

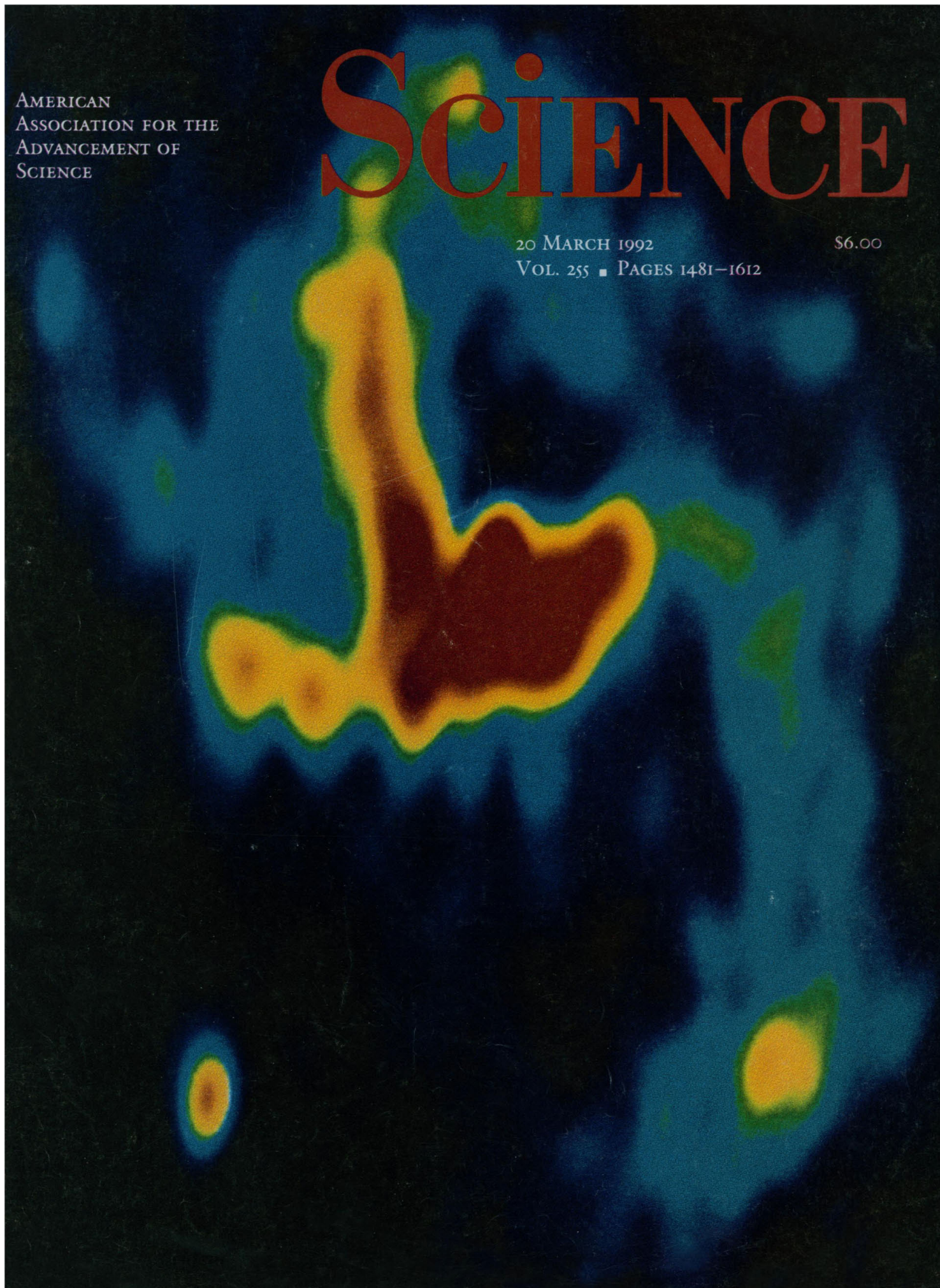
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I. Simcox, T. G., Marsh, S.J., Gross, E.A., Lernhardt, W., Davis, S.J.  
and Simcox, M.C., *Gene*, **109**: 121 - 123, 1991

