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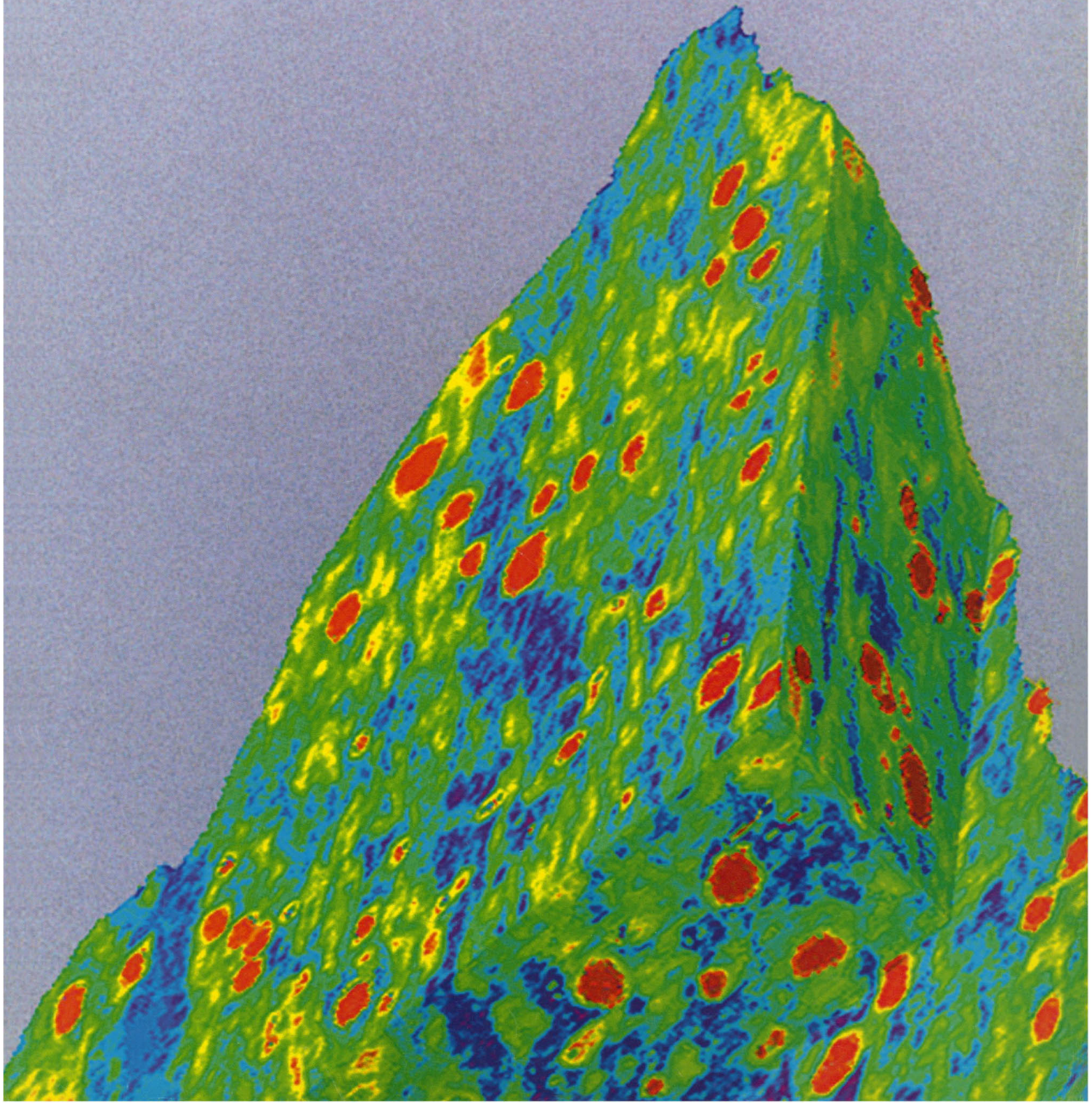

