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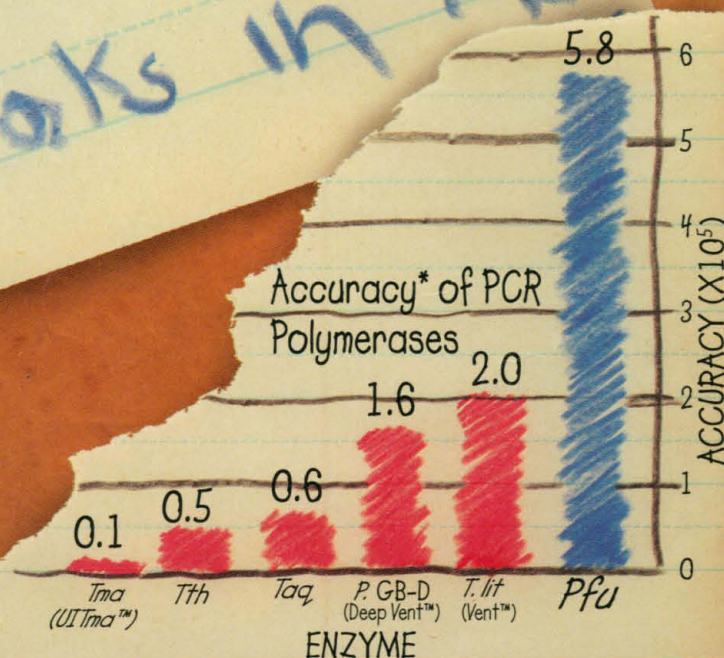
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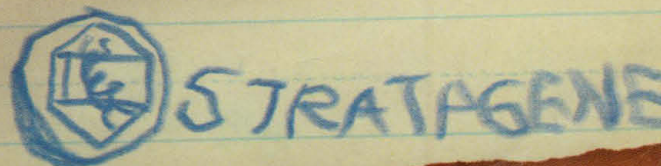
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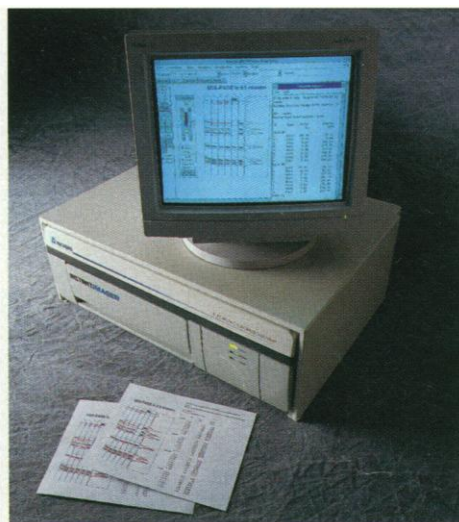
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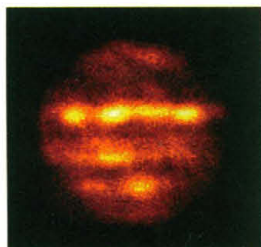
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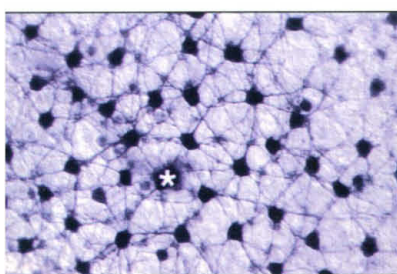
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Living in caves and under coral overhangs on coral reefs, the polyps of the ahermatypic coral *Tubastrea* sp. expand at night (up to 20 to 30 millimeters in diameter) to capture planktonic prey with tentacles armed with batteries of stinging cells. Unlike their hermatypic or

reef-building relatives, they do not contain symbiotic algae. See page 637 and the related Report (page 640) and News story (page 597). [Photo: A. T. Marshall, at Heron Island Reef, Australia]



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Higher Education • Poland: Teachers
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Foundations Help Out • Czech
Republic: Grad School Bridges
Old Divisions