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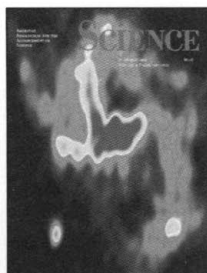
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**COVER** Radiograph of the core of the Milky Way galaxy, ten light-years in extent, showing a new source—the Galactic Center Transient—within four light-years of the center (lower left). The radio emission from this source is thought to be a result of relativistic electrons spiraling in an intense magnetic field, which are probably from a system in which a neutron star or a black hole accretes material from its companion. See page 1538. [Image by J.-H. Zhao *et al.*]

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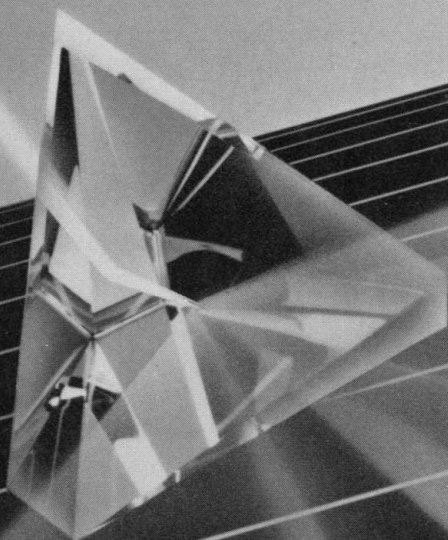
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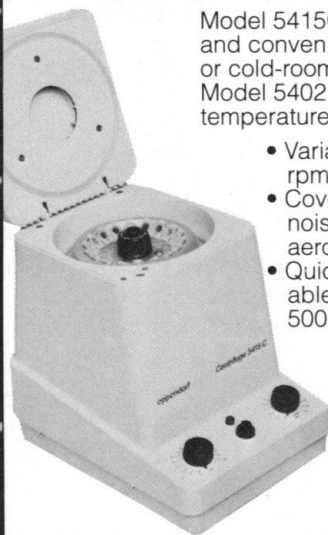
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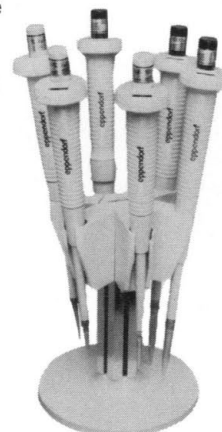
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## This Week in SCIENCE

### Go with the flow

**G**ranular materials (sand piles) provide analogs for behavior in a wide variety of systems and over many scales, from flux lattices in superconductors to earthquakes, and also have several distinct properties, such as for sound propagation. Jaeger and Nagel (p. 1523) review some of the advances in understanding granular materials and granular flow and the applications in physics, engineering, and geology. For example, the "phase transition" marking the onset of flow in a sand pile has been related to earthquake behavior and the onset of electrical current flow.

### Milky Way microwaves

**A**t the center of the Milky Way galaxy are a variety of strange objects, possibly even a black hole. One of these, the compact source Sgr A\*, is a strong emitter of radio-frequency radiation lying right at the galactic center. Zhao *et al.* (p. 1538; cover) describe a transient radio source near the center of the galaxy that is at least as strong as Sgr A\*. The radio emission may be from the hot plasma surrounding an x-ray binary star system.

### Cubic core

**P**yruvate dehydrogenase multienzyme complexes (PDCs), which catalyze a key reaction in glucose metabolism at the junction of glycolysis and the citric acid cycle, contain numerous copies of pyruvate dehydrogenase, dihydrolipoyl transacetylase, and lipoamide dehydrogenase. Mattevi *et al.* (p. 1544) have determined the atomic structure of the catalytic domain of dihydrolipoyl transacetylase, which associates as eight trimers to form the cubic core of the PDC complex in *Azotobacter vinelandii*. A 29 angstrom active site channel is formed at the trimer interface; coenzyme A enters this channel from the inside of the core, and lipoamide enters from the outside.