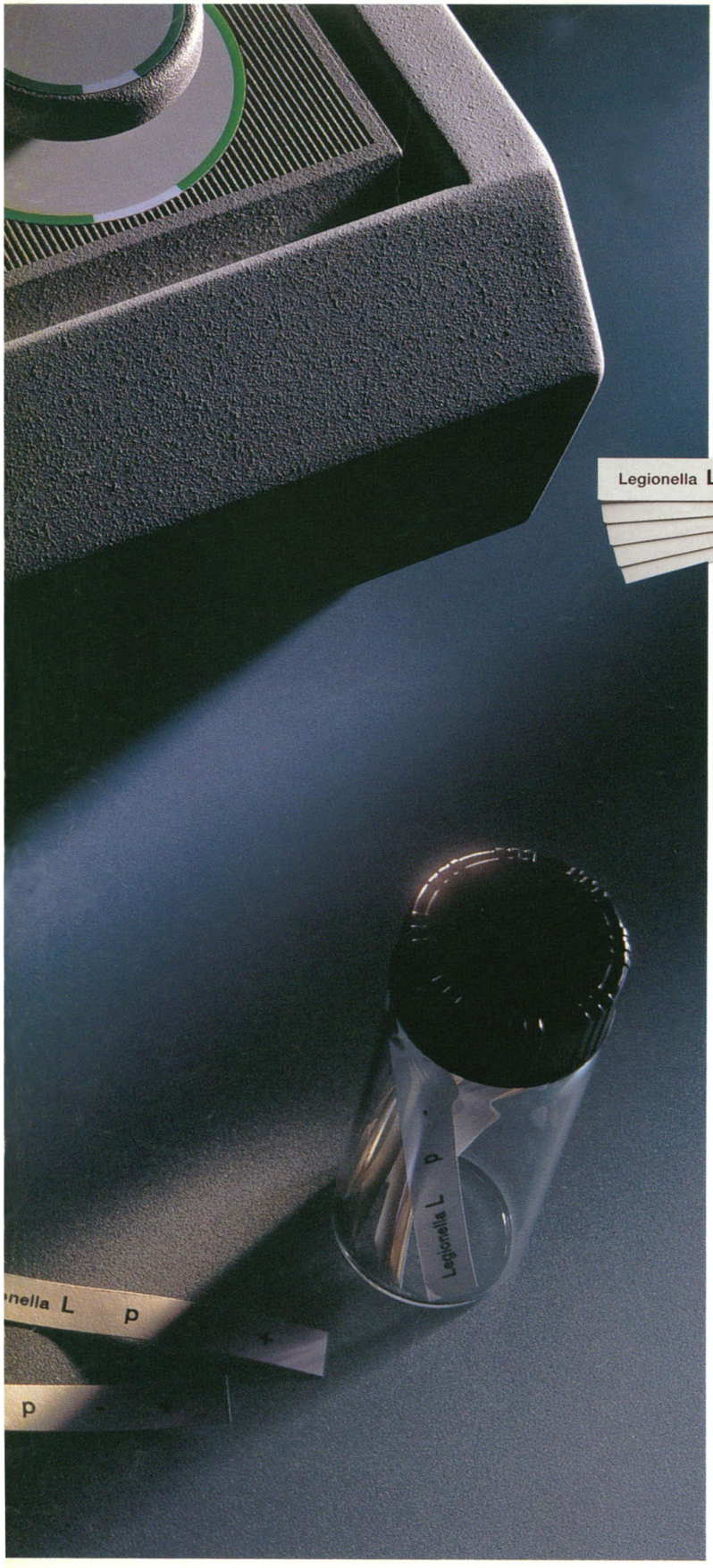

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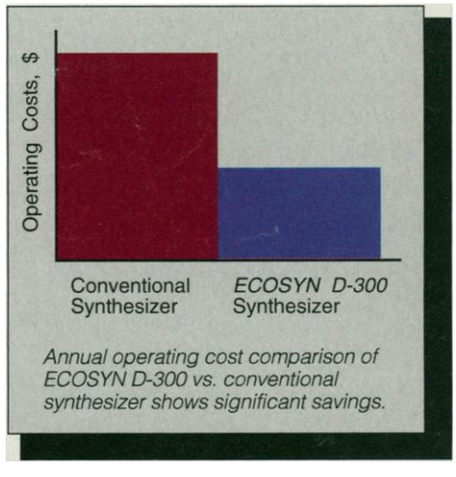

