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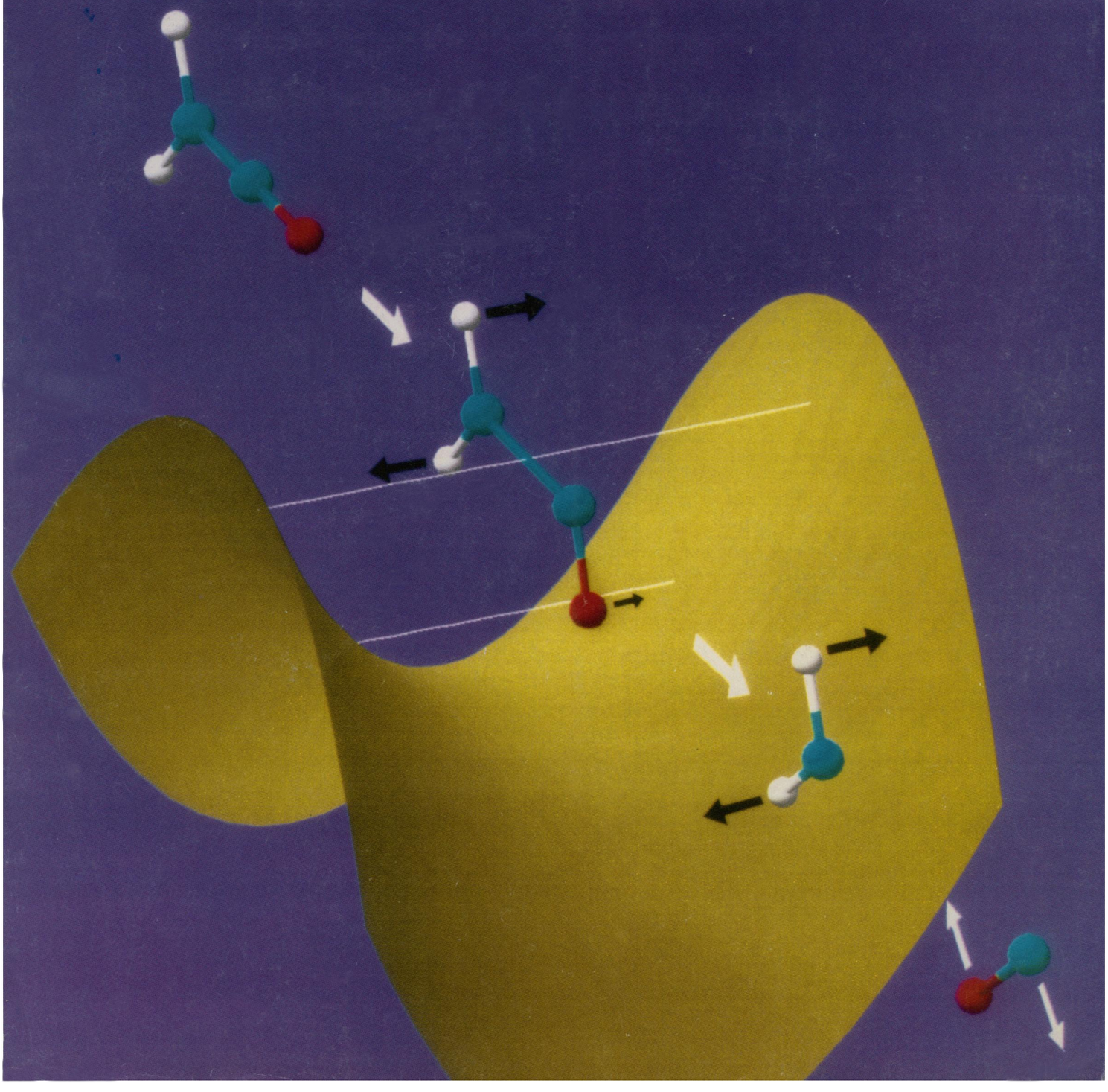

