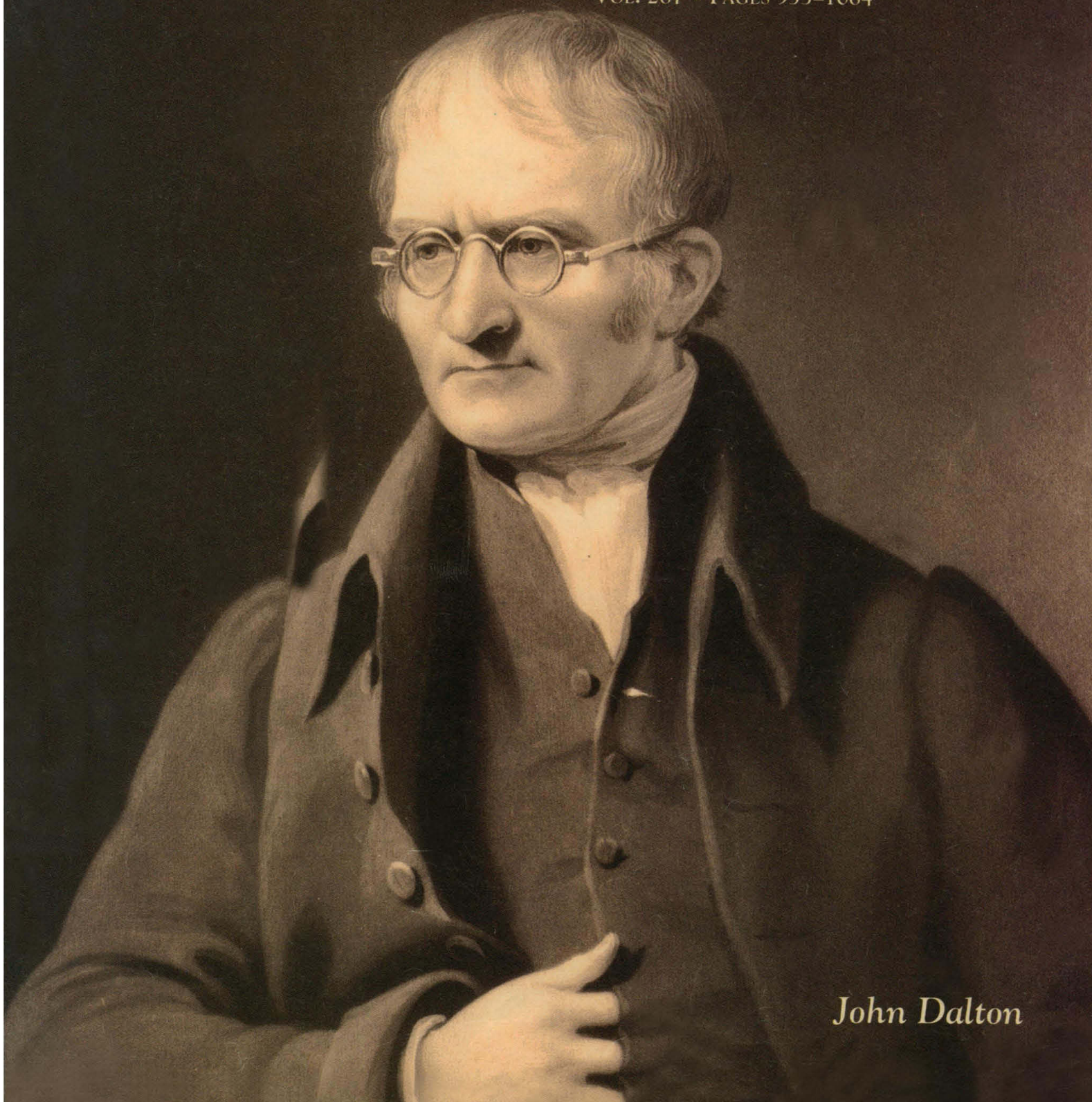


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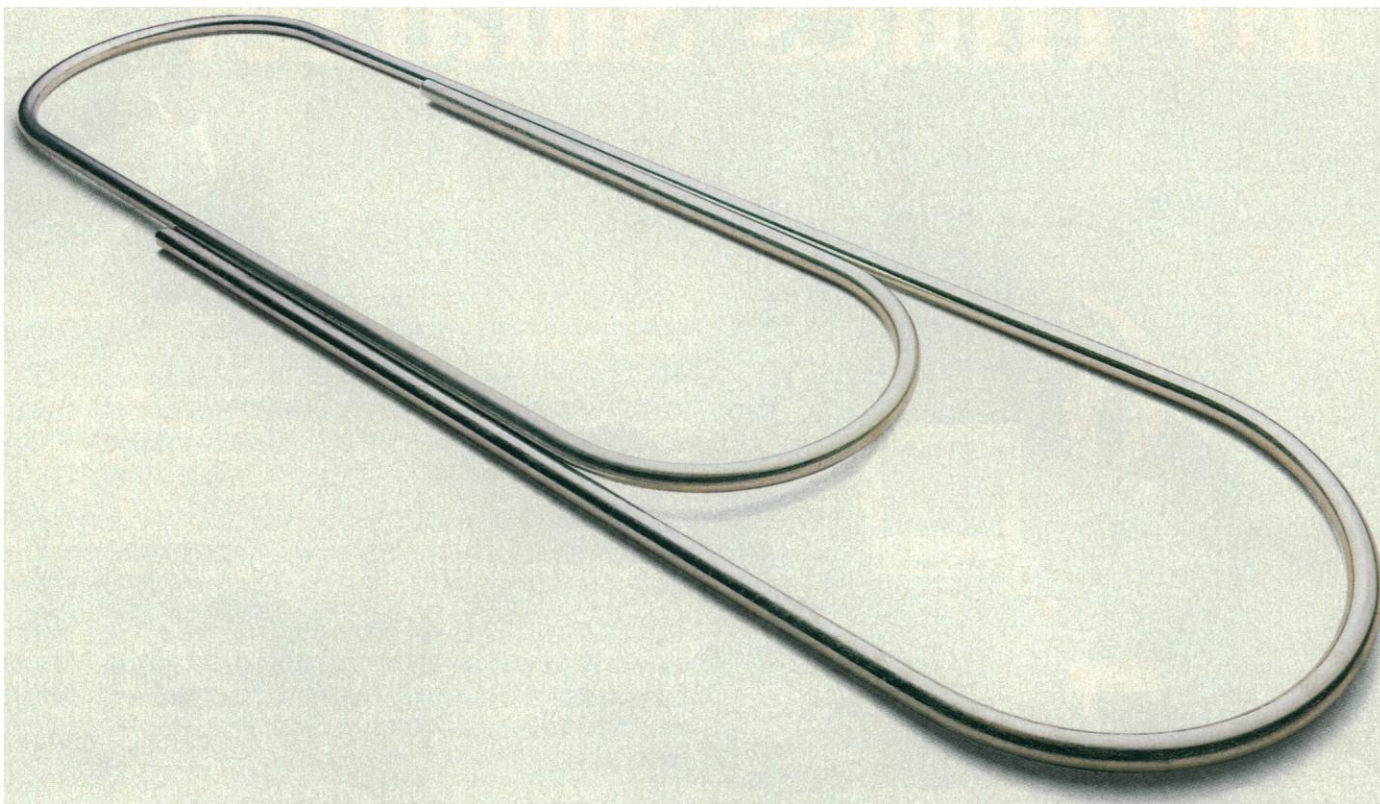
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