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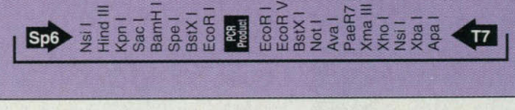

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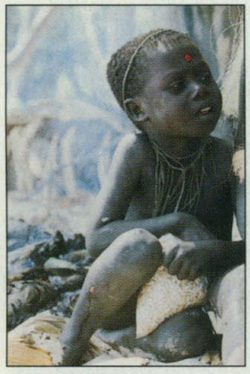

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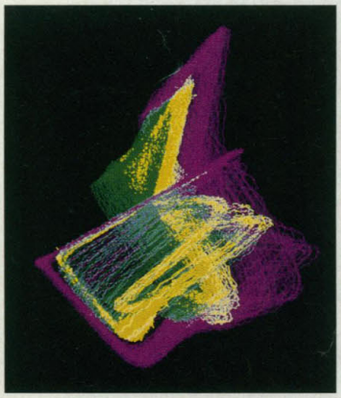

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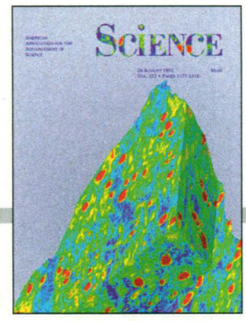
COVER

False-color, three-dimensional density map of a sample of pelitic schist from British Columbia, Canada, generated from high-resolution computed x-ray tomography images. The sizes and relative positions of the large garnet crystals (red orbs) provide clues about the atomic-scale mechanisms that govern metamorphic recrystallization. See page 1236. [Image: Cambria Denison]



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Effects of the Mount Pinatubo eruption on stratospheric ozone levels

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	0.06 µg	84%
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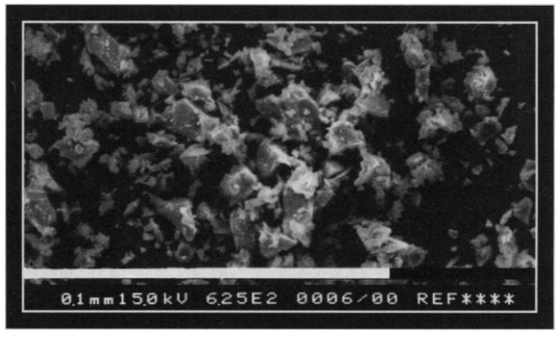

Scanning electron micrograph of powdered glass.

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THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

New World bronze

Metallurgy initially developed in the new world at about 1500 B.C. in the central Andean region and eventually spread by trade and cultural exchange to West Mexico before about 1200 A.D. In a review article, Hosler and Stresser-Pean (p. 1215) describe this evolution and present new evidence that this technology also spread during the next several centuries to East Mexico, where a second locus of metallurgy developed in the Huastic region.

■

Assembly instructions

Potassium ion channels are formed from multiple protein subunits that can associate in different ways to produce distinct channel properties; Li *et al.* (p. 1225) show that hydrophilic amino-terminal domains of these subunits can specify how assembly proceeds. A truncated form of the *Drosophila* Shaker B potassium channel that contains only the hydrophilic amino-terminal tail can itself assemble into a multimeric form. Normally the proteins from different potassium channel subfamilies do not assemble with one another. A chimeric polypeptide consisting of the distantly related mammalian potassium channel polypeptide (DRK1) with a Shaker B amino terminal domain tail is capable of coassembling with Shaker B.