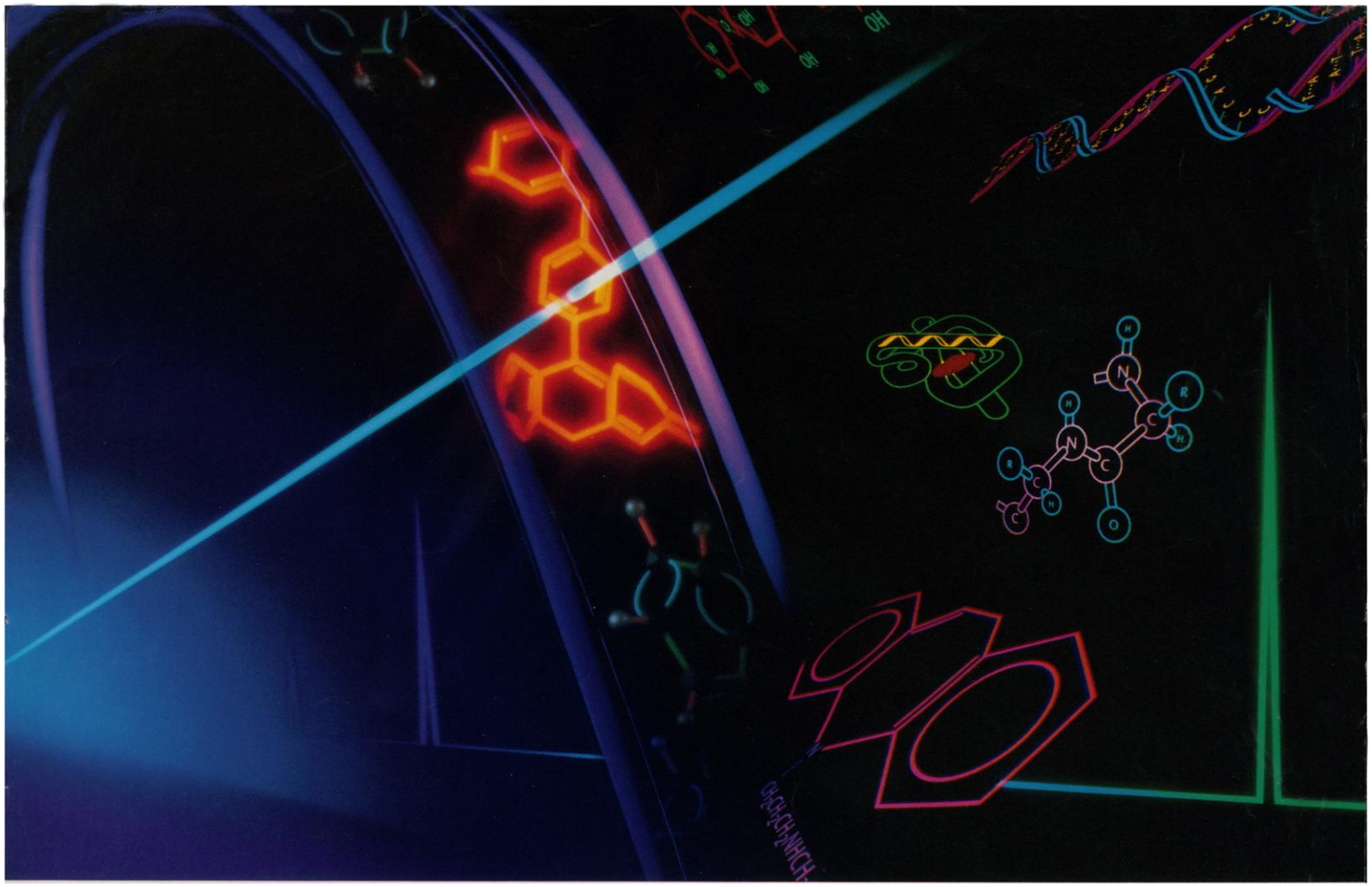

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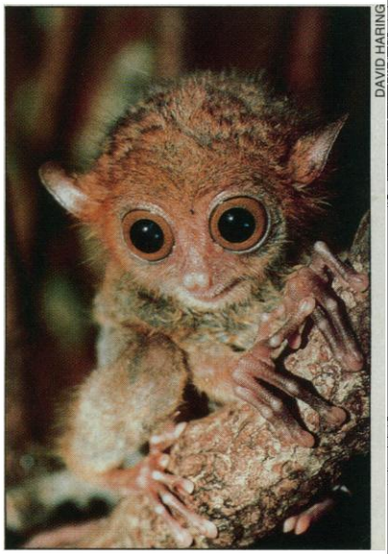
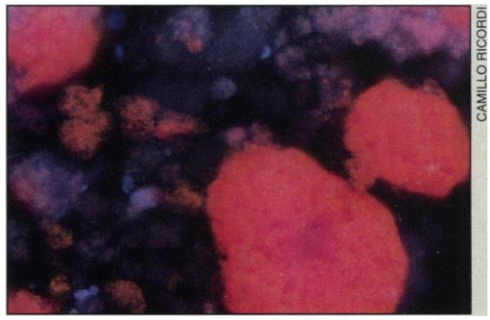
NEWS & COMMENT

RESEARCH NEWS



DAVID HARING

1516 Anthropoid origins



CAMILLO RICORDI

1522 Cell transplantation

DEPARTMENTS

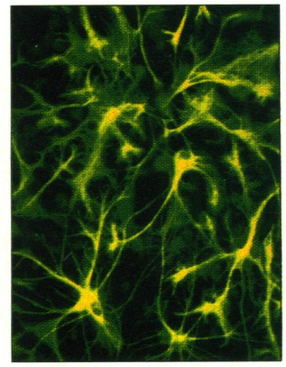
COVER

Schematic of the unimolecular dissociation of ketene (CH_2CO), in which stepwise increases of the dissociation rate are seen as the total energy increases through transition-state vibrational thresholds (white lines). Highly vibrationally excited ketene moves to the transition state of the reaction by localizing energy in the C–C bond (blue). Once at the transition state at the peak of the potential energy surface (yellow), CH_2 and CO repel each other, converting potential energy into translational and rotational energy of the fragments. See page 1541 and the Perspective on page 1523. [Illustration: Tim Robinson, University of California, Berkeley]

PERSPECTIVES

ARTICLES

REPORTS



1563 & 1566
Glial cell connections

1547
History in glass

◩ Indicates accompanying feature

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DUPONT

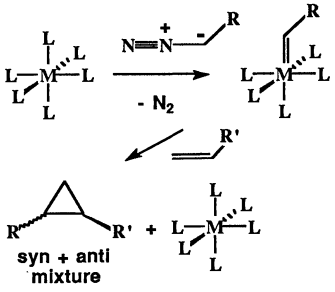
edited by PHIL SZUROMI

Climbing drops

When a water drop is placed on a surface that has been made to decrease in hydrophobicity with distance, surface tension effects (the difference in contact angle as the drop wets the surface) can produce an imbalance of forces that propel the drop. Chaudhury and Whitesides (p. 1539) produced a chemical hydrophobicity gradient on a silicon wafer with a diffusing front of a vapor-phase silane compound [$Cl_3Si(CH_2)_9CH_3$]. A 1- to 2-microliter droplet on such a surface moved up a 15° incline at a rate of 1 to 2 millimeters per second.

Carbene mechanism

One way to introduce chirality, or handedness, into molecules is through the use of asymmetric reactions. Maxwell *et al.* (p. 1544) have studied the mechanism of the cyclopropanation of alkenes by ethyl diazoacetate, as catalyzed by a rhodium-porphyrin metal complex. Low-temperature infrared and nuclear magnetic resonance spectroscopies were used to characterize a metallocarbene species (in which a carbon atom forms a double bond directly to the



rhodium atom). This species decomposes in the presence of styrene to form cyclopropanes, which strongly suggests that this carbene is the active intermediate, rather than a metal-alkene π complex.