### Faux frost on Ceres

**S**pectral observations of the asteroid Ceres suggests that its surface rocks contain water-bearing phyllosilicates such as clay minerals. In addition, a spectral feature near 3.07 micrometers had been interpreted as evidence that water frost covered the surface. An analysis of new spectra and comparison with laboratory measurements by King *et al.* (p. 1551) show that this feature is most reasonably attributed to an ammonium-bearing phyllosilicate, ammoniated saponite. Because deammoniation starts to occur at about 400 kelvin, Ceres has probably undergone minimal thermal processing since its formation.

### Memory glass model

**M**olecular dynamics simulations by Tse and Klug (p. 1559) have revealed the basis for the structural memory effect in  $\text{AlPO}_4$ , which has a high-pressure amorphous form that can return to its original crystalline form when compression is released. Comparison with previous simulations for  $\alpha$ -quartz, which is isostructural but remains amorphous after high-pressure treatment, indicates that the memory effect is due to the  $\text{PO}_4$  units, which essentially retain their coordination number of four despite being severely distorted.

### Organics in the ocean

**D**issolved organic matter (DOM) in the oceans represents one of the largest carbon reservoirs on Earth. Isolation of DOM has been difficult, however, and thus the full implications of DOM for the carbon (C) cycle and the relation of C in DOM to expected nitrogen (N) and phosphorus (P) levels has not been clear. Benner *et al.* (p. 1561) successfully isolated milligram amounts of DOM exceeding 1000 daltons by tangential-flow ultrafiltration. The recovered DOM revealed high abundances of polysaccharides, which do not contain much P or N, particularly in DOM from surface waters.

### In hot water

**R**echarge in geothermal systems typically occurs over a wide area, whereas discharge of heated water is commonly focused into a few discrete vents, even along a continuous fracture zone. Germanovich and Lowell (p. 1564) examined this process using the percolation theory and considering the thermomechanical response of fractures. Focusing might result from thermal expansion of the walls as the hot fluids move through the fractures; small fractures would close, leaving a few large vents. Cyclic venting may occur as fractures reopen in the cooling rocks.

### Systemin precursor

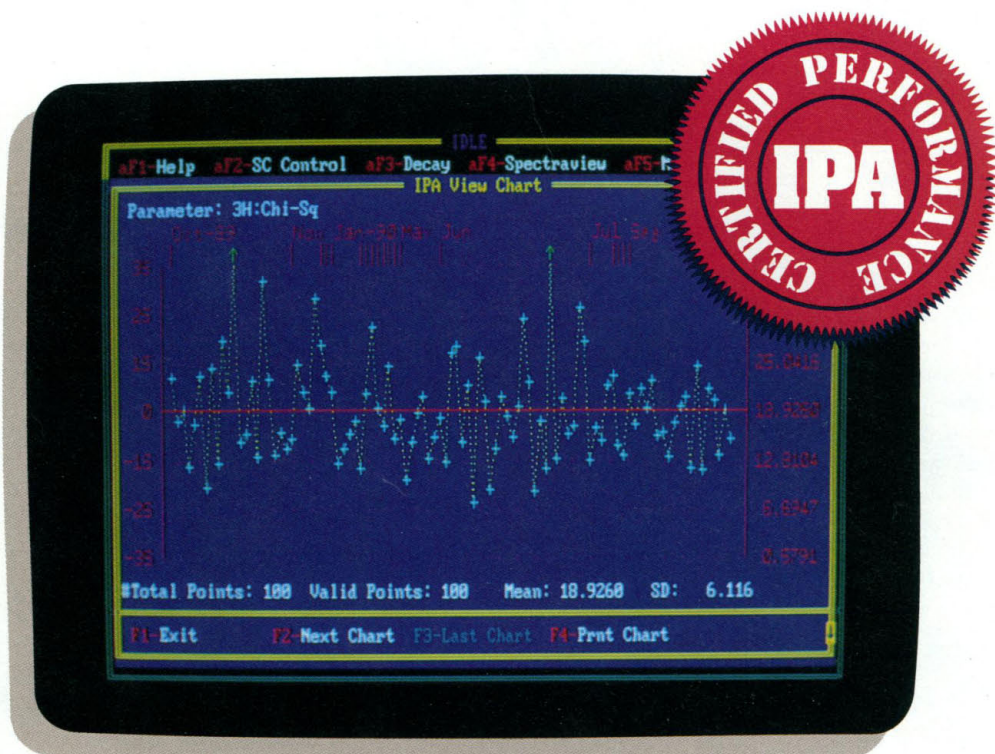
**P**roteolytic processing of a 200-amino acid precursor protein produces systemin, an 18-amino acid plant hormone that induces synthesis of proteinase inhibitors throughout plants, such as the tomato, in response to leaf wounding. McGurl *et al.* (p. 1570) isolated the prosystemin gene from tomato and found prosystemin mRNA in all plant tissues except for the roots. Expression of an antisense cDNA for prosystemin almost completely suppressed the wound-induced production of proteinase inhibitors.