■

Cardiac chaos

Are cardiac arrhythmias similar to the chaotic behavior seen in other nonlinear systems? If so, might they be susceptible to therapeutic control? Garfinkel *et al.* (p. 1230) have examined these questions by stimulating arrhythmias in a portion of perfused rabbit heart tissue with injections of a mixture of ouabain and epinephrine. Analysis of the interbeat intervals by means of Poincaré maps shows evidence of chaotic aperiodicity. By applying small electrical stimuli during real-time analysis of the data, the authors can steer the perfused ventricular tissue back to periodicity. Although the relevance of these results to clinical cardiac arrhythmias is uncertain, the finding may point the way toward active control of such conditions.

■

Mount Pinatubo and the ozone layer

The eruption of Mount Pinatubo, one of the largest of this century, injected large quantities of sulfur dioxide—which rapidly forms sulfate particles—into the stratosphere. The many particles absorb and reflect more incoming sunlight; this process cools the troposphere, warms the stratosphere, and affects circulation. These changes, along with the possibility that the particles could allow ozone-destroying reactions to proceed, might affect mid-latitude ozone levels. Brasseur and Granier (p. 1239) use several model simulations to investigate the effects. The simulations suggest that soon after the eruption, ozone levels are most affected by the changed atmospheric dynamics, but that later on and at higher latitudes chemical loss may become significant.

Receptor desensitization

A number of functions have recently been described for the βγ subunits of heterotrimeric guanine nucleotide-binding proteins (G proteins), which once appeared to be less important than their associated subunits. Pitcher *et al.* (p. 1263) have found that βγ subunits bind to the β-adrenergic receptor kinase (βARK) and facilitate its transport from the cytosol to the plasma membrane. This process results in enhanced phosphorylation of the β-adrenergic receptor and consequent desensitization of the receptor. The activation of the β-adrenergic receptor, which causes dissociation of βγ subunits, appears to be coupled to receptor desensitization.

Pain relief

Aspirin and ibuprofin are examples of nonsteroidal anti-inflammatory drugs (NSAIDs), which have been thought to exert their pain-relieving (analgesic) effects by inhibiting cyclooxygenase. This enzyme synthesizes prostanoids, which evoke pain behavior by action at peripheral nerve terminals. Malmberg and Yaksh (p. 1276) now show that NSAIDs block excessive sensitivity to pain (hyperalgesia) at a site in the central nervous system, the spinal receptors for the neurotransmitters glutamate and substance P. Thus, the anti-inflammatory and analgesic effects of this class of drugs appear to act at different sites in the body.

■

In-depth analysis

Accurate depth perception is an advantage those with binocular vision enjoy. Interpretation of a three-dimensional image occurs through use of several cues, including slight differences in how the images fall on the two retinas, and proprioceptive information about the actual distance to the object. Trotter *et al.* (p. 1279) analyze how specific neurons in the primary visual cortex of monkeys respond to these various cues. Microelectrode recordings within area V1 of the cortex showed that the visual responsiveness of most of these neurons was modulated by the distance to the object. These results indicate that integration of information from both retinal and extraretinal sources can occur early in the visual processing pathway for cortical representation of three-dimensional space.

■

Core controversy

Models of the formation of Earth's iron-rich core must account for the high concentrations of siderophile (metal-loving) elements that have remained in the upper mantle. The extrapolation of the metal-silicate partition coefficients for these elements determined at laboratory conditions to high pressures and temperatures is debated by Jones *et al.* (p. 1281), O'Neill (p. 1282), and Murthy (p. 1284).

■

Ethics and science

There are an increasing number of attempts to devise formal statements of ethical principles with respect to scientific research. The ambiguities surrounding one pioneering attempt are discussed by Rothman (p. 1290) in his review of *The Nazi Doctors and the Nuremberg Code*. The Nuremberg Code, a statement of principles governing experimentation on human subjects, came out of the trials that followed World War II. As comments on the Code reveal, the issues of informed consent, injury, and risk in human experimentation and the usefulness of formal codes and the mechanisms for their enforcement remain controversial.

