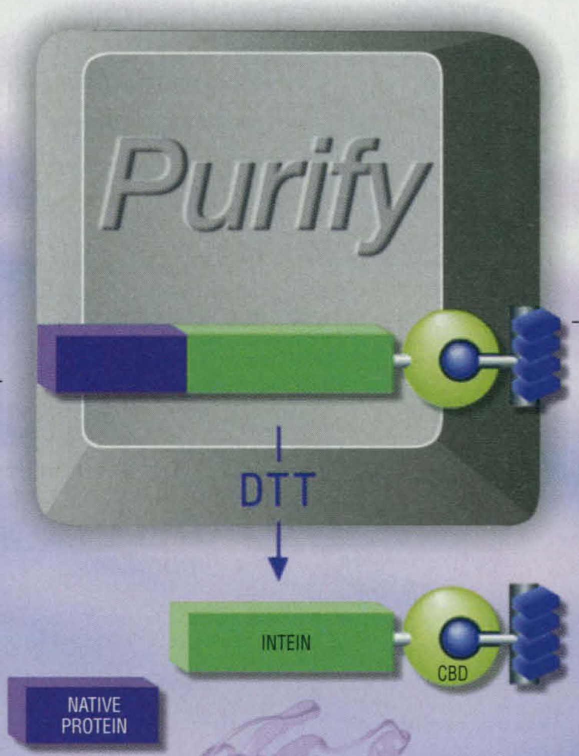

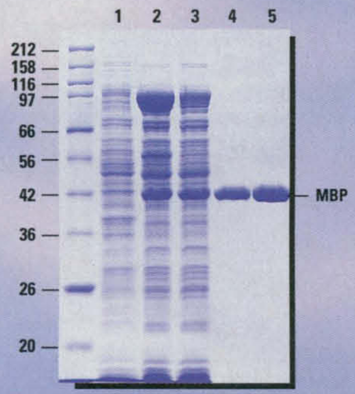

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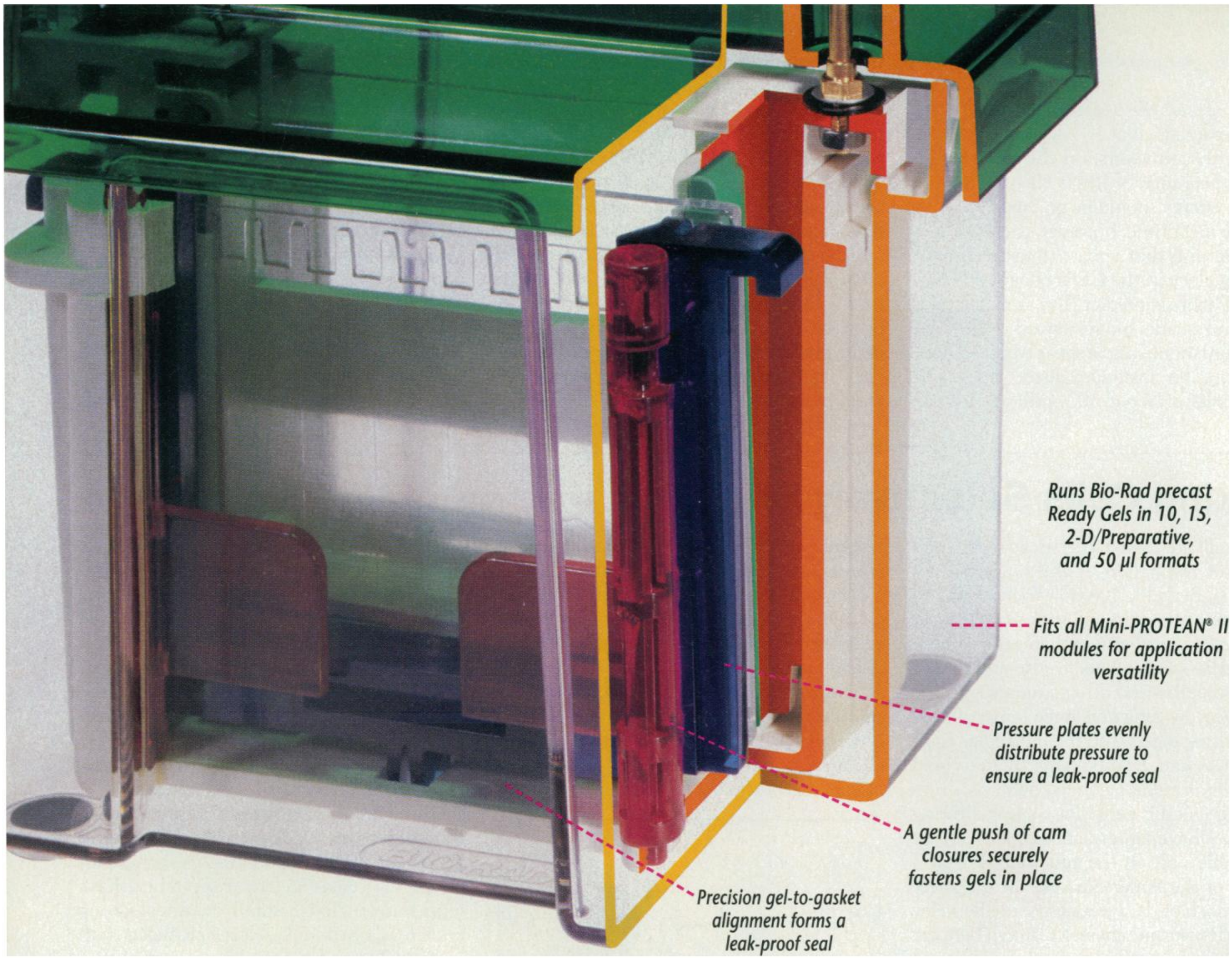
