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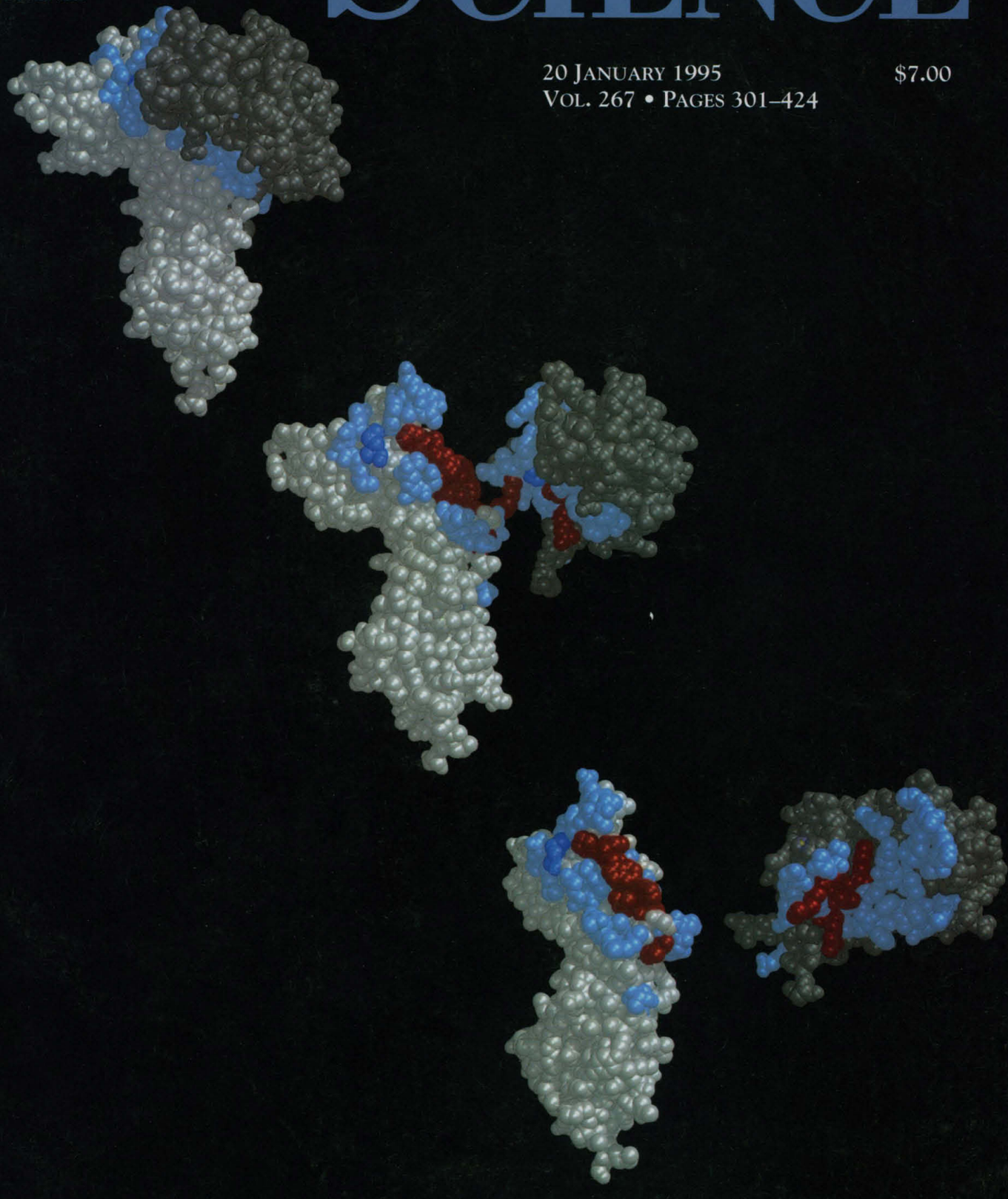