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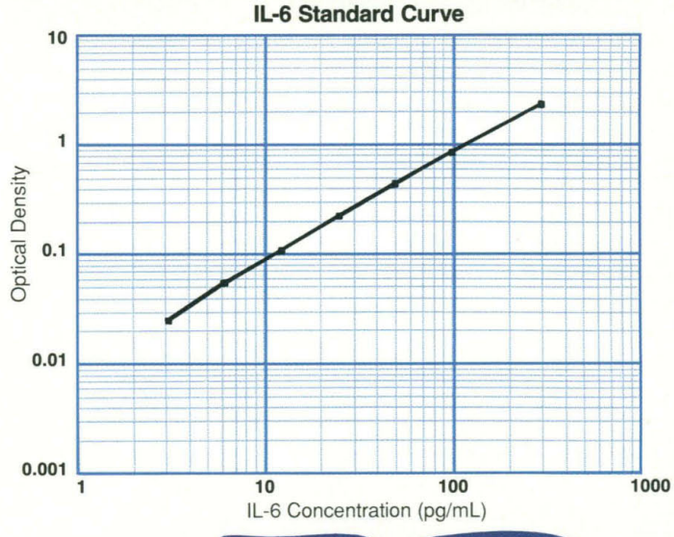

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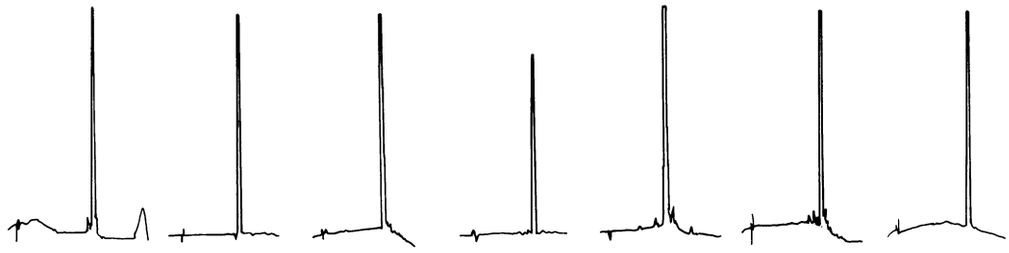

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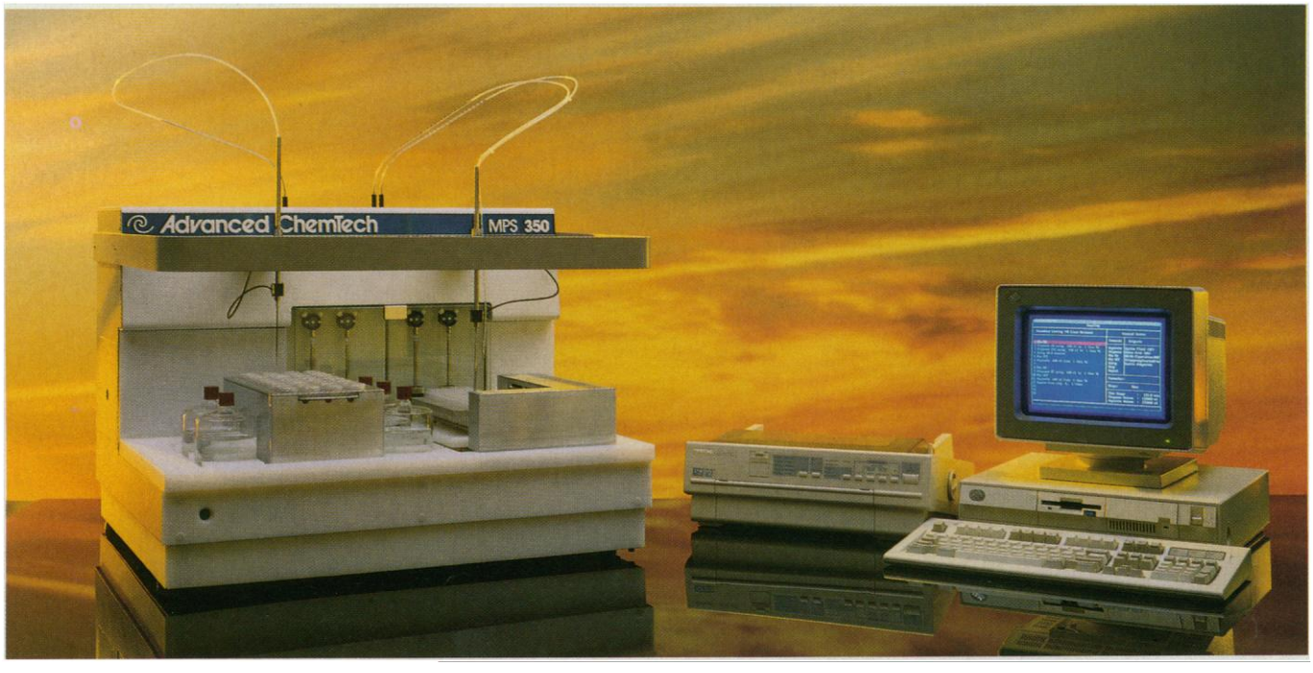