Brain tumor treatment

Retroviruses are being considered for clinical applications of gene transfer, but their effectiveness can be limited because stable integration requires active DNA synthesis as occurs during cell division. Because brain cells are usually not undergoing cell division, the introduction of a detrimental gene into rapidly dividing brain tumor cells can turn this potential limitation into an advantage. Culver *et al.* (p. 1550) injected murine fibroblasts expressing a retroviral vector into brain tumors in rats (cerebral gliomas). The retroviral vector expressed the herpes simplex thymidine kinase gene, which when integrated into the tumor cells sensitized them for treatment with the antiviral drug ganciclovir. Such treatment caused complete regression the gliomas, sparing the normal brain tissue.

Devonian impact?

Tektites are typically tiny glass spherules (generally <1 millimeter across) thought to be produced by rapid cooling in air of melt droplets ejected by a large asteroid impact. Glassy spherules resembling tektites have been found at the Cretaceous-Tertiary boundary, about 65 million years ago. Wang (p. 1547) now describes similar glassy spherules from an Upper Devonian (about 365 million years old) limestone sequence in South China. Despite the great age of the spherules, the glass has not devitrified, and intricate "splash-form" shapes are preserved.

Uterine oxytocin

Oxytocin is a peptide hormone produced in the posterior pituitary that causes uterine contractions and is used to induce labor. However, the physiological role of oxytocin in parturition has not been clear because the amount of circulating oxytocin does not increase during labor. Lefebvre *et al.* (p. 1553) report that oxytocin is produced in the uterus itself and that the amount of oxytocin produced increases dramatically during gestation. Oxytocin may promote parturition by acting as a paracrine or autocrine factor, rather than as a circulating hormone.

Enhanced vaccine

Adjuvants are used in vaccinations to enhance the ability of killed or attenuated microorganisms or of proteins or synthetic peptides to produce an immune response. Zheng *et al.* (p. 1560) used the covalent chemical interactions between surface molecules on antigen-presenting cells (APCs) and T helper cells to enhance the immunogenicity of protein subunit vaccines in mice. Cell-surface galactose groups on APCs were enzymatically oxidized to aldehyde groups, which could then undergo Schiff base condensation reactions with surface amine groups. The improved immune response was comparable to or exceeded that of alum, the only adjuvant currently used for human vaccines.