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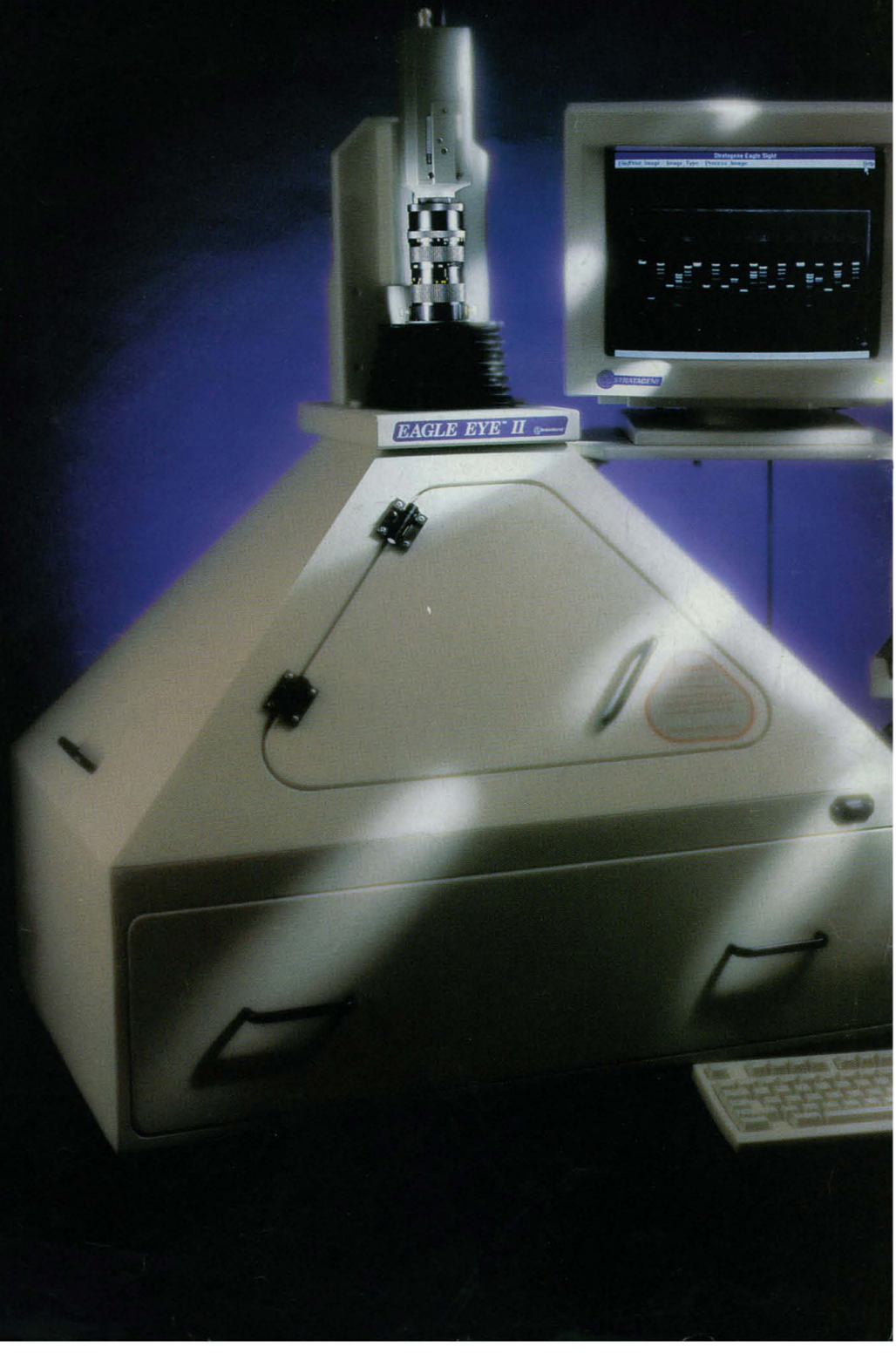