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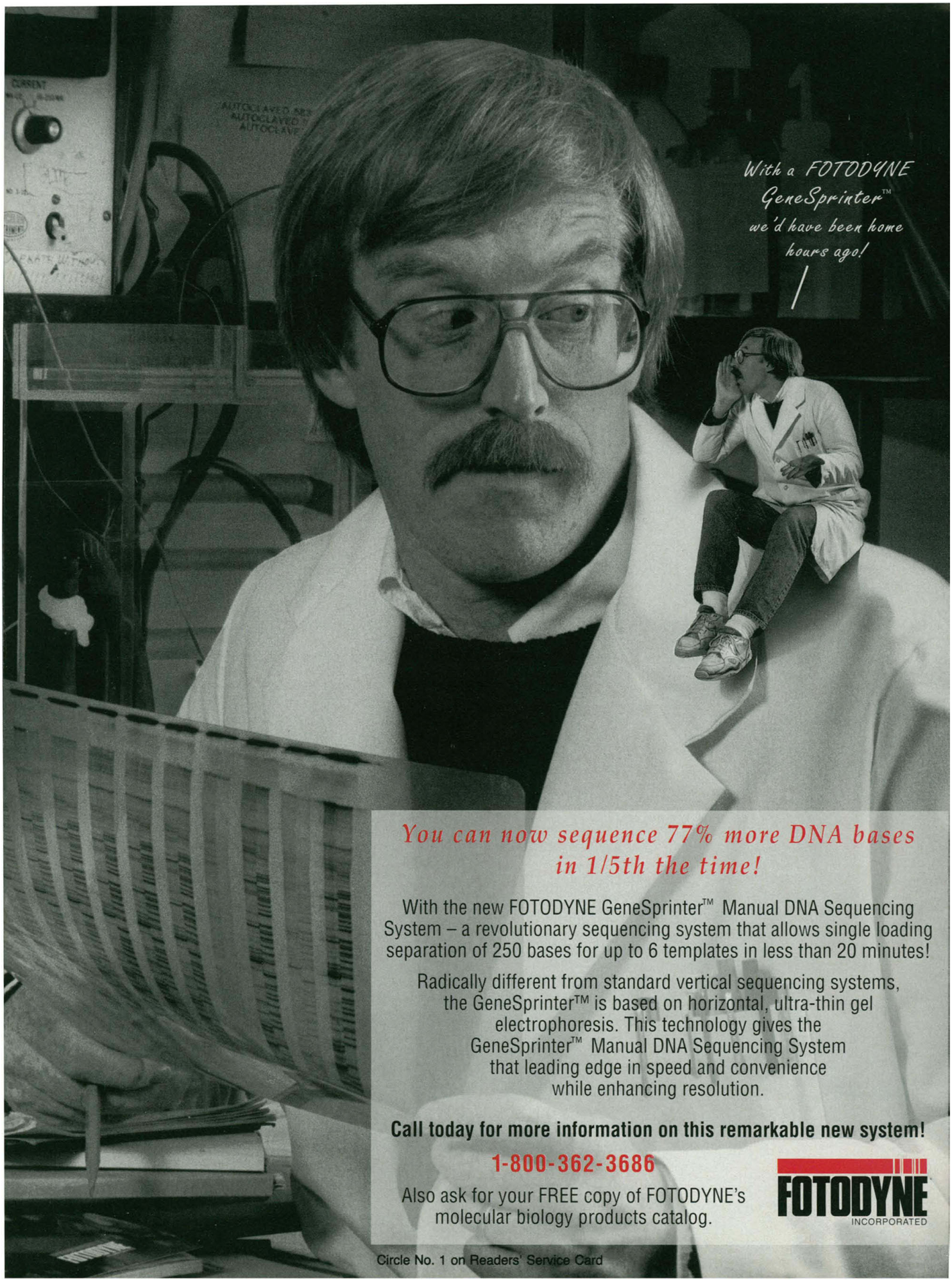

