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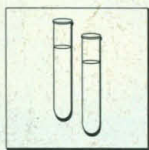
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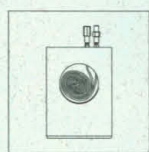
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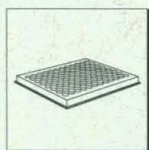
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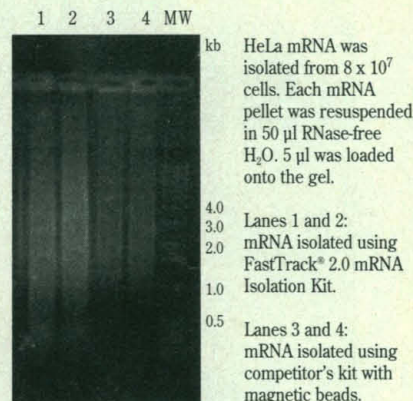
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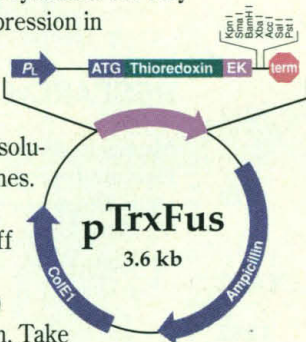


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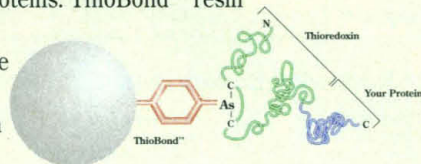


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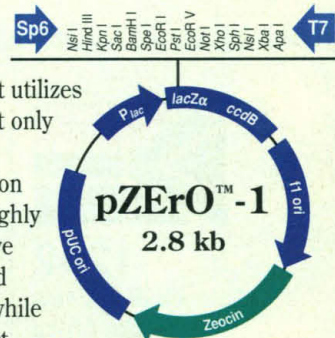


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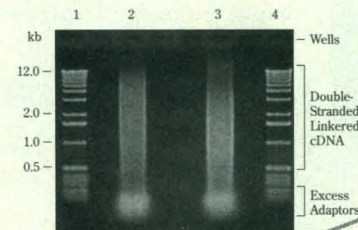


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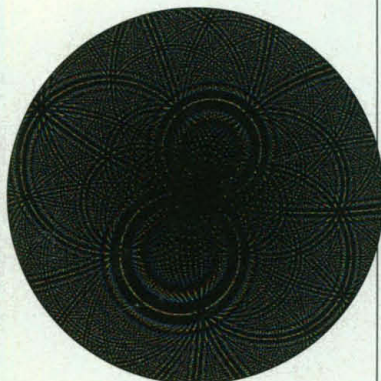
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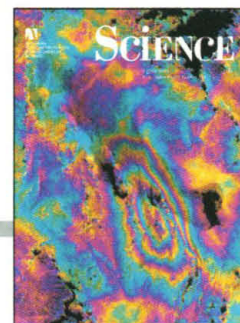
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Surface displacement associated with the 17 May 1993 Eureka Valley, California, earthquake obtained by interferometric processing of radar images acquired by the European Remote Sensing Satellite (ERS-1). Each color cycle represents 28 millimeters of ground dis-

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Glacial retreat



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Amersham LIFE SCIENCE

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MRED

Conspicuous consumption

Since World War II and to the present day, the mineral extraction and processing industry has expanded enormously, but discoveries of new mineral reserves have more than kept pace with demand. Hodges (p. 1305) reviews some of these historical developments and looks at problems and trade offs faced in particular by developing nations, for which mining industries often constitute a major part of the national economy.

High-pressure mixing

The hydrogen-bonded lattice of ice exists in more than ten crystalline phases. Aoki *et al.* (p. 1322) have studied a Fermi resonance between two vibrational bonds in phase VII of ice that can be tuned by external pressure; as pressure is increased from 17 to 30 gigapascals, infrared spectroscopy shows that there is a change in the relative intensity of the two absorption peaks generated by resonant mixing. From this change the strength of the anharmonic coupling between the vibrational bands can be inferred, so that the method is a diagnostic of the interatomic and intermolecular potentials in the ice lattice.

Distant flares

Solar x-ray flares of moderate intensity occur on a weekly to daily time scale, the rate varying with the solar cycle, while occasional flares, orders of magnitude more intense, have been observed from other stars. Haisch *et al.* (p. 1327), making use of the unprecedented sensitivity of the Japanese ASCA satellite, have detected several flares of solar-like strength on

Proxima Centauri, a nearby dwarf star fainter than the sun by a factor of 500. Although x-ray flaring activity appears to be common to many types of stars, its wide range of intensity in comparison to optical luminosity is not at all understood.

Ice timing

Assessing how long mountain glaciers remain near their maximum extent and, in particular, how fast they eventually retreat is critical for understanding the dynamics of past climate change. Gosse *et al.* (p. 1329) measured cosmogenic beryllium-10 from recessional moraines and bedrock to infer the glacial history of the important Pinedale glacial sequence in Wyoming. The glacial maximum there lasted from 5900 years to about 15,800 ¹⁰Be years ago (the calibrated age has some uncertainty) and that the glaciers had retreated 33 kilometers by about 12,100 ¹⁰Be years ago.