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duces the Right Chemistry • New
University Takes Science to the
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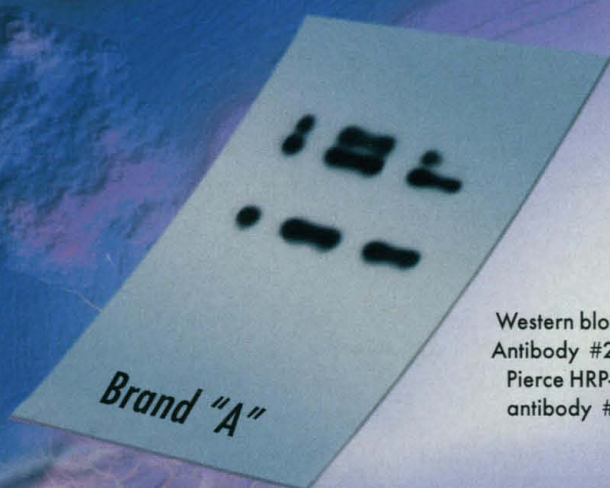
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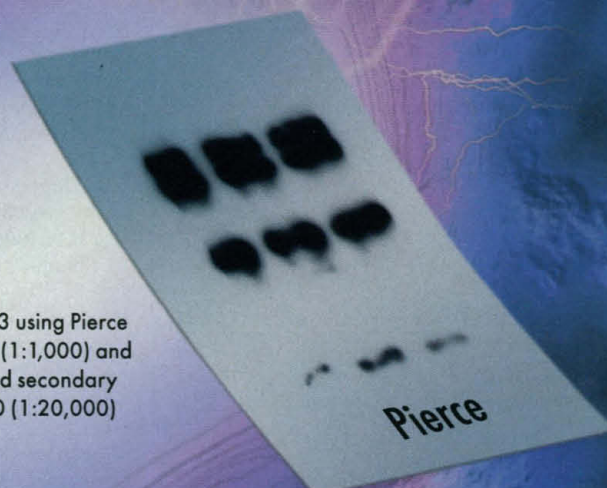
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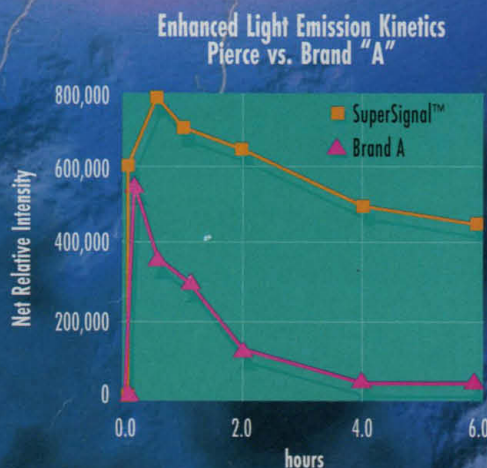
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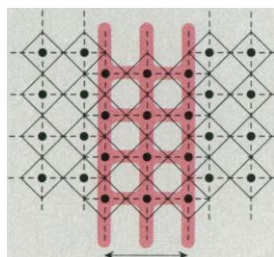
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Quantum surprises

High-temperature superconductivity research has reinvigorated several areas of condensed matter physics, including the study of spin correlations in magnetic systems. Dagotto and Rice (p. 618) review recent studies of "ladder" materials, made by assembling square lattices from chains. Cross-over from quasi-long-range or-



Three-leg ladder $\text{Sr}_2\text{Cu}_3\text{O}_5$

dering in one-dimensional antiferromagnetically coupled spin chains to real long-range order in planar lattices is observed. Under the right conditions of doping, ladder compounds may exhibit carrier pairing and superconductivity.

Rare storms on Saturn

Two rare, large-scale storms were observed in Saturn's atmosphere from July through December 1994. Sanchez-Lavega *et al.* (p. 631) have taken advantage of the spatial and temporal resolution provided by ground-based observations from four telescopes in France, Japan, Spain, and the United States along with images from the Hubble Space Telescope to study the evolution of the clouds, the wind velocity structure of the upper atmosphere, and the duration of the storms.

Distortions I

What happens when six identical methyl groups are bonded to a tungsten atom or a rhenium

Water and proteins in supercritical CO_2

Supercritical carbon dioxide (scCO_2) can serve as an environmentally friendly replacement solvent in a number of applications, but usually for hydrophobic compounds. Johnston *et al.* (p. 624; see the Perspective by Beckman, p. 613) have found a nontoxic surfactant that stabilizes microdroplets of water in scCO_2 . Proteins and ionic species can dissolve in these microdroplets, thus allowing these compounds to be processed with scCO_2 methods.

atom? Classical bond theory predicts an octahedral structure, but recent ab initio calculations have indicated that a regular trigonal prismatic structure is formed. Now, experimental evidence from crystallographic studies of these highly unstable compounds indicates that the structure is different still. Pfennig and Seppelt (p. 626) report a distortion of the structure, reducing its symmetry, which cannot be explained with current theories.

Distortions II

A phase change from rutile to fluorite with increasing pressure has been widely believed to occur in metal dioxides such as SnO_2 and PbO_2 . Haines *et al.* (p. 629) present crystallographic evidence that this is not the case: the structure of the high-pressure phases is significantly distorted from the fluorite structure. This finding is not only important for the structural systematics of metal dioxides. It also indicates a common high-pressure cubic phase for other dioxides, such as the high-pressure structure of SiO_2 .

Insulin resistance

Tumor necrosis factor- α (TNF- α) inhibits signaling by the insulin receptor and thus contributes to insulin resistance in patients with obesity or diabetes.