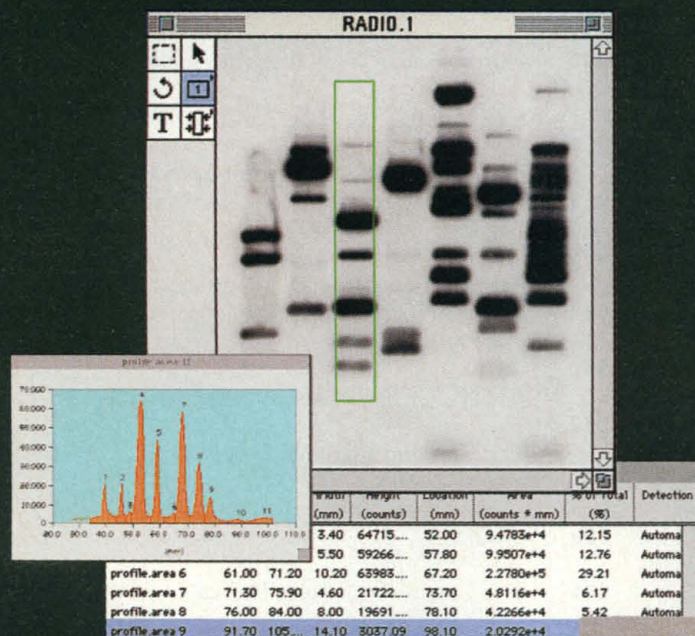
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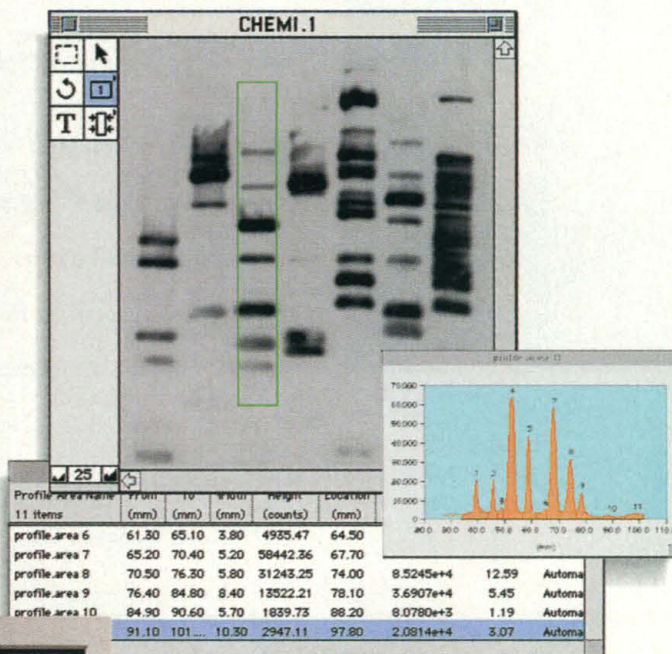