Putting their heads together

The phylogeny of the arthropods, which since the Early Cambrian age has constituted the largest group of animals, is unresolved and controversial.

Chen *et al.* (p. 1339) describe fossils of the ancient arthropod *Fuxianhuia* recovered from the Cambrian age Chengjiang fauna. The head of this animal consisted of multiple units whose form may signify an ancestral segmentation of the arthropod head. The modern arthropod head presumably arose through the fusion of the multiple units of primitive ancestors such as *Fuxianhuia*.

Change of heart

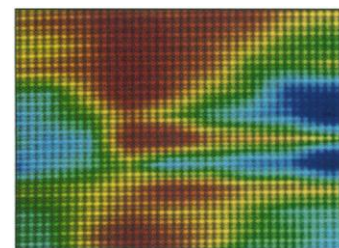
The β -adrenergic receptors are important regulators of heart function; activation of them increases the rate and force of cardiac contractions. Koch *et al.* (p. 1350) have created transgenic mice that overexpress in the heart either the β -adrenergic receptor kinase-1 (β ARK1), which desensitizes the receptors, or an inhibitor of β ARK1. The former have decreased myocardial function, especially during stimulation by catecholamines, while the latter show increased cardiac function, both in response to stimulation and under basal conditions. The results lend some support to the idea that the increased myocardial levels of β ARK1 noted in humans with heart failure have a direct connection with the disease.

Suffering from a loss of Fas

Rieux-Laucat *et al.* (p. 1347) describe three human patients in whom mutations in the Fas gene have produced immunological problems. In the most severely affected case, a complete absence of Fas-mediated apoptosis was traced to a large deletion in the Fas gene; the phenotype, marked by lymphoproliferation and autoimmunity, is reminiscent of that observed in Fas-deficient mice. In the other two patients, a smaller deletion led to impairment of Fas-mediated apoptosis and less severe health problems, suggesting that small genetic errors, subtly affecting the apoptosis pathway in a variety of ways, may influence the development of a variety of idiopathic autoimmune ailments.

A complex, touching tale

Tactile information from a rat's whiskers is processed by its trigeminal somatosensory system. In this neuronal network, upward connections from the whiskers are outnumbered by downward connections from brain, allowing for complex signal processing. Nicolelis *et al.* (p. 1353) recorded activity from



up to 48 neurons in the cortex, thalamus, and brainstem of rats, and found that exploration by whisker twitching was preceded by synchronous system-wide oscillatory signals initiated in the cortex. These oscillations may represent not simply a precursor to whisker activity but a complex and dynamic processing of the subsequent sensory input.

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Intracellular signal transduction is mediated by conformational changes and modifications of signaling molecules. Kimura *et al.* (p. 1362; see also Perspective by Bohen, p. 1303) demonstrate that one of the molecular chaperones, Hsp90, that plays a role in the conformational changes in several signaling pathways needs the cooperation of a second molecular chaperone, Ydj1, to function effectively. Ydj1 interacts directly with the glucocorticoid receptor to maintain the receptor in an inactive state. Mutations of Ydj1 lead to activation of the glucocorticoid receptor in the absence of hormone.