Hotamisligil *et al.* (p. 665) found that the effect of TNF- α required the presence of insulin receptor substrate 1 (IRS-1), a protein that normally participates in transmitting biochemical signals from the insulin receptor. In cells treated with TNF- α , IRS-1 became phosphorylated on serine residues and inhibited the tyrosine kinase activity of the insulin receptor. IRS-1 from muscle and fat tissues of obese rats also inhibited receptor kinase activity. Thus, in addition to its role in transmitting signals from the insulin receptor, IRS-1 appears also to mediate inhibition of receptor function in response to TNF- α .

Go with the Rho

The small guanosine triphosphatase Rho participates in regulation of diverse cellular processes including cell adhesion, cytokinesis, the cell cycle, and transcription. However, the molecular targets of regulation by Rho are unknown. Amano *et al.* (p. 648) and Watanabe *et al.* (p. 645) have used different methods to detect proteins that interact with Rho. Both groups identified protein kinase N (PKN), a serine-threonine kinase related to members of the protein kinase C family. Binding of activated Rho to PKN appears to activate the kinase. Watanabe *et al.* identified another protein, rhophilin, that binds to activated Rho and has

sequence similarity to PKN. These proteins may mediate some of the various cellular effects of Rho.

Molecular diagnosis

A key goal of ongoing cancer research is the development of sensitive methods for detecting genetic changes in malignant cells, in the hope that these methods will permit earlier diagnosis of the disease. In a pilot study of 25 patients with symptoms suggestive of bladder cancer, Mao *et al.* (p. 659) found that a molecular diagnostic assay that monitors microsatellite DNA markers was more sensitive and cost-effective than conventional cytology in detecting cancer cells in urine. Although studies with much larger patient groups are needed, these early results suggest that this molecular assay has potential as a screening test for bladder cancer.

Molecular chaperones

Proteins fold to the correct final conformation with the assistance of a set of proteins that are known as molecular chaperones, but the underlying mechanisms have been unclear. Chaperones could act by maintaining unfolded proteins in an unfolded state prior to their correct folding. Another possibility would be that misfolded proteins could actually be unfolded by chaperones in order to then refold correctly. Zahn *et al.* (p. 642) show that two different chaperones actually do both. Bacterial chaperones known as SecB and GroEL can actually bind to partially folded proteins preventing misfolding and aggregation but can also unfold misfolded proteins in order to help them attain the correct final conformation.

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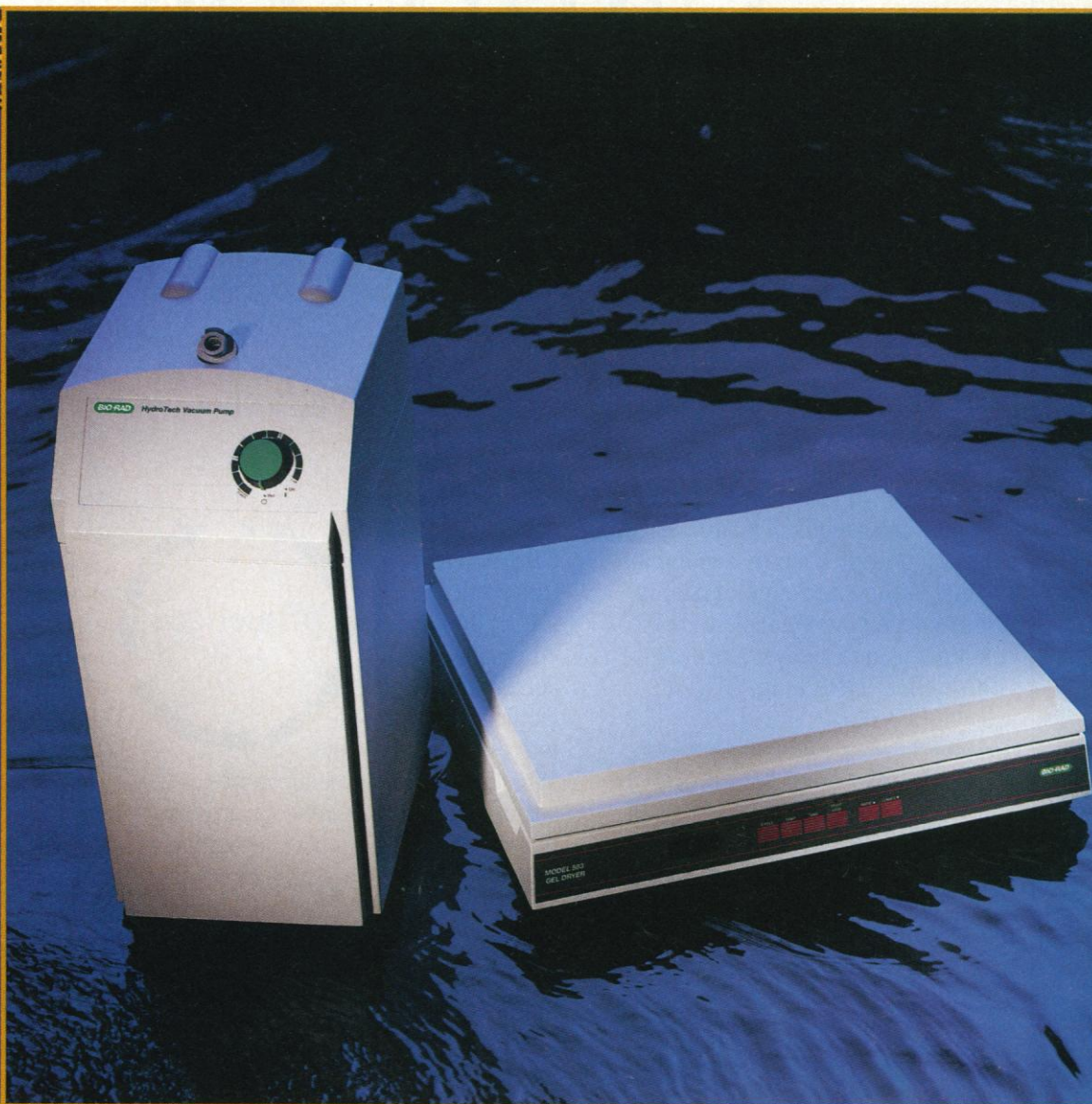
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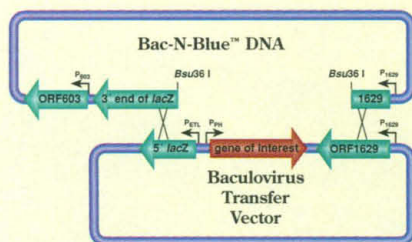
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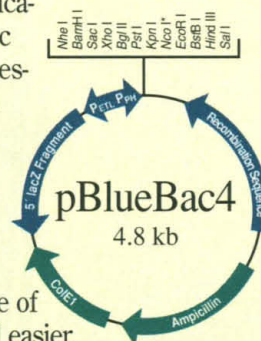