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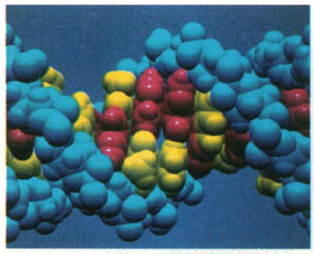
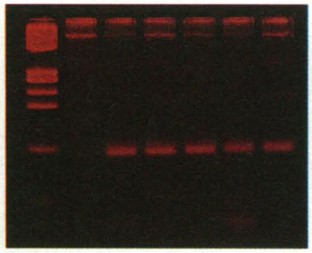
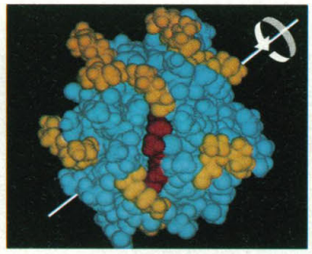


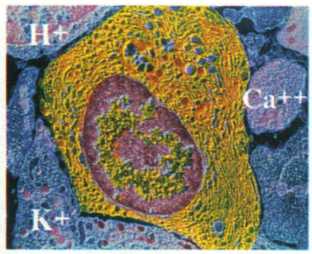
DNA Quantitation



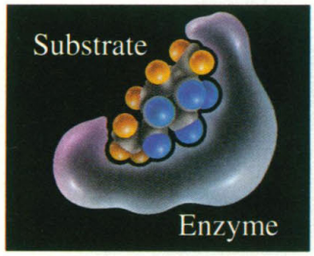
Gel Scanning



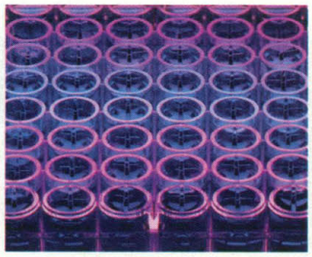
Macromolecular Anisotropy Measurements



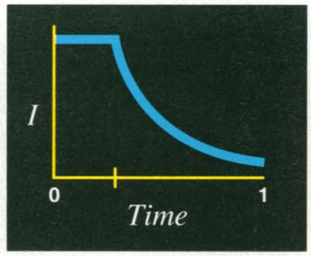
Intracellular Ion Determinations



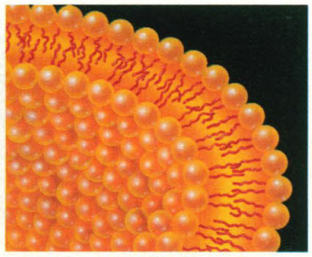
Enzyme Kinetic Analysis



Microplate Assays



Stopped-Flow Kinetic Analysis



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