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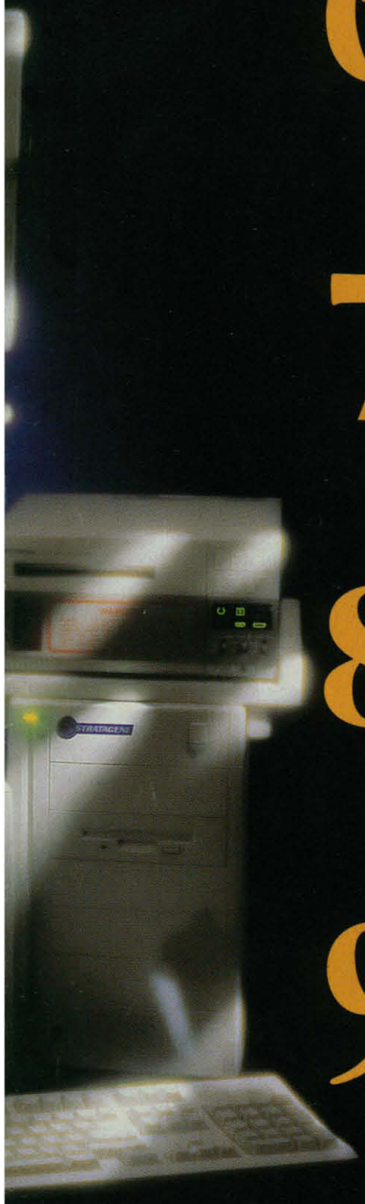

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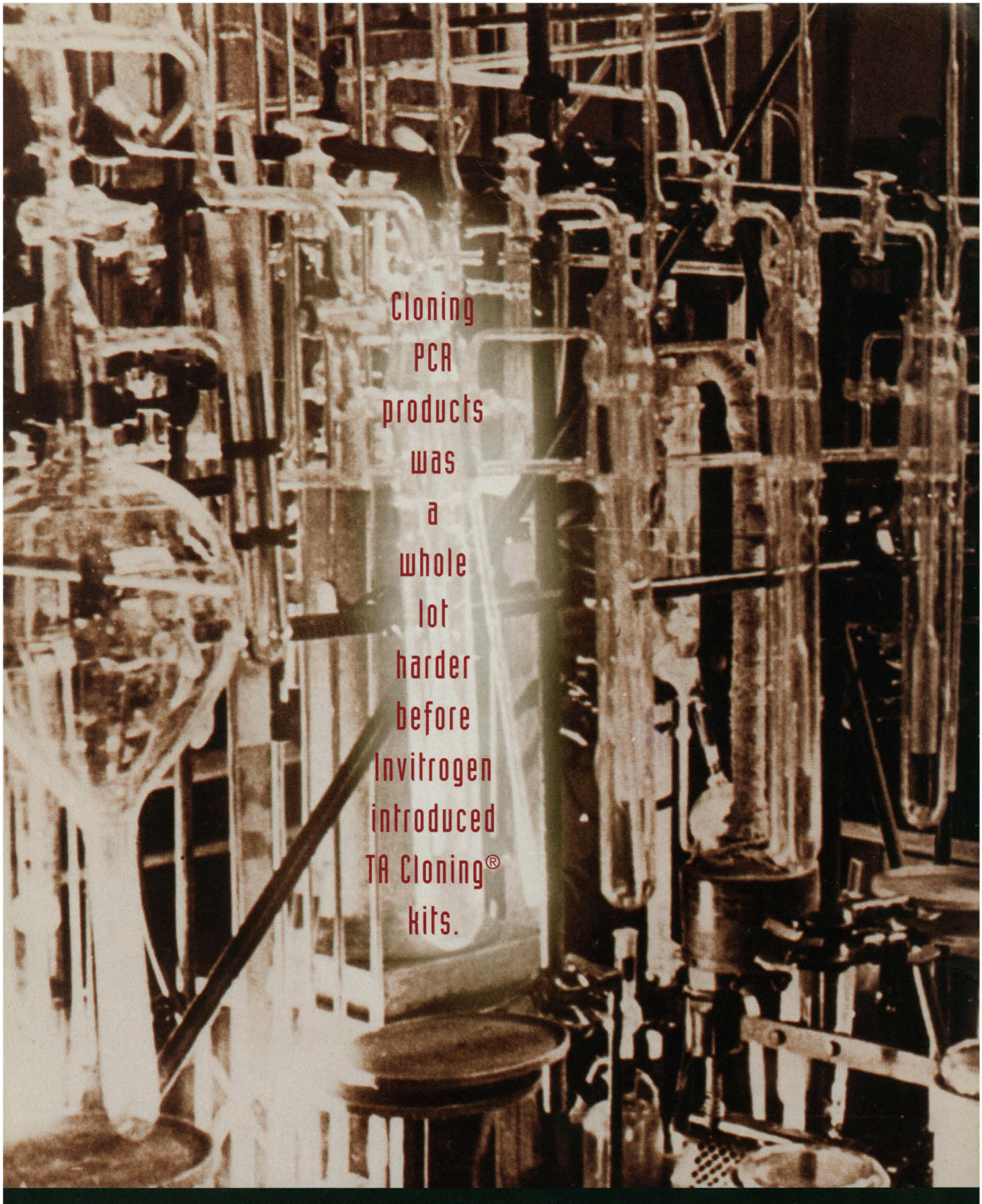