### CD4 for CD8

**I**nfection of mice with lymphocytic choriomeningitis virus (LCMV) caused meningitis and death through a  $\text{CD8}^+$  cytotoxic T cell response. Muller *et al.* (p. 1576) expected that  $\beta_2$ -microglobulin-deficient mice, which lack functional major histocompatibility complex class I proteins and produce few  $\text{CD8}^+$  cells, would be resistant to LCMV in the same manner as immunosuppressed mice and newborns. Instead, these mice, although they survived longer, also developed choriomeningitis. A compensating  $\text{CD4}^+$  response may have occurred, probably through endogenous viral peptides bound to class II molecules.



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## Drug Prohibition in the United States: Costs, Consequences, and Alternatives

An Article Reprinted from *Science* (1 September 1989)

ETHAN A. NADELMANN  
FROM THE ABSTRACT:



"Drug legalization" increasingly merits serious consideration as both an analytical model and a policy option for addressing the "drug problem." Criminal justice approaches to the drug problem have proven limited in their capacity to curtail drug abuse. They also have proven increasingly costly and counter-productive. Drug legalization policies that are wisely implemented can minimize the risks of legalization, dramatically reduce the costs of current policies, and directly address the problems of drug abuse. Twelve pages.

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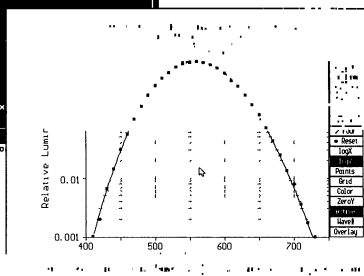
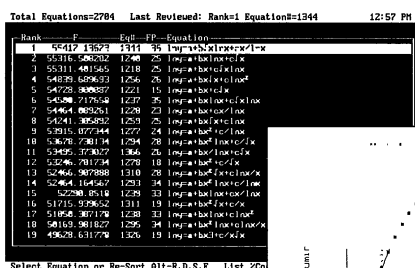
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▲ **Extensive fitting and ranking choices** Choose curve fitting algorithm (Singular Value Decomp., Gauss-Jordan, LU Decomposition), best fit ranking criteria (DOF adj.  $r^2$ , Fit Std Error, F-statistic and Std  $r^2$ ), smoothing functions (polynomial interpolation, FFT and Lowess) and more!