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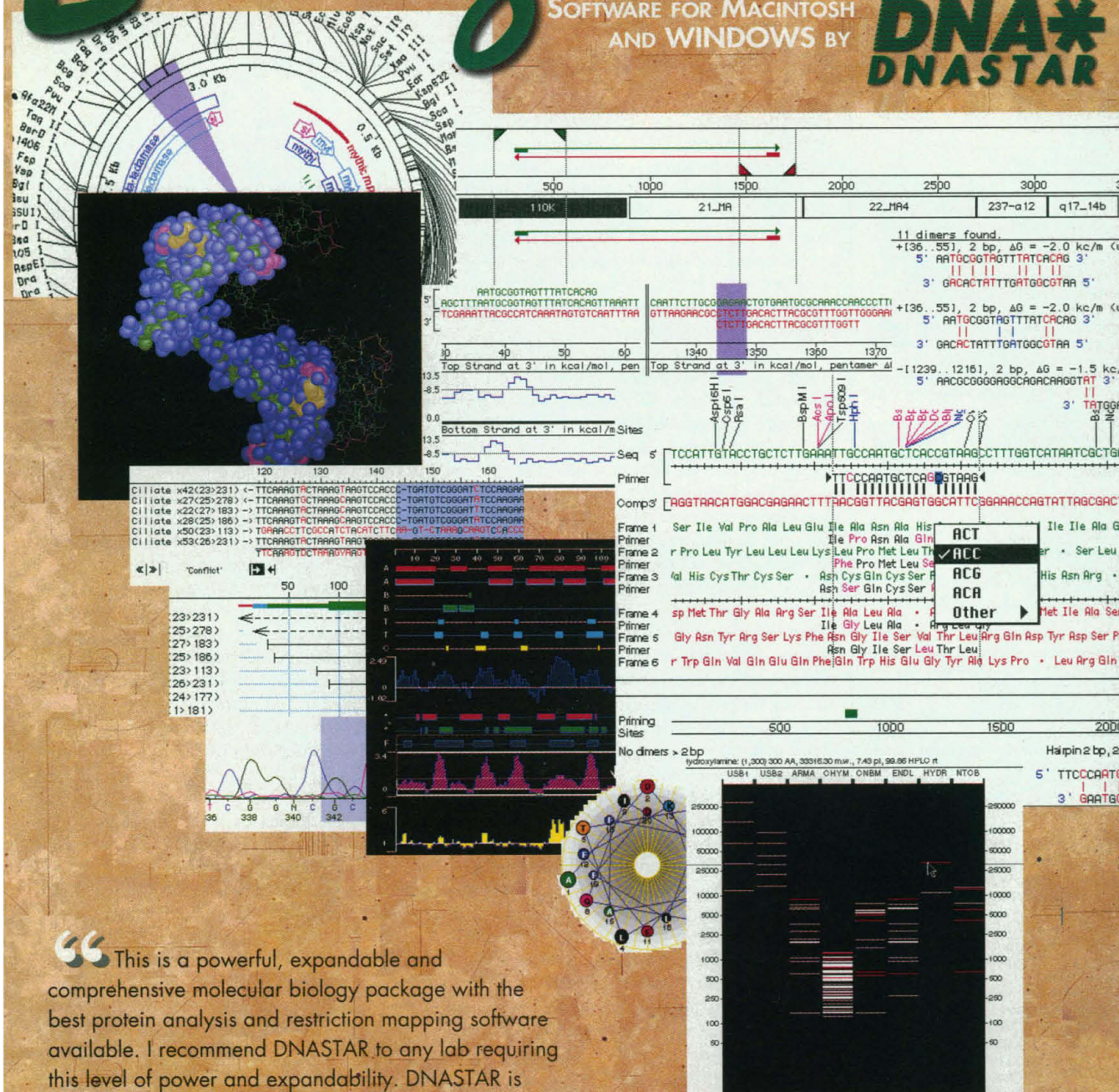
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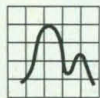
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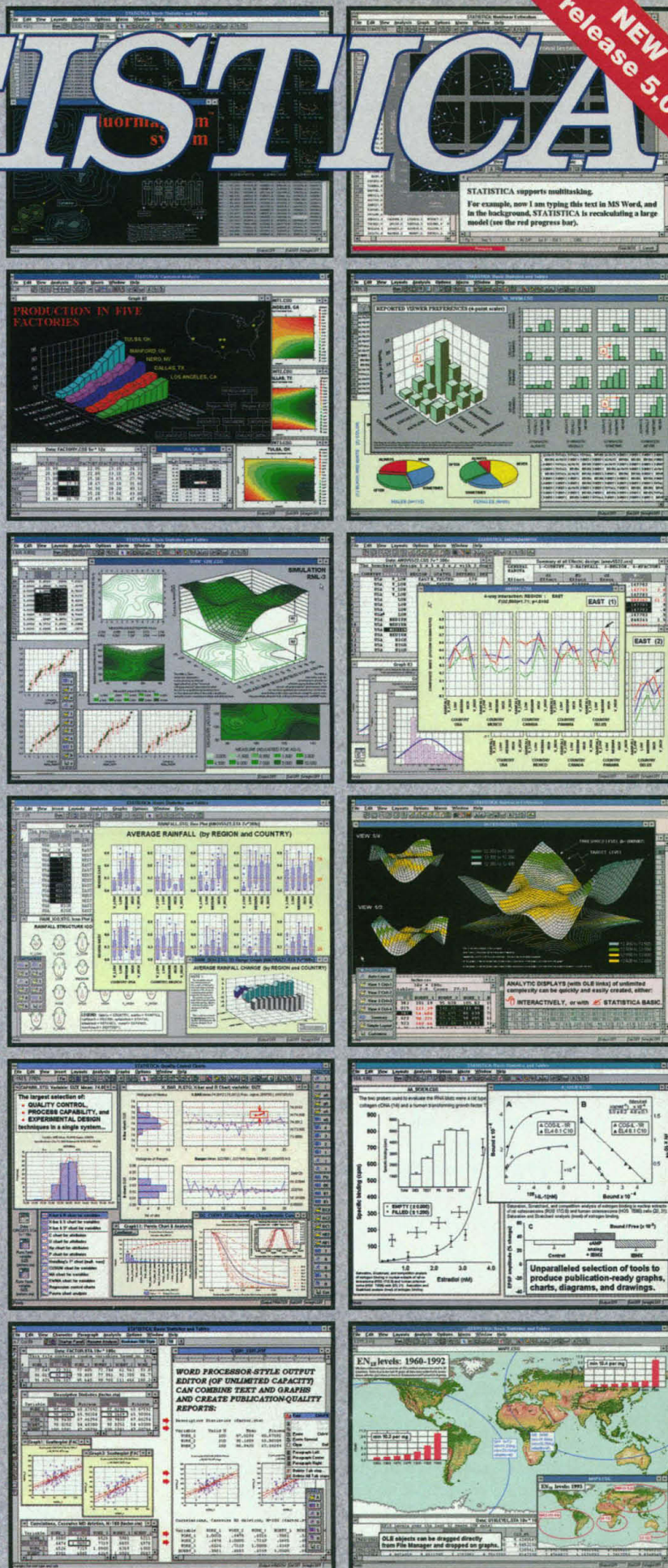