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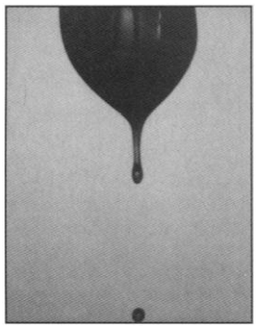

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Blowing nanobubbles

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVES

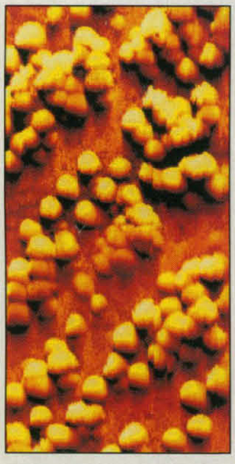
ARTICLE

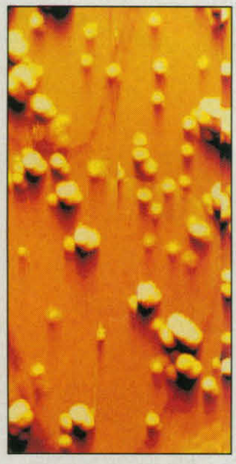
REPORTS

DEPARTMENTS

COVER

The "hot spot" of binding energy in the complex between human growth hormone (dark gray) and the extracellular domain of its receptor (light gray). The amino acid residues that make contact across the interface are colored according to how much energy they contribute to the binding interaction (red, substantial contribution; light blue, minor or no contribution; dark blue, not tested). Small complementary subsets of contact residues on each protein provide most of the binding energy. See page 383. [Graphics: Tim Clackson, Kerrie Andow, and James A. Wells]





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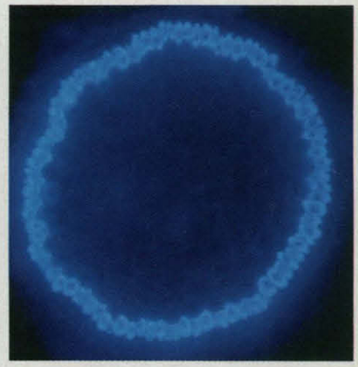
Seeing surfactants



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Detoxification

Correction

The title of the report by M. Travisano *et al.* was incorrect in the 6 January Table of Contents on page 7. It should have been "Experimental tests of the roles of adaptation, chance, and history in evolution." The report appeared on page 87.