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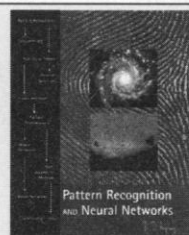
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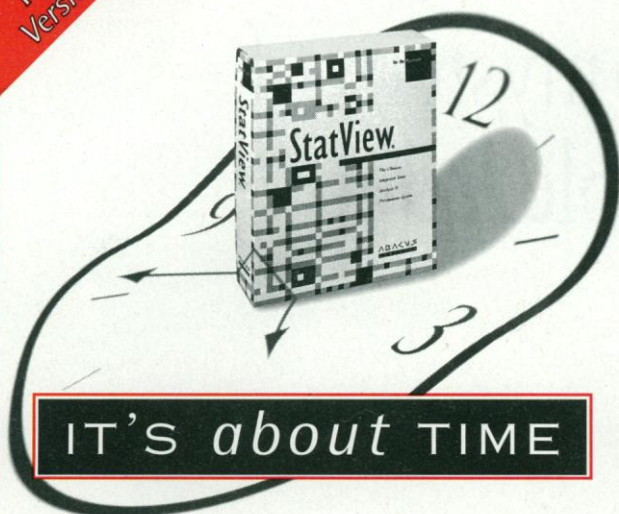
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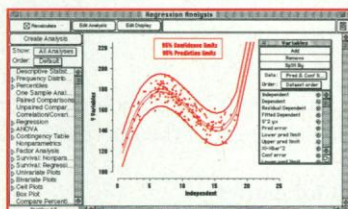
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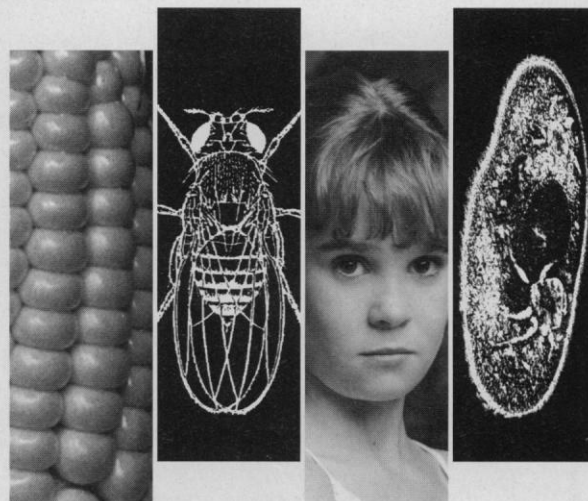