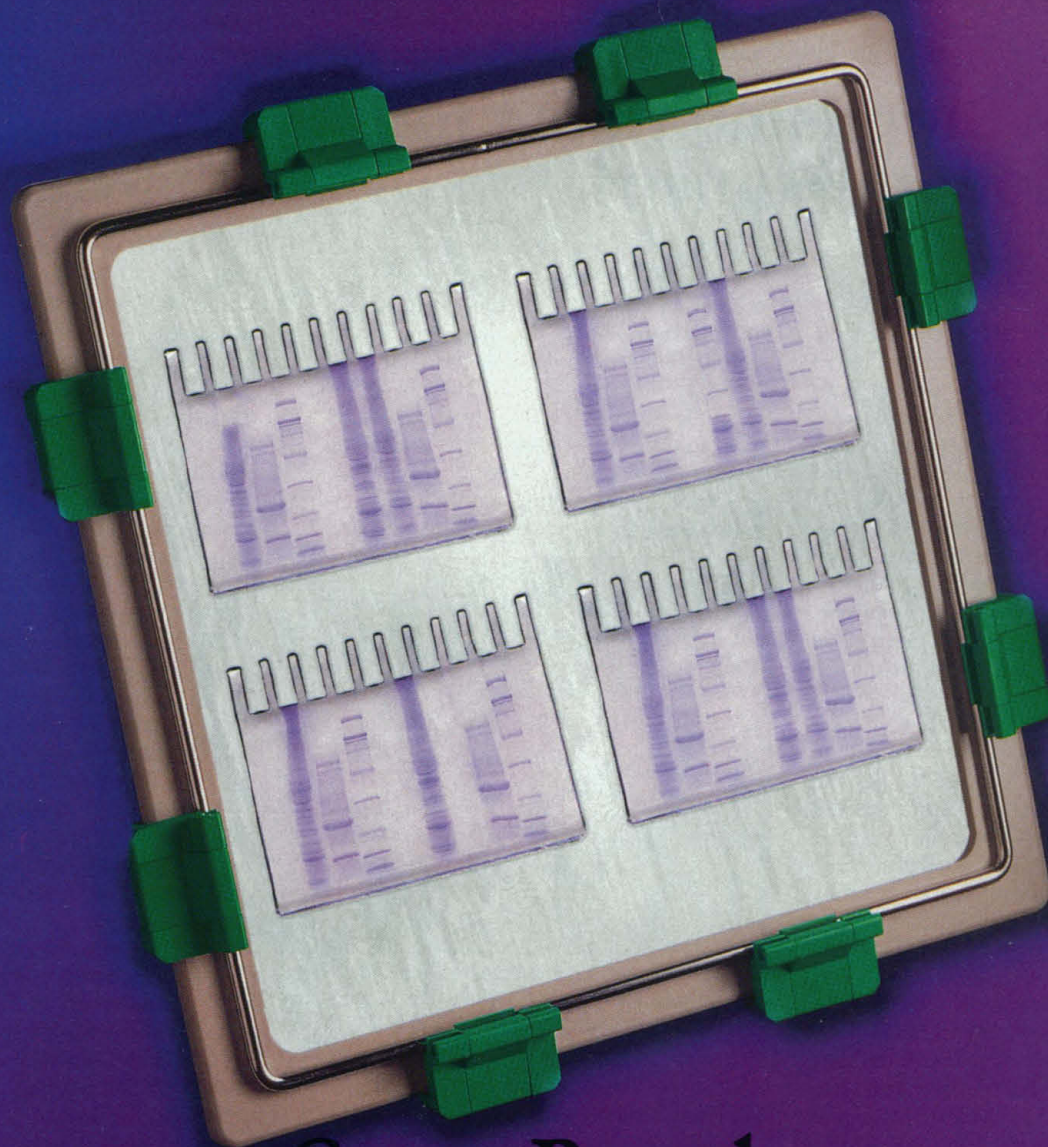
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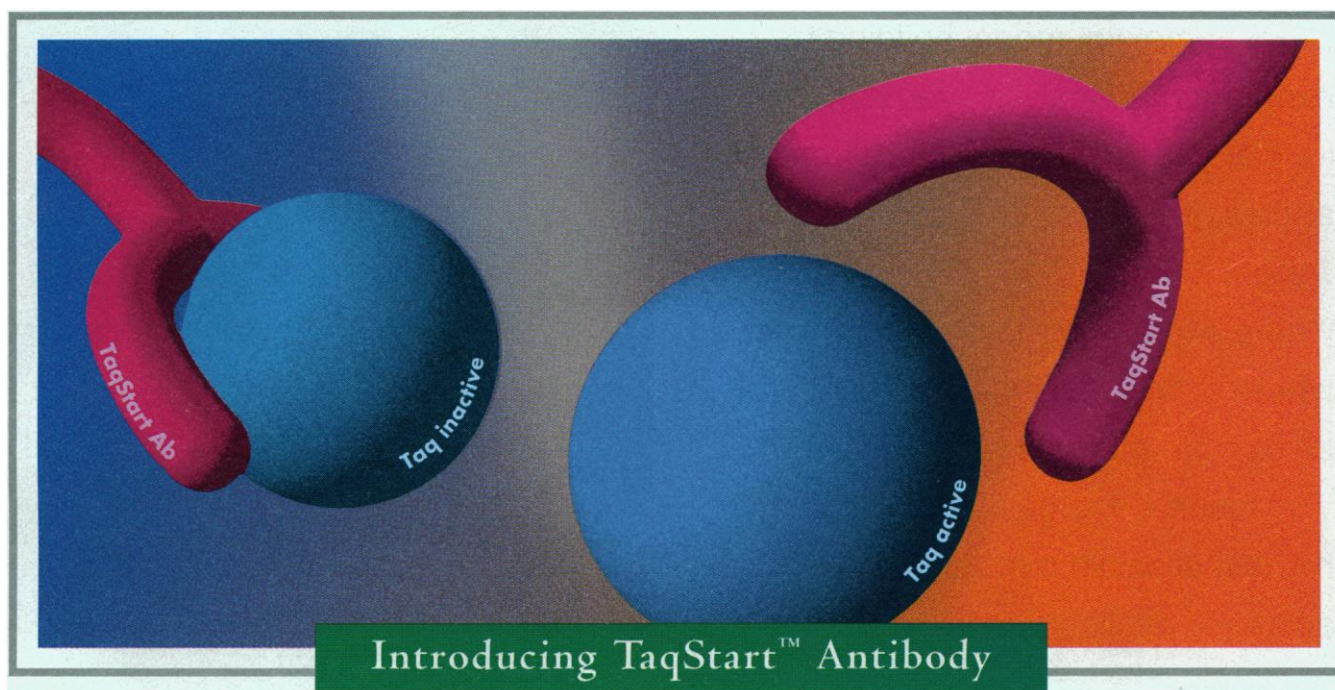
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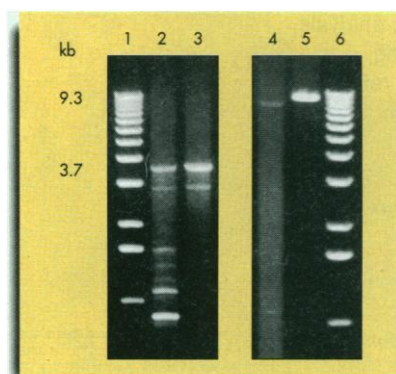
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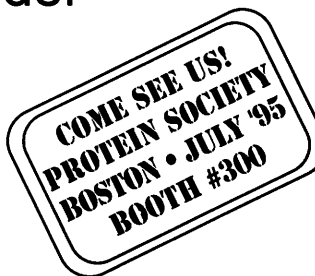