◩ Indicates accompanying feature

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THIS WEEK IN SCIENCE

edited by DAVID LINDLEY

Dating clays

A long-standing geological problem has been how to obtain credible dates for the time of diagenesis of ancient sediments. Accurate dates would provide information on hydrocarbon maturation, the history of ancient basins, and the processes of diagenesis itself. Dong *et al.* (p. 355) studied whether useful ages might be obtained from the Ar-Ar method, for which a seemingly intractable difficulty is that laboratory irradiation releases ^{39}Ar from clays. Their results, however, imply that loss is from low retentivity sites and that it parallels the natural loss of radiogenic ^{40}Ar, so that the measured isotopic ratio can be predictably interpreted.

Far away or close?

Searches for planets outside our own solar system have of necessity focused on nearby stars, the majority of which are smaller than the sun. By modeling both hydrodynamics and radiation effects in protoplanetary systems, Boss (p. 360) argues that Jupiter-mass planets are likely to form at orbital radii of a few astronomical units, as in the solar system, even when the mass of the central star is as little as one-tenth the mass of the sun. Such a planet would more easily be found by looking for a wobble in the spatial position of the star around which it orbits than by looking for a periodic Doppler wobble in the star's velocity.

Radical stabilization

In most carbon allotropes, the number of covalent bonds formed by each carbon atom is either four (as in diamond) or three (as in graphite and fullerenes). Lagow *et al.* (p. 362) describe the synthesis of a carbon allotrope in which the carbon atoms are covalently bound to just two other carbon atoms. Such a form would normally be unstable, as the ends of these acetylenic chains are reactive free radicals. Synthetic conditions that would usually generate fullerenes from graphite produce this novel linear allotrope when species such as nitrile groups are present to stabilize the reactive ends of the carbon chains. Unlike fullerene soot, this material readily dissolves in common organic solvents.

Superconducting symmetries

Condensed matter physicists agree that cuprate superconductors have unusually high transition temperatures and that the electrons are paired, but the nature of the pairing mechanism and the details of the transport remain controversial. One way to probe the electronic structure of these materials is through photoemission, in which the surface of a superconductor is bombarded with energetic photons to knock out electrons whose energies are recorded. Shen *et al.* (p. 343) present a critical review of recent photoemission studies with a particular emphasis on the implications for theory. The weight of the evidence seems to favor the so-called *d* wave pairing state, but as the authors observe, the debate is not over.

Oat attack

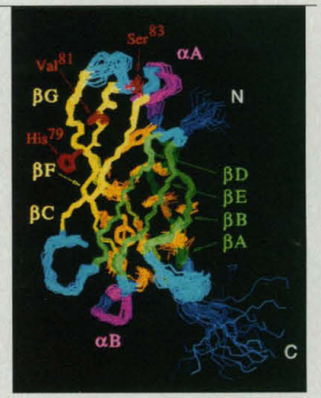
Plants have evolved a variety of mechanisms to defend against disease, including the accumulation of saponins toxic to the invading pathogen. Such a preestablished defense is responsible for the resistance of oat plants to attack by certain fungi: A saponin produced in oat roots is toxic to fungi that do not have their own counterattack. However, as Bowyer *et al.* (p. 371) show, fungi that encode the appropriate saponin-degrading enzyme are able to inactivate the plant's defense and infect the oat roots. Wheat, which does not produce saponins, is susceptible to infection by both types of fungus. The presence or absence of the detoxifying capability in the fungus then determines the range of plants it can invade.

Return of RET

To date, the causal mutations in inherited human cancers have been shown to function by inactivating genes that suppress cancer development (tumor suppressor genes). Santoro *et al.* (p. 381) demonstrate that inherited human cancers can also be caused by mutations that convert normal genes to dominant transforming genes. Mutant alleles of the *RET* receptor tyrosine kinase gene, found previously in patients with multiple endocrine neoplasia types 2A and 2B (MEN2A and MEN2B), were found to transform cultured fibroblasts through constitutive activation of the kinase. The MEN2A mutation resulted in aberrant dimerization of the kinase, and the MEN2B mutation altered its catalytic properties.