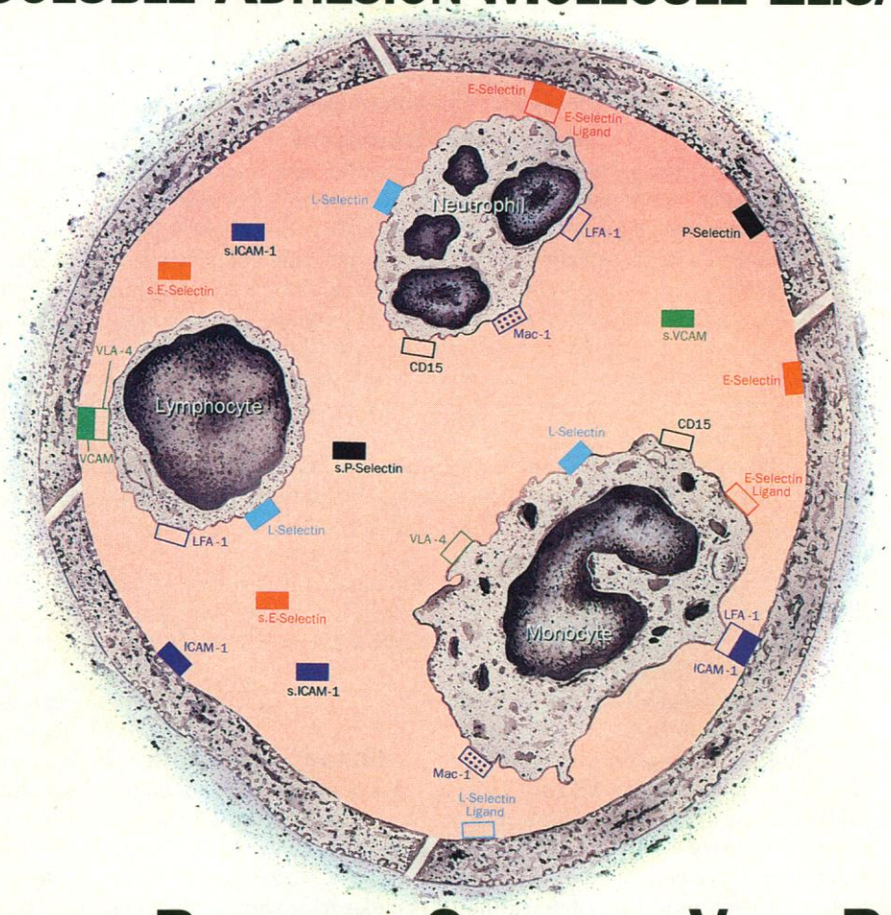
Glial glutamate receptors

Glutamate (Glu) receptors mediate most of the excitatory transmission in the brain. The non-NMDA (*N*-methyl-D-aspartate) subtype of the Glu receptor usually conducts monovalent, not divalent, cations, but certain combinations of the cloned versions of these receptors have high permeability to calcium-like NMDA receptors. Müller *et al.* (p. 1563), working with mouse cerebellar slices, and Burnashev *et al.* (p. 1566), working with primary cell cultures, have shown that Bergmann glial cells use a non-NMDA Glu receptor with a high calcium permeability. These cells also express the Glu receptor subunits that are known to conduct calcium (GluR-A, C, and D, but not B) when their cloned versions are combined. Bergmann glial cells may use these calcium-conducting channels during development (as the glia help guide neuronal movement) or for cellular signaling. Purkinje cells, which are closely associated with Bergmann glial cells, release Glu when stimulated and may provide a neural-glial connection.

Synaptic depression

Hebb's postulate suggests that coincidental electrical activity in pre- and postsynaptic cells can stabilize synaptic connections (Hebbian activation). An extension of Hebb's postulate suggests that asynchronous synaptic activity would weaken synaptic connections (Hebbian depression). Dan and Poo (p. 1570), working with isolated neuromuscular synapses from *Xenopus* in an in vitro system, found that postsynaptic pulses of the neurotransmitter acetylcholine, either alone or with asynchronous presynaptic activity (with a time delay between pre- and postsynaptic activity), depressed synaptic activity. Such depression resulted from reduced release of acetylcholine, but induction of depression required increases in cytosolic intracellular calcium in the muscle cell.

SOLUBLE ADHESION MOLECULE ELISAs



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Gearing, A.J.H. et al, In Press, Annals N. Y. Acad. Sci.

Cancer researchers report a growing interest in endothelial adhesins....

Current reports have suggested a role for intracellular adhesion molecule 1 (ICAM-1) in the progression of human malignant melanoma and other cancers. Stage I, II and III patients with histologically diagnosed malignant melanoma had significantly increased serum levels of circulating ICAM-1, (cICAM-1). We suggest that elevated levels of serum cICAM-1 may be of diagnostic and prognostic importance in patients with malignant cutaneous melanoma.

Harning, R. et al,Cancer Research (1991) 51, 5003-5005.

On-going studies into inflammatory diseases cite soluble adhesins as an area of potential importance....

Studies have shown differences in intensity related to age and to particular inflammatory conditions (Such as rheumatoid arthritis, systemic lupus erythematosus, metastatic cancer, and acute urolithiasis) of both ICAM-1 and VLA (unpublished).