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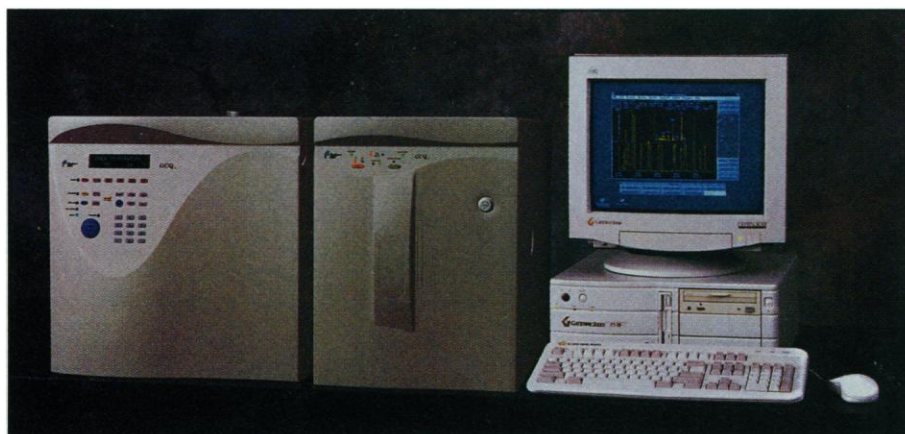
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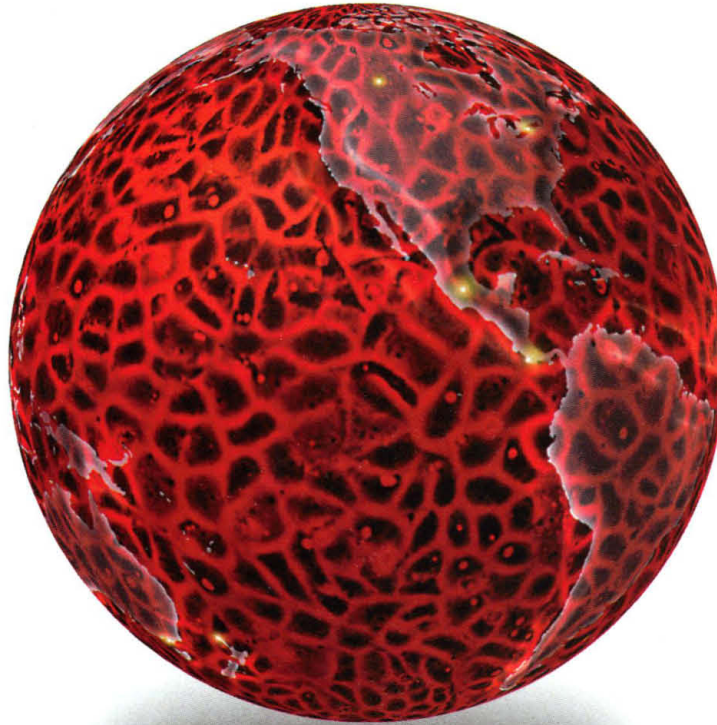