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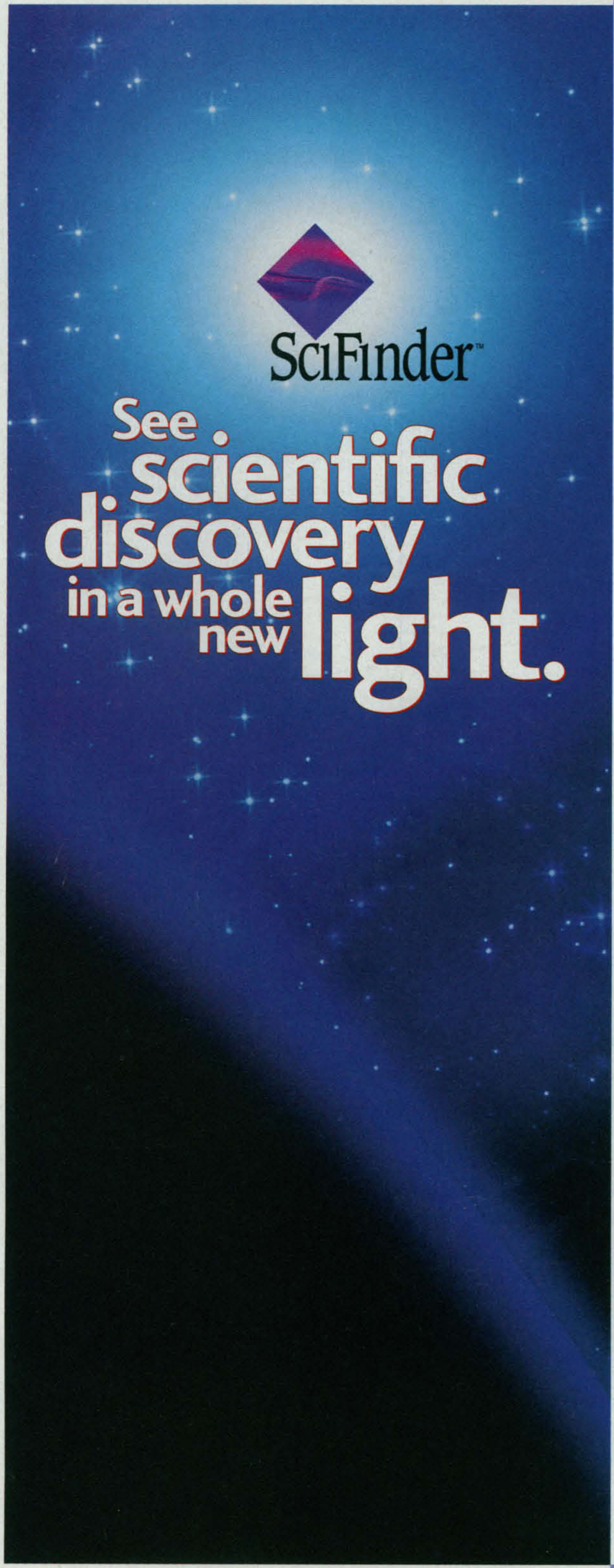
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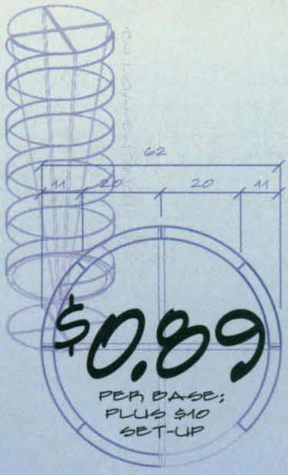