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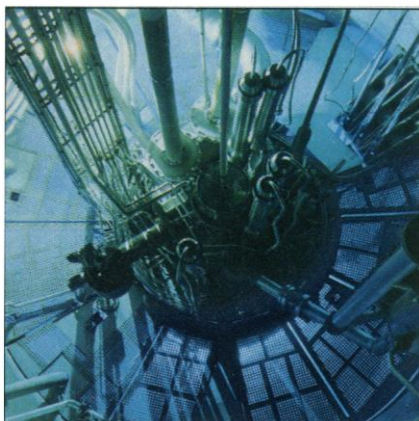
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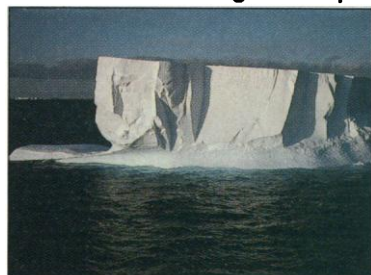
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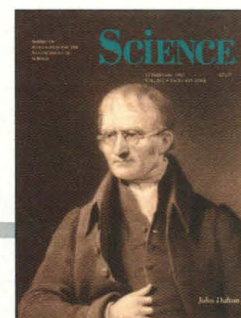
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## COVER

John Dalton (1766–1844) is celebrated for developing the atomic theory of chemistry, but his first scientific paper to the Manchester Literary and Philosophical Society in 1794 was an account of how his color perceptions differed from those of other people. After

150 years, amplification of DNA from his preserved eye tissue has revealed the molecular basis for his color blindness. See page 984. [Engraving: Dated 1836, reproduced by permission of the British Library]



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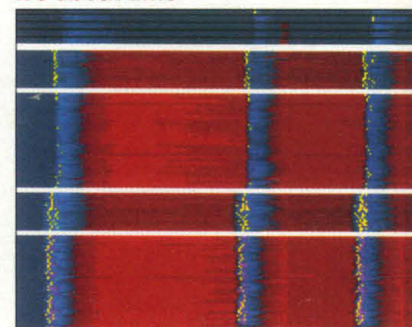
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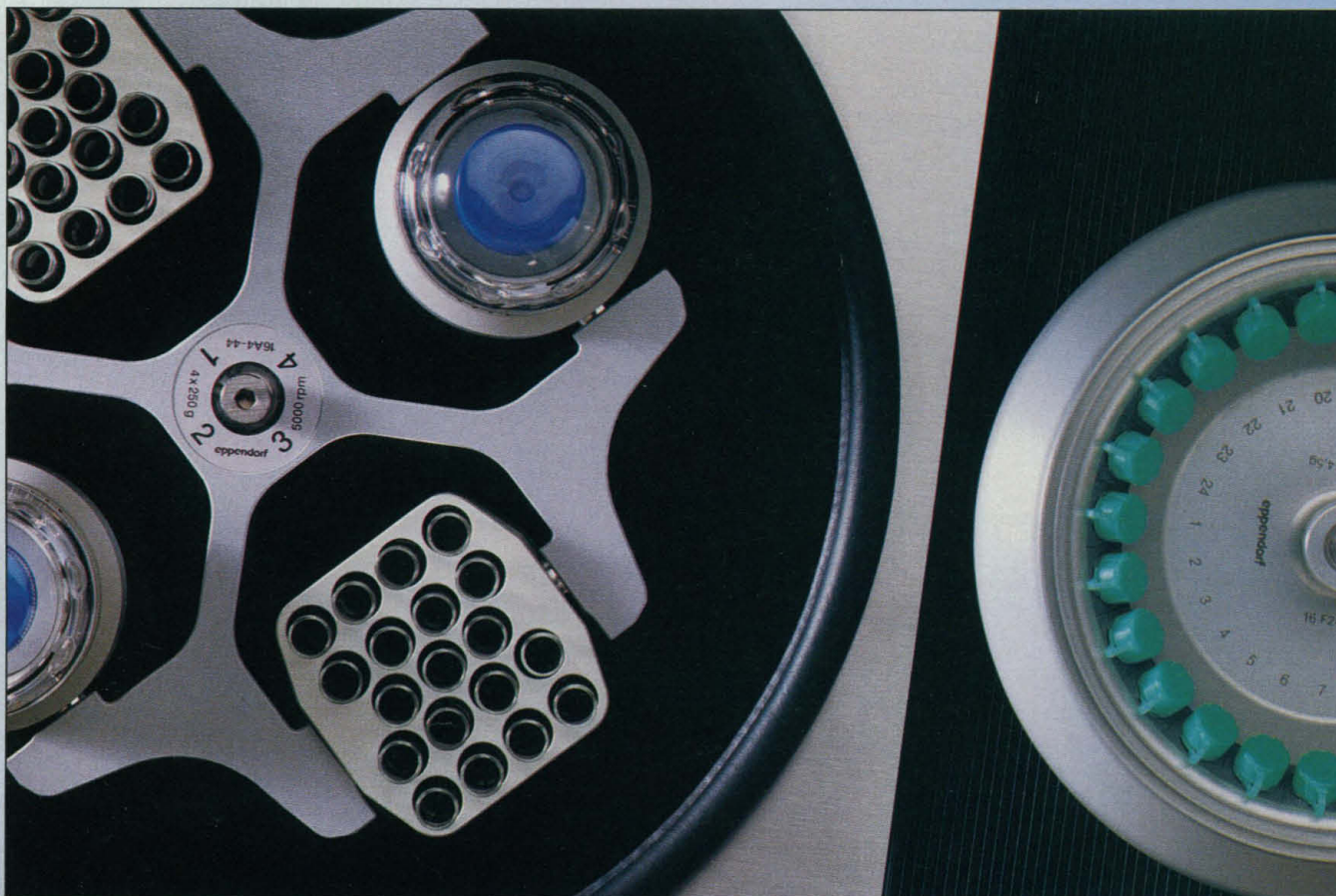
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## Under the wire