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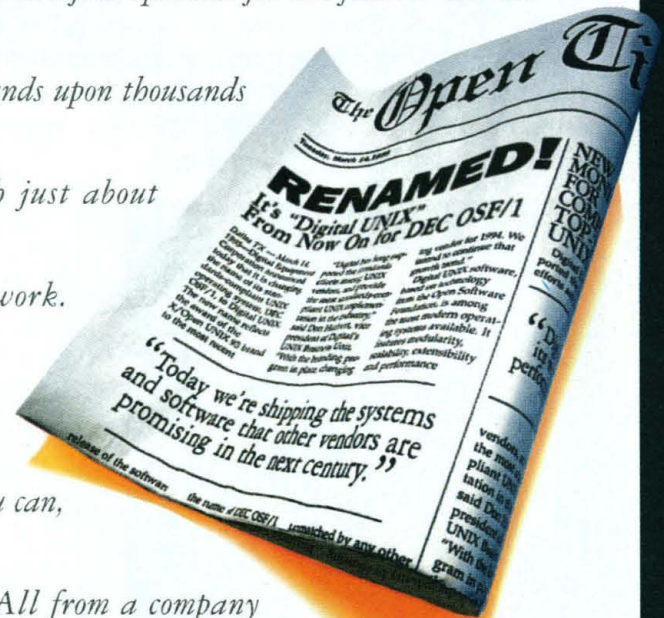
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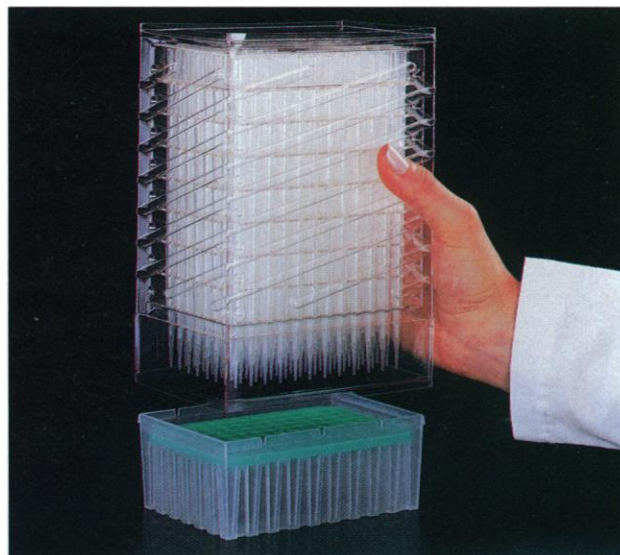
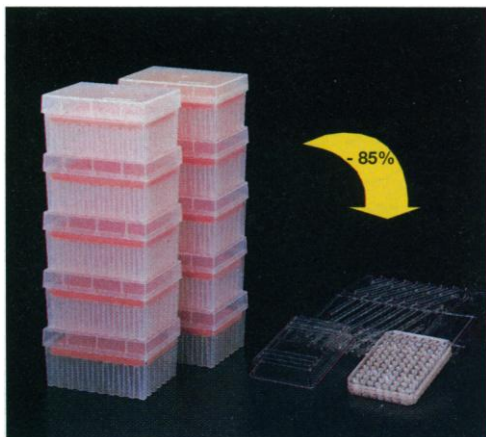
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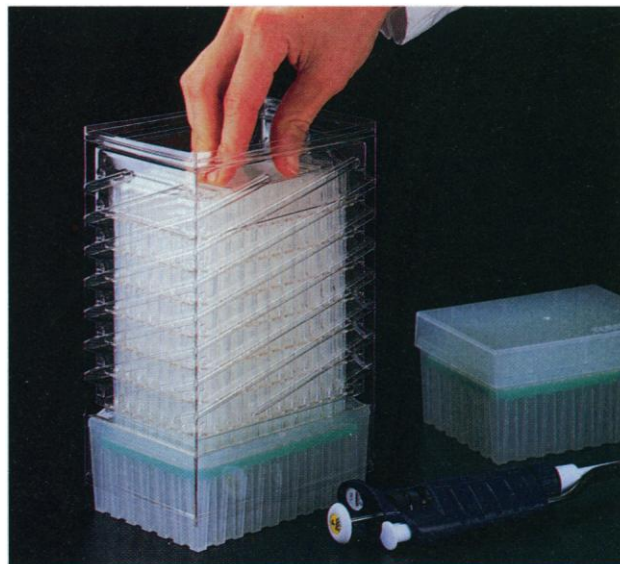
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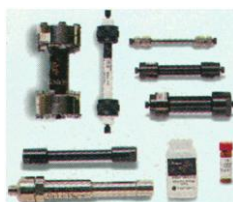
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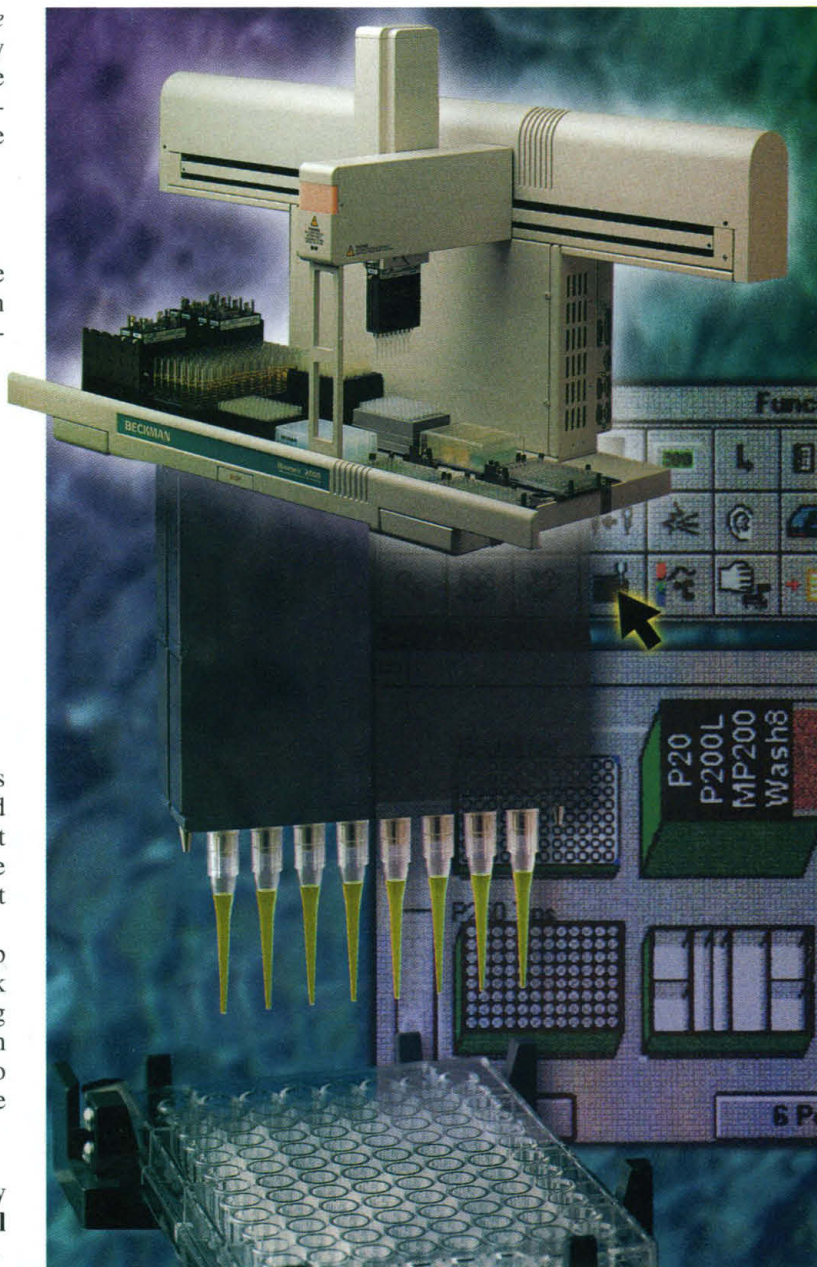