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▲ **Unique graphical review process** Graphically



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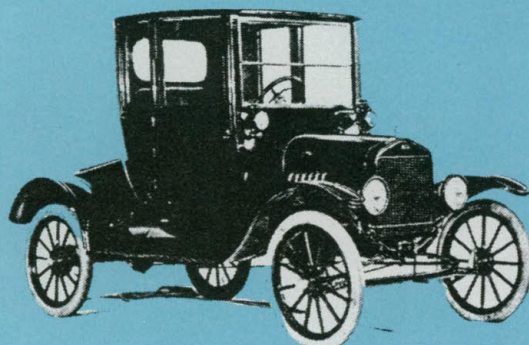
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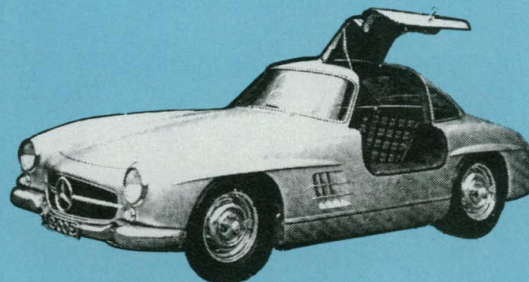


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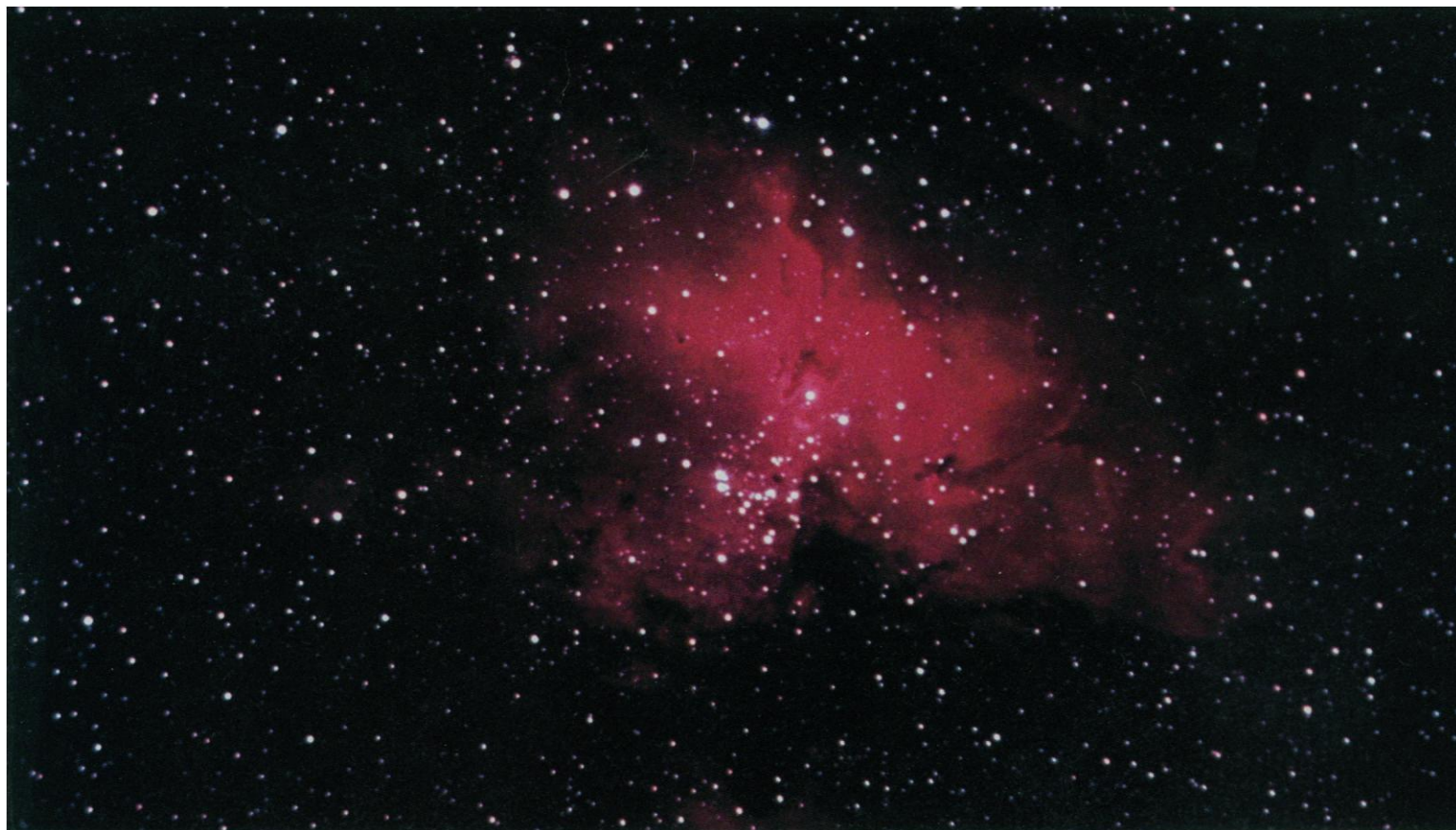
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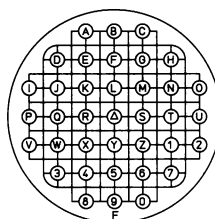