To bind or not to bind

Cell adhesion molecules (CAMs) are membrane proteins that control which cells coalesce to form tissues and which are cut adrift. One family of CAMs is the cadherins, so-called because they require calcium to function. Overduin *et al.* (p. 386; see also the Perspective by Wagner, p. 342) present the structure of a repeating domain of the cadherin found in epithelial cells. The structure reveals the adhesive surface that a cadherin molecule uses to bind to a similar molecule on another cell; calcium appears to rigidify the domains and to protect them from proteolytic attack. Tumor cells that have lost their complement of epithelial cadherin are known to have an increased potential for invasion.



New light on JNK

Activating transcription factor–2 (ATF2) participates in regulation of several genes including those encoding transforming growth factor–β2, interferon β, and E-selectin. Activation of transcription by ATF2 is enhanced by its interaction with the tumor supressor gene product Rb or with the adenoviral oncoprotein E1A. Gupta *et al.* (p. 389) present evidence that ATF2 is phosphorylated and activated by the protein kinase JNK (c-Jun NH_2-terminal protein kinase). JNK is activated in response to pro-inflamatory cytokines or ultraviolet irradiation of cells, suggesting that activation of ATF2 by JNK may contribute to the increased transcription of particular genes in response to such stimuli.

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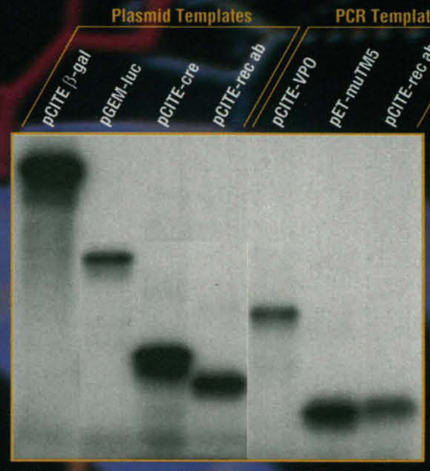
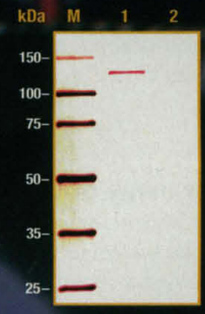


STP2 performance with various DNA templates.



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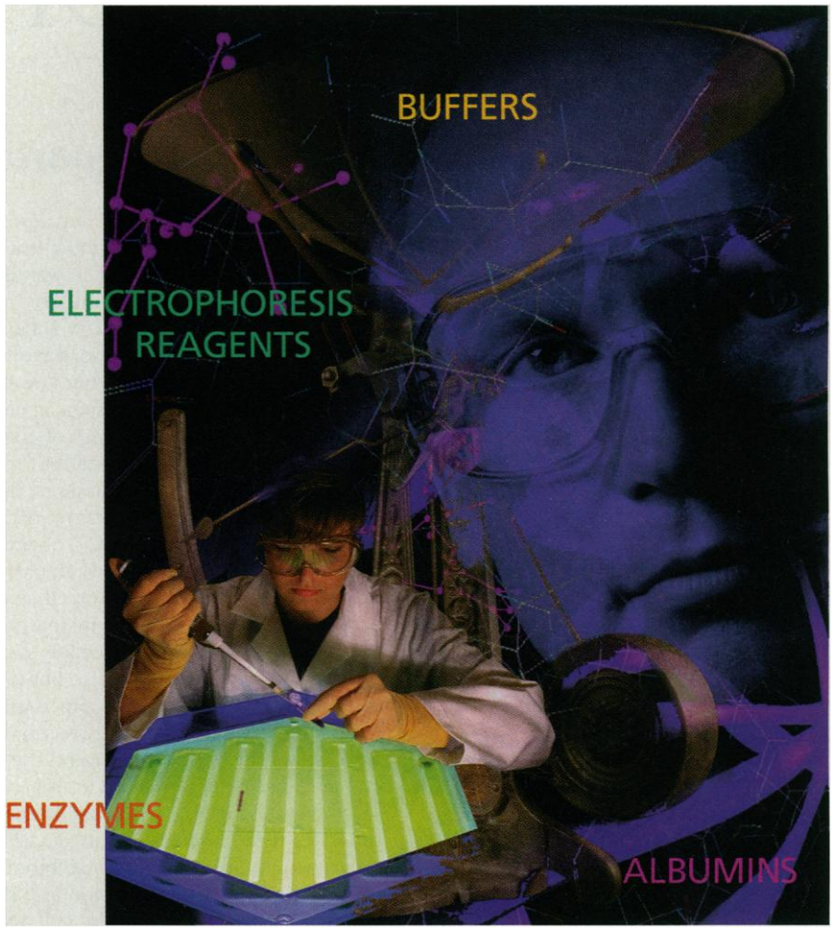