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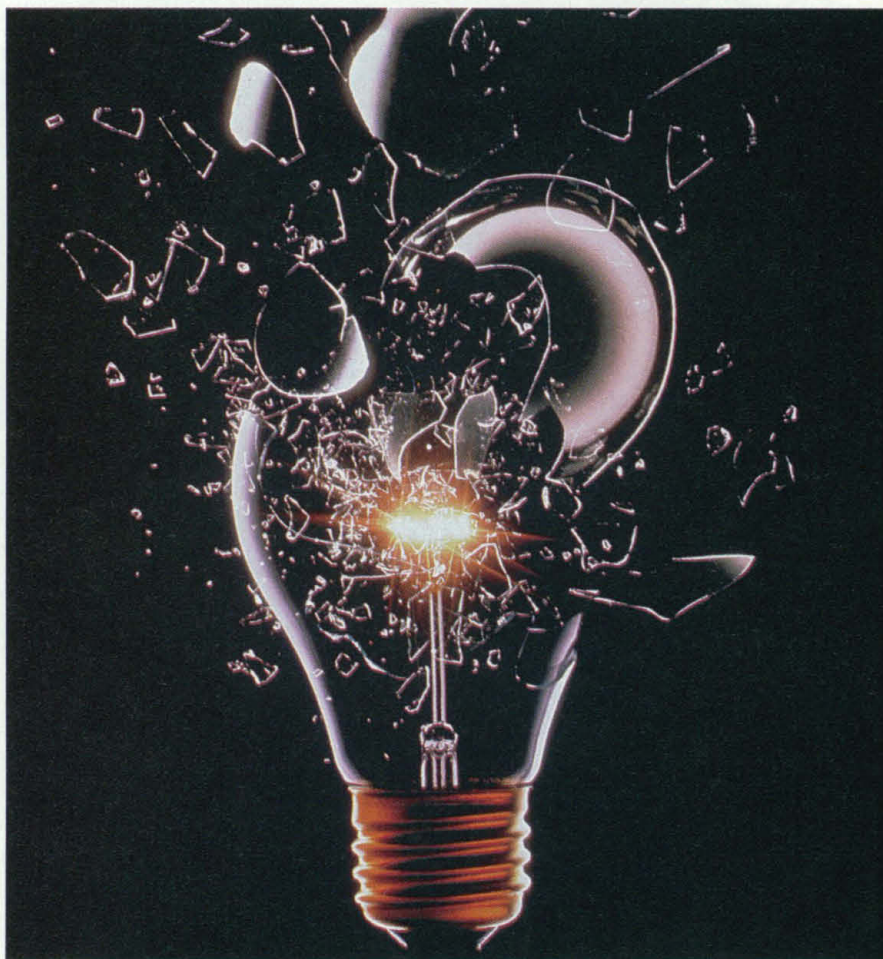
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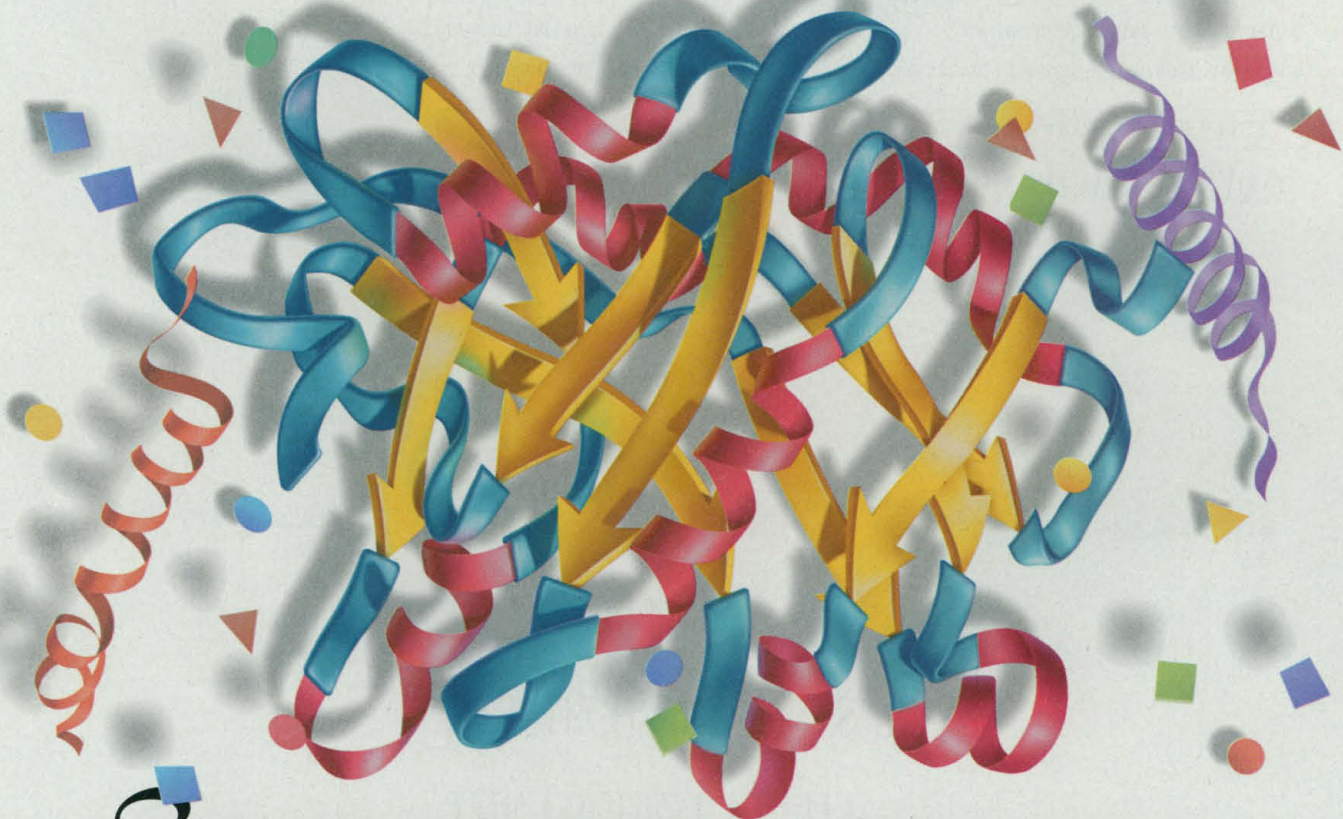
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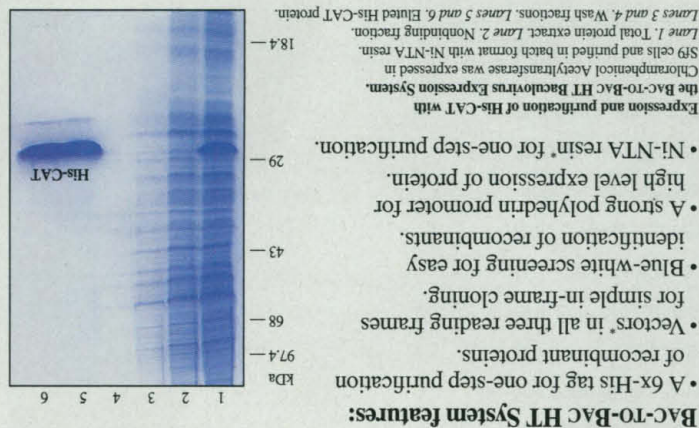
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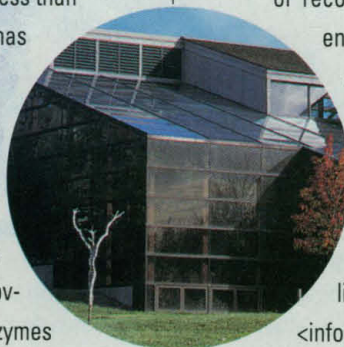