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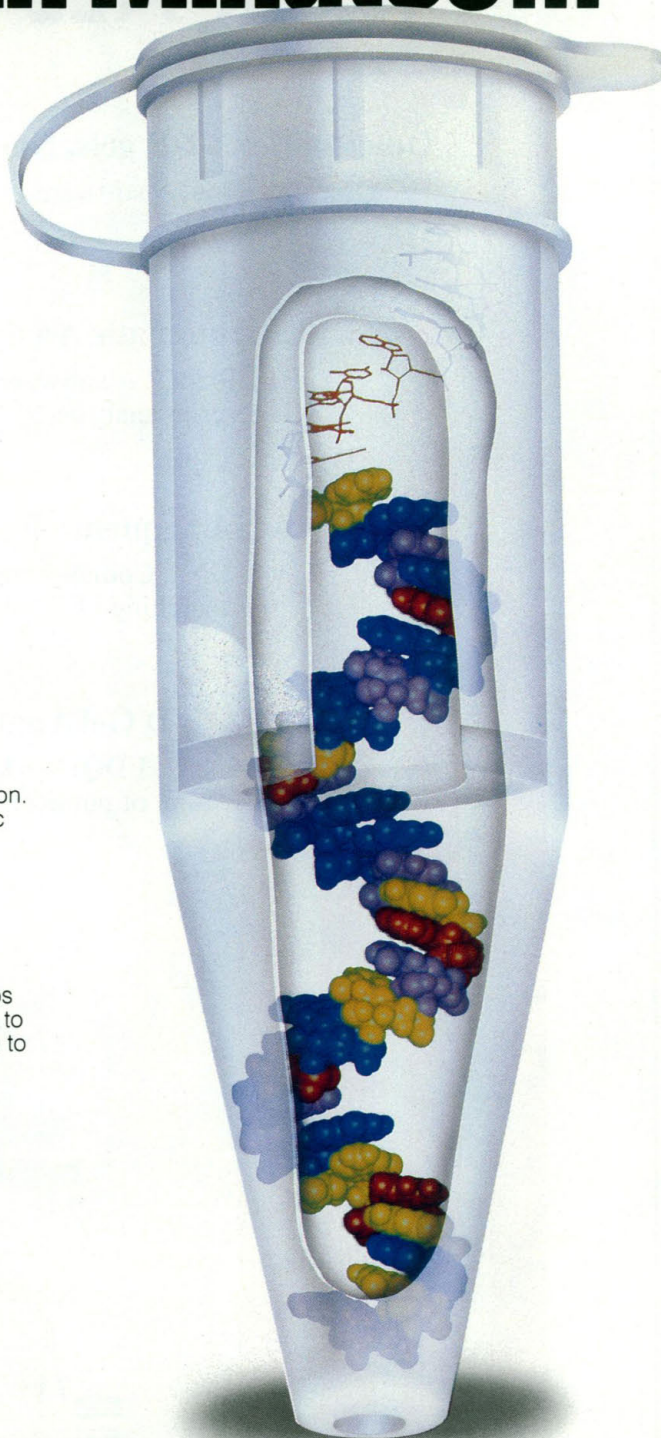