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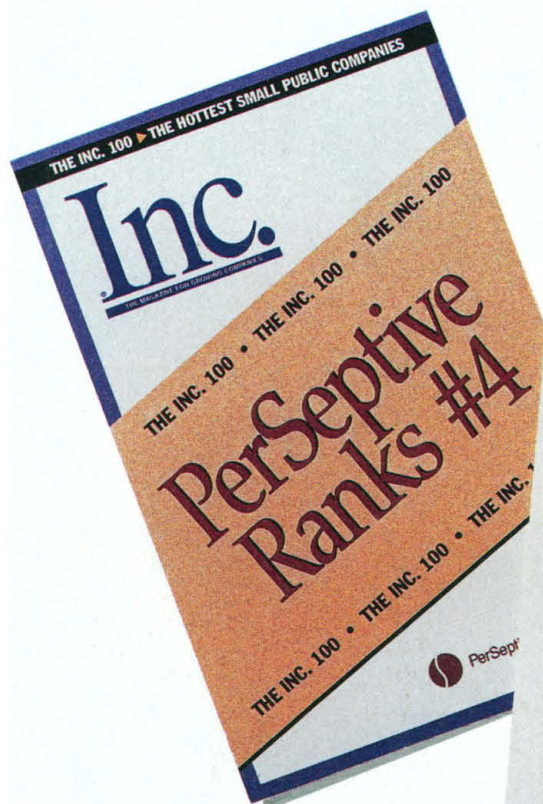
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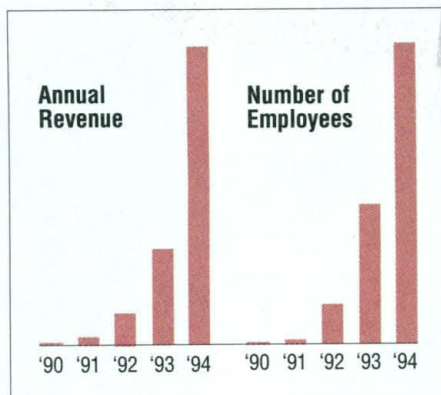
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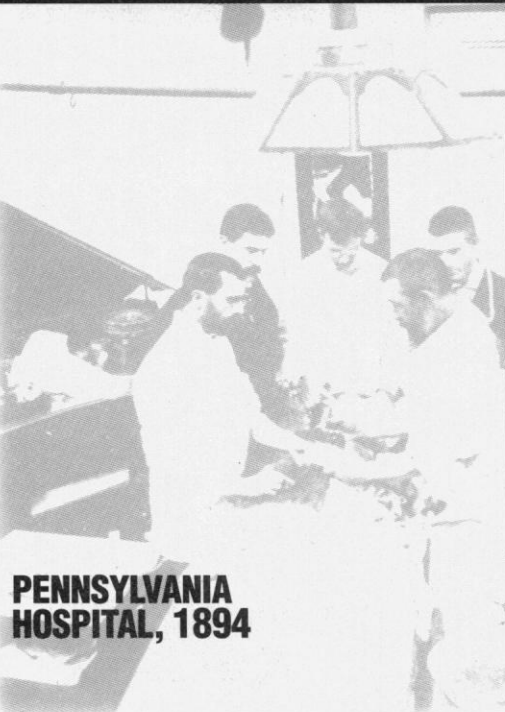
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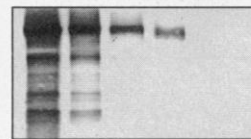
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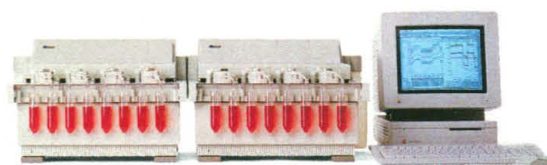
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1. Science 257, 1906-1912, (1992) 2. J. NIH Research 5, 69, (1993)