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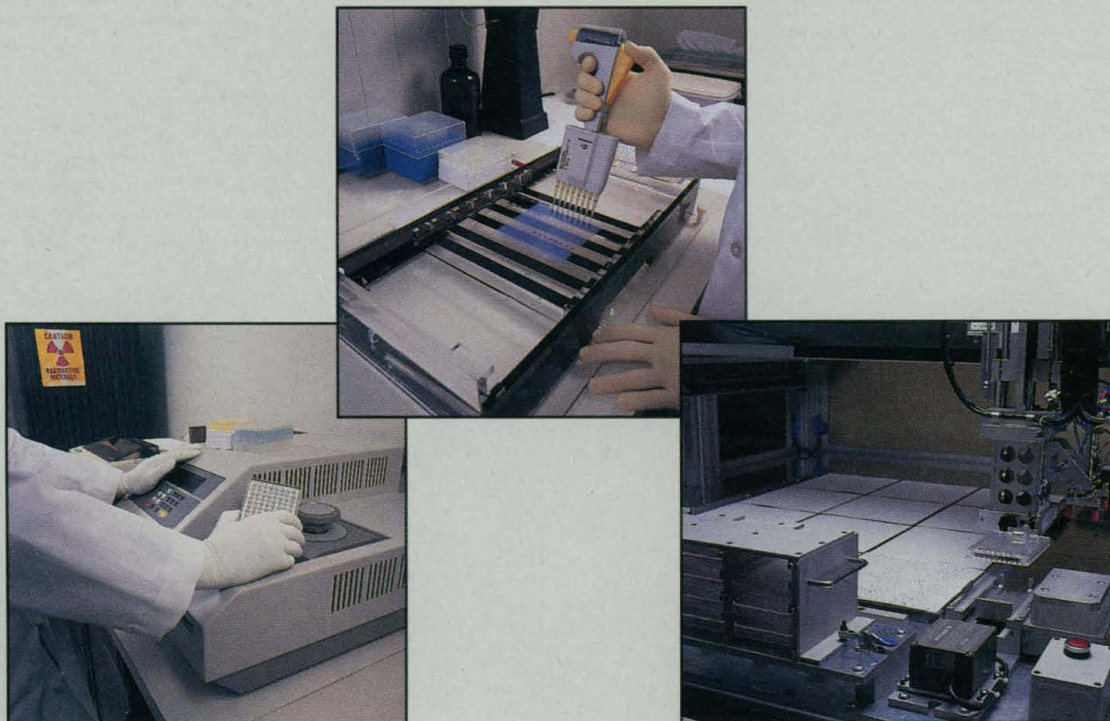
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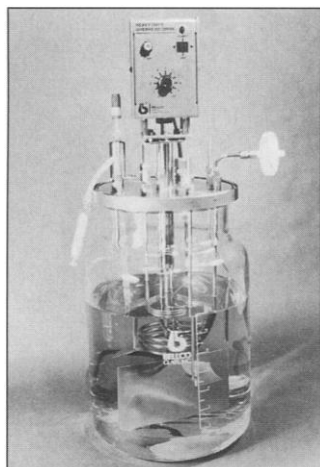
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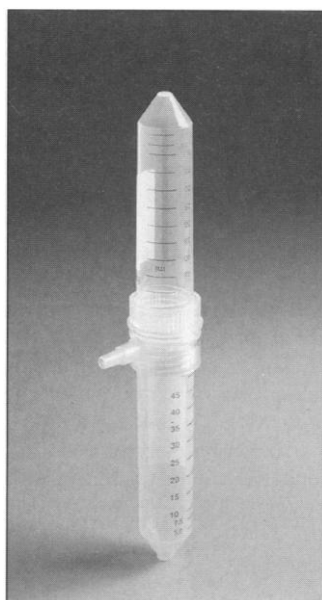
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Literature