Seth, R. et al,The Lancet (1991) 338, 83-84.

Diseases where Cytokines are important may also have a role for adhesins....

Tumour necrosis factor, interleukin-1 and γ-interferon cause the release of soluble ICAM-1.

Giavazzi, R. et al,Cancer Research (1992)

British Bio-technology Products have introduced a new range of ADHESION ELISA's to measure levels of soluble ICAM-1 and E-Selectin.

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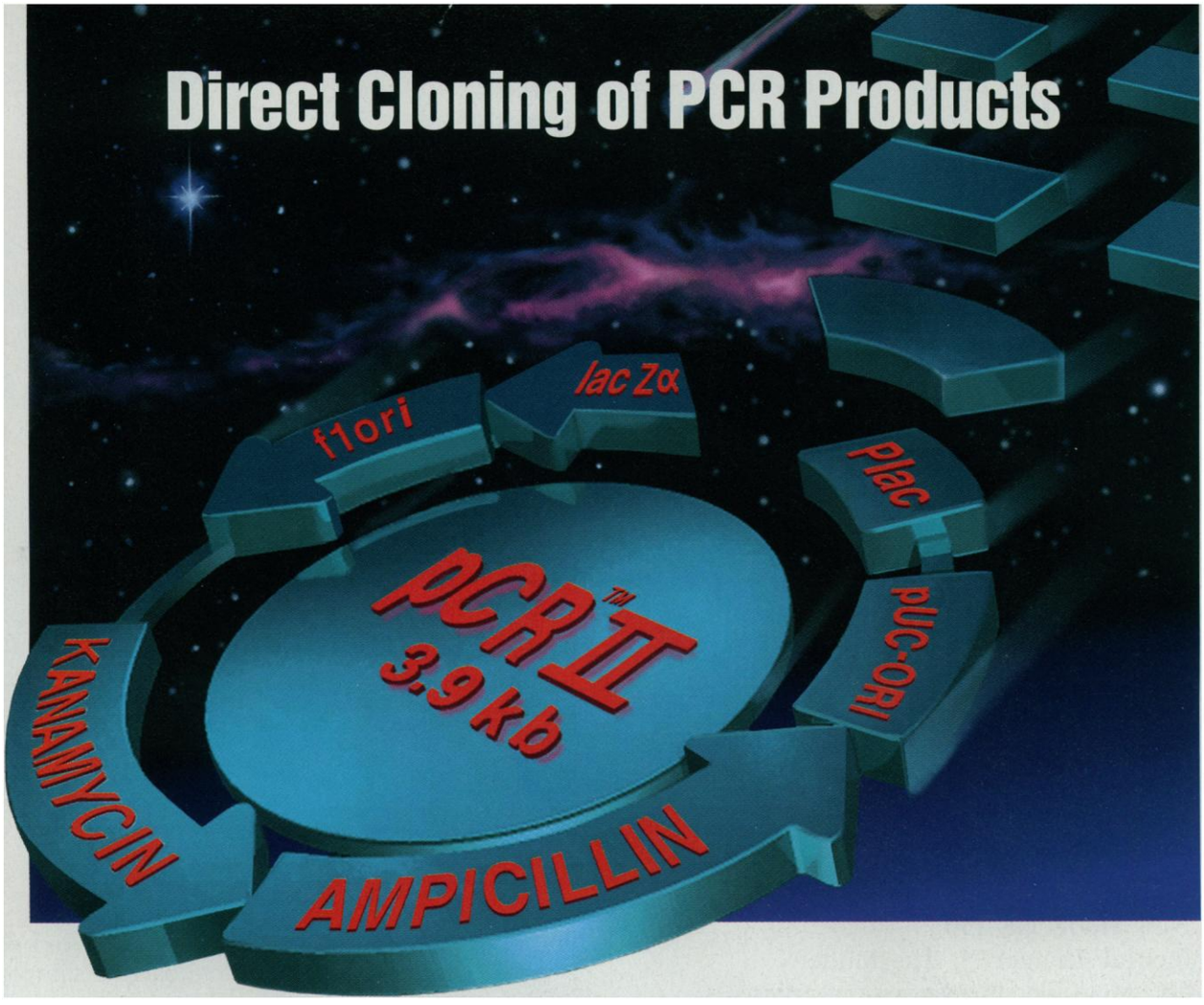