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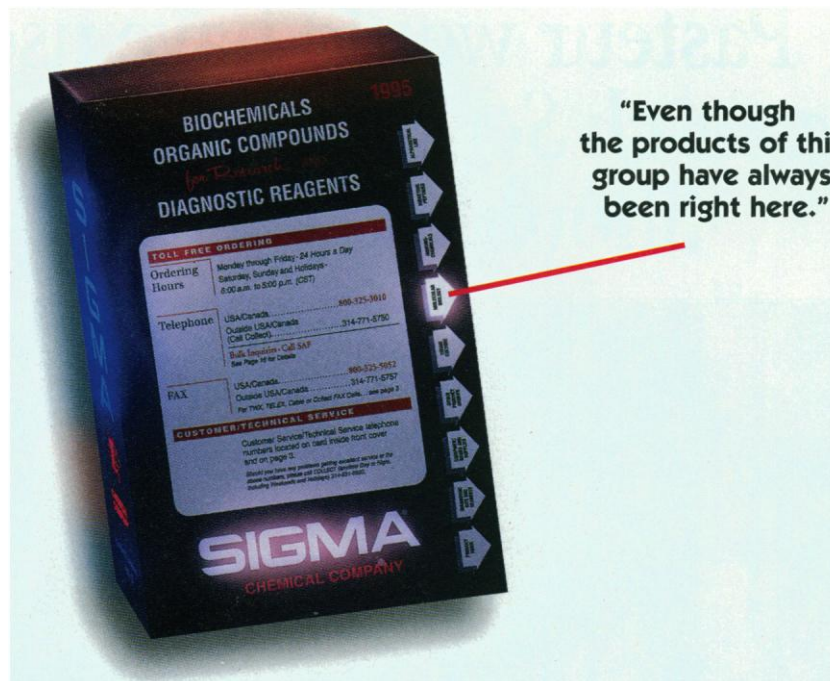
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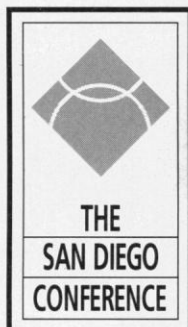
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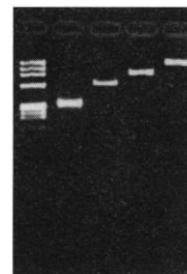
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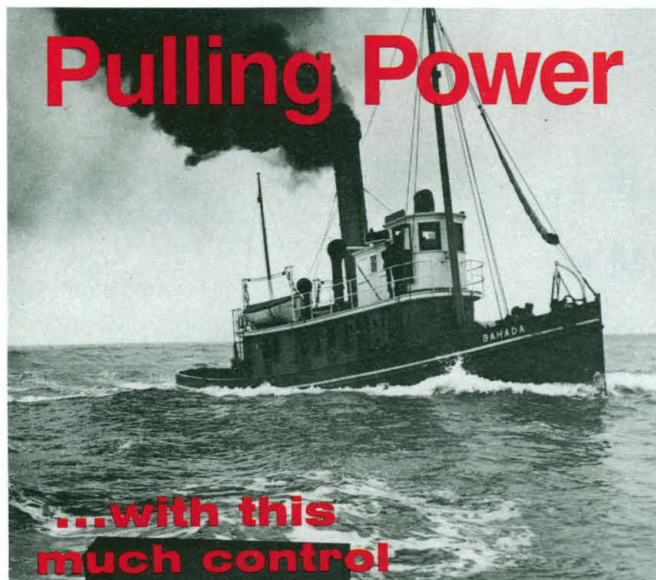
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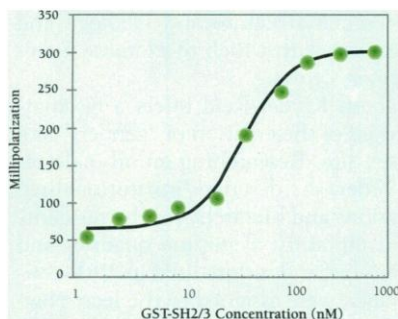
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Example Application:
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