Digital Syringe, for the Most Accurate, Precise Data highlights the advantages of using this product for Karl Fischer moisture titrations. Use of this syringe for sample introduction into Karl Fischer titrators eliminates the need to weigh the syringe with and without sample, saving a great deal of time. **Hamilton. Circle 143.**

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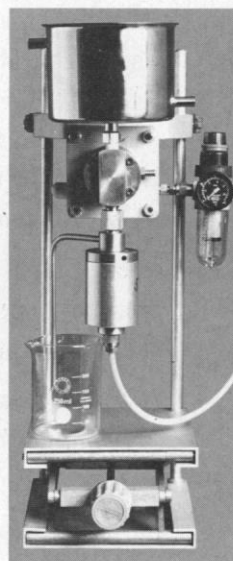


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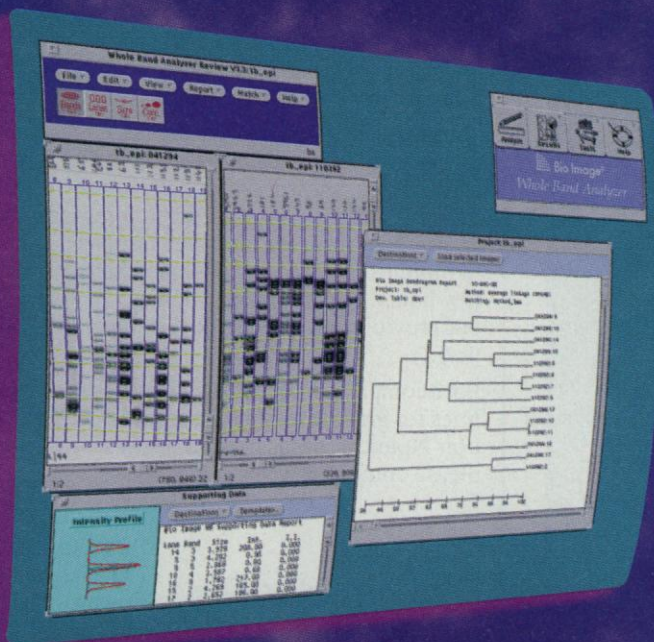
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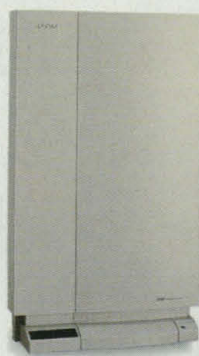
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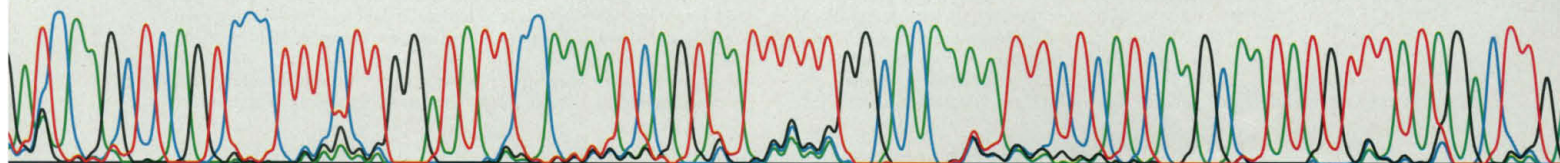
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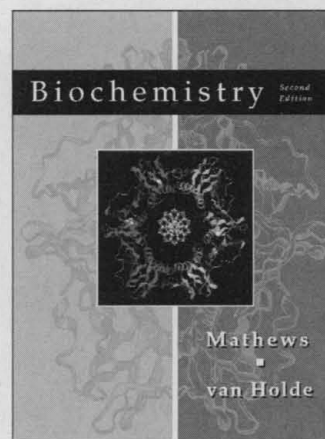