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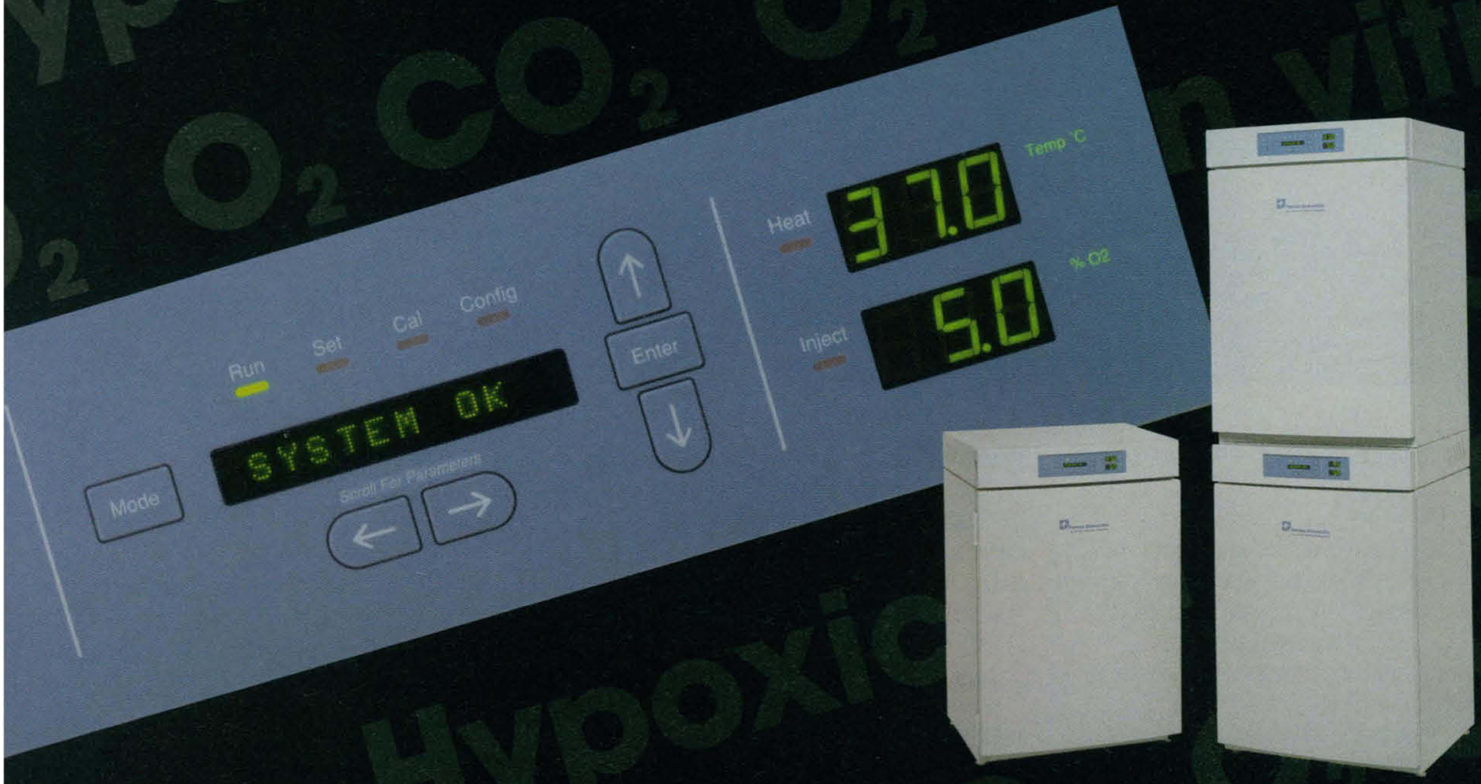

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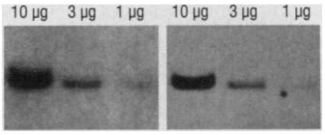