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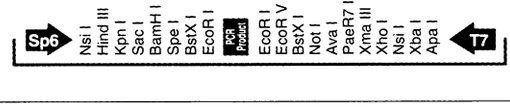

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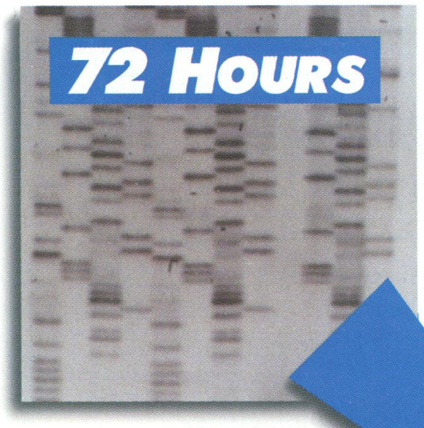

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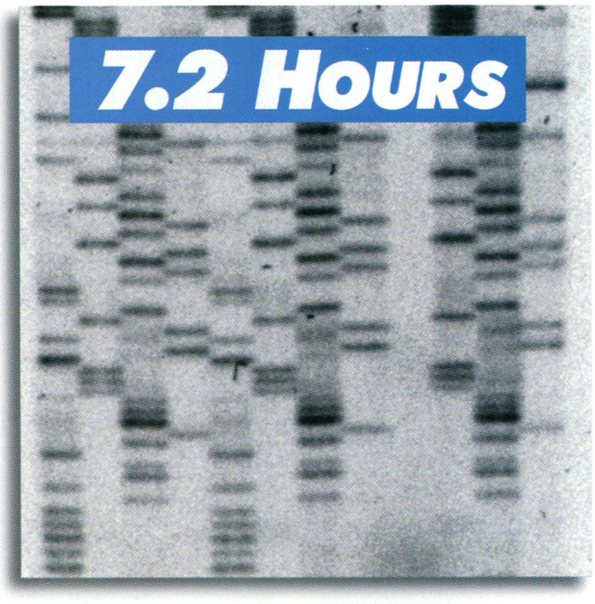

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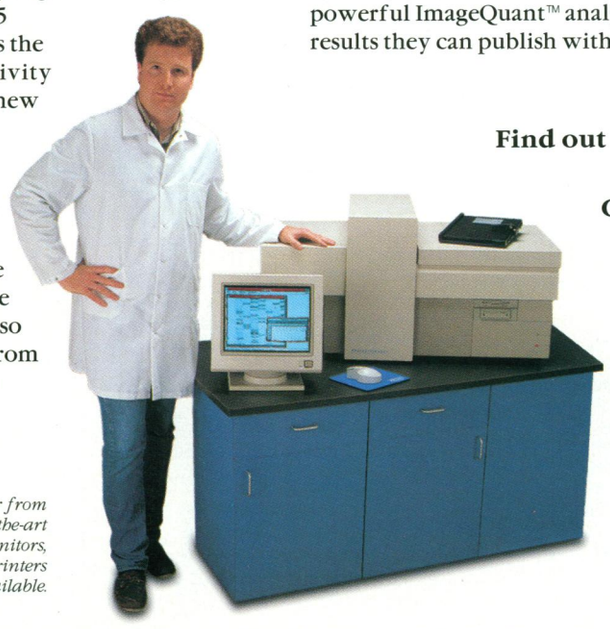

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