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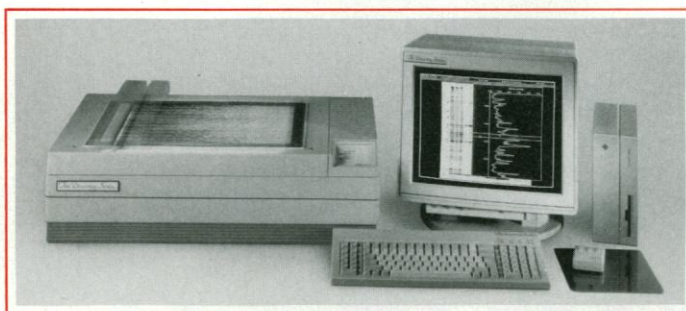
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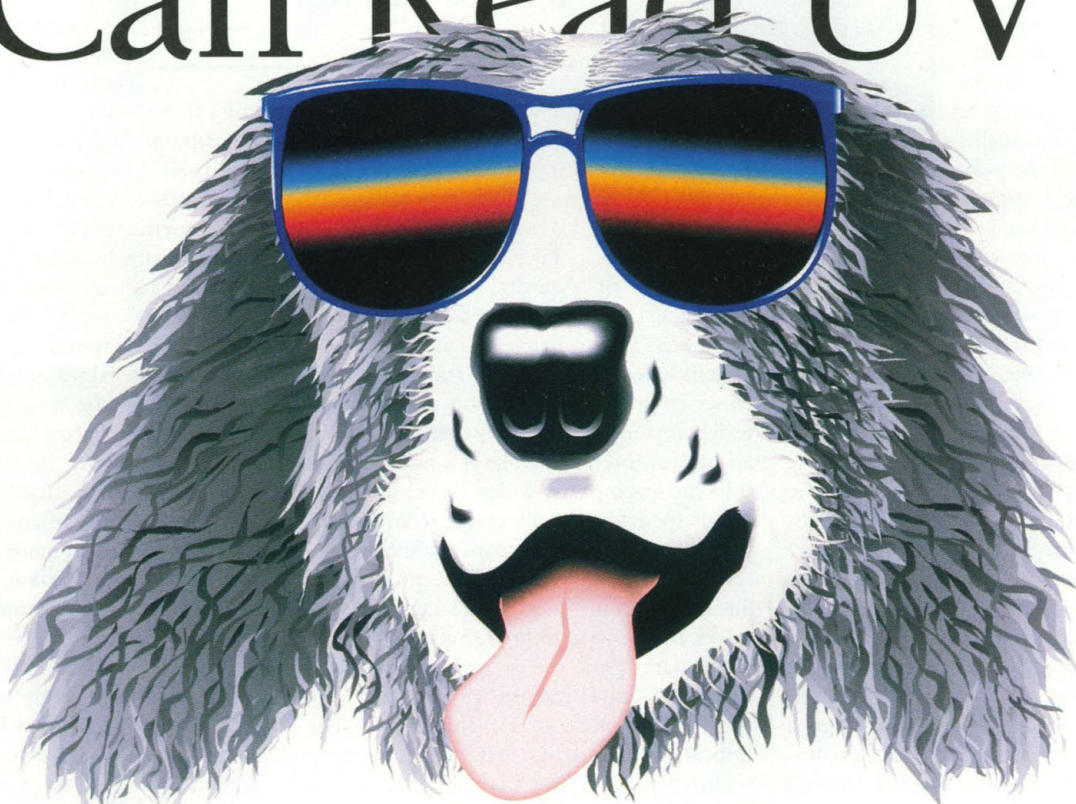
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