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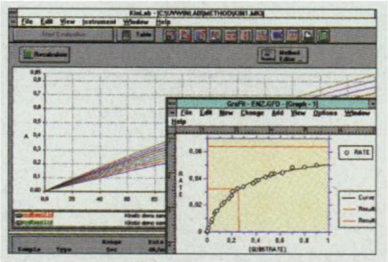

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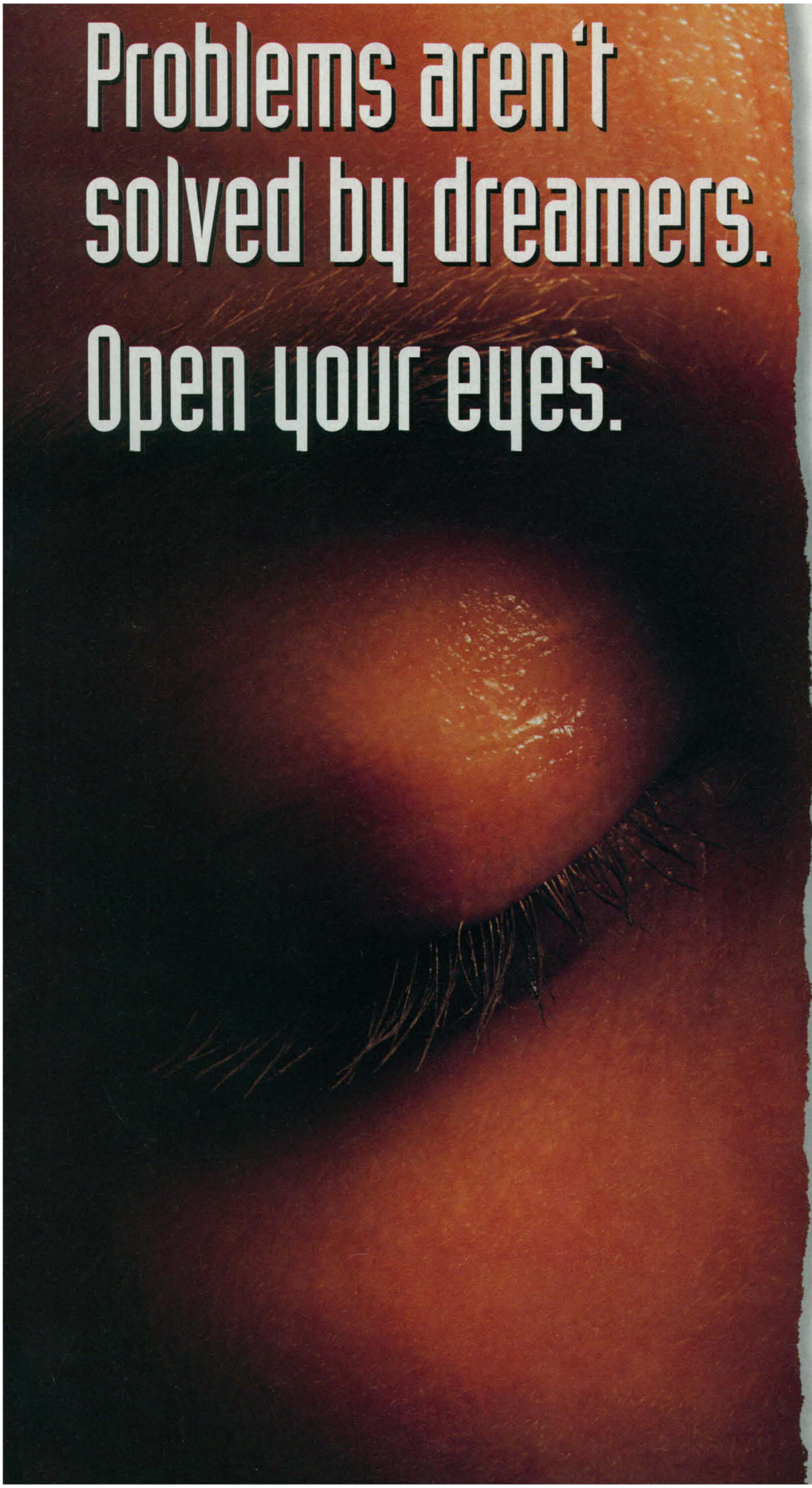
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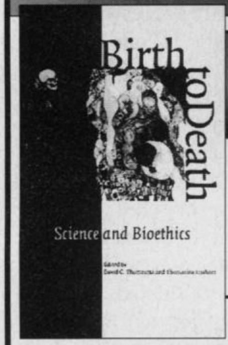

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