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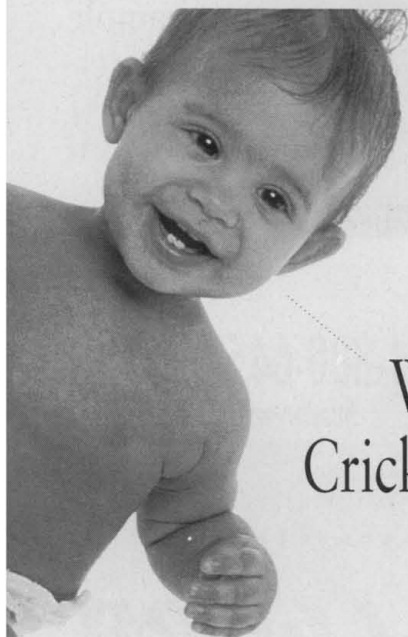
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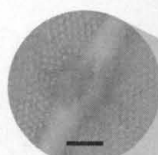
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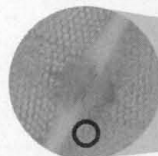
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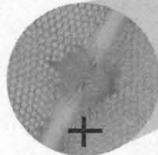
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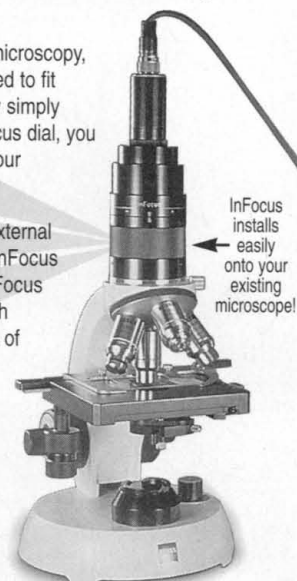
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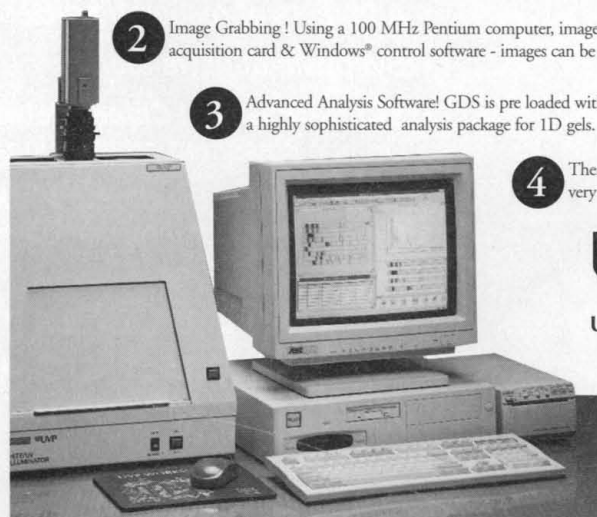
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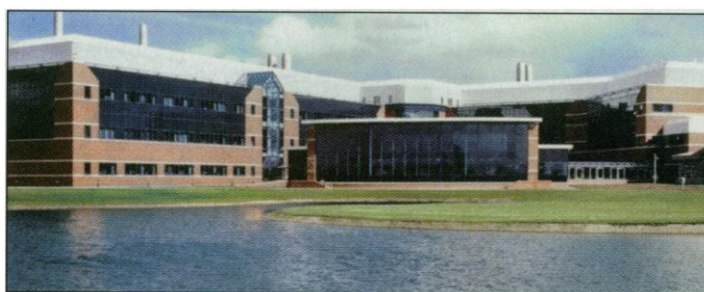
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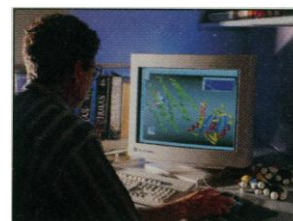
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