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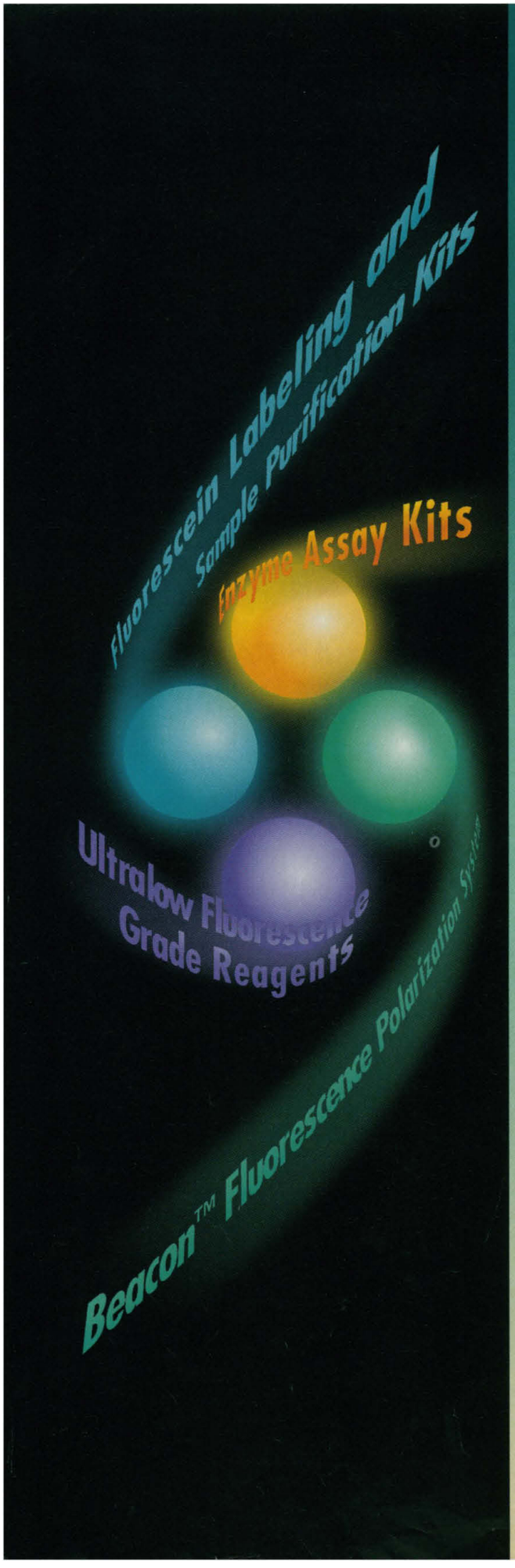

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