If, as recent observations have suggested, the Hubble constant is close to the high end of its range of empirical uncertainty, then the universe is young and galaxies must have formed quickly. These factors and others are problematic for many cosmological theories, and Bartlett *et al.* (p. 980) describe the numerous advantages—for theoretical cosmologists—of supposing that the Hubble constant is in fact lower than the observations mostly indicate.

## Metallic plastic

Conducting polymers have electrical conductivities typical of metals, but mechanically they resemble brittle plastics, making them difficult to dissolve or process. Shi *et al.* (p. 994) show that polythiophene films made by electrochemical deposition from boron fluoride–ethyl ether solutions are shiny and flexible, and can be cut with scissors. The tensile strength of these films is greater than that of aluminum foils.

## Two-in-one

A complex set of reactions and phase changes accompany the formation of thermosetting polymers. Bras *et al.* (p. 996) designed an instrument allowing small-angle x-ray scattering, which provides structural and phase change data, and Fourier-transform infrared spectroscopy, which gives chemical information, to be performed at the same time. By eliminating errors involved in comparing separate experiments they confirmed that phase separation rather than hydrogen bonding interactions drives structure development in polyurethanes.

## Color vision, old and new

The visual pigments in the retina that respond to long- and middle-wavelengths of light are encoded by a cluster of genes on the X chromosome. In men with normal color vision, Neitz and Neitz (p. 1013) found that the number of genes in the cluster ranged from 2 to 9—this is more than had been supposed, and the multiplicity may help to explain individual variations in color perception. When either or both of the long- and middle-wavelength gene classes are completely absent, color blindness results. The chemist John Dalton attributed his own color blindness to a blue tint in the vitreous humor of his eyes, but molecular analysis by Hunt *et al.* (p. 984) of tissue preserved at Dalton's behest reveals that he lacked genes encoding the middle-wavelength pigments.

## Ice delivery

Heinrich events, characterized by accumulation of debris transported by icebergs in North Atlantic sediments every 10,000 years or so, are thought to mark massive discharges of icebergs from North American ice sheets during the last glaciation. Bond and Lotti (p. 1005) have identified in several ice cores prominent increases in debris on a time scale of 2000 to 3000 years. The composition of the debris implies that icebergs were discharged not only from the Hudson Strait, the source usually associated with the Heinrich events, but also from the Gulf of St. Lawrence and Iceland. The more frequent events coincide with warmer periods noted in Greenland ice core records.

## Split charge

Many-electron systems can behave like a fluid of quasi-particles, collective entities that have properties different from the electrons themselves and may possess fractional charge. Theory implies that fractional charge is responsible for the fractional quantum Hall effect, in which a confined two-dimensional layer of electrons in a magnetic field exhibits quantized electrical conductance, and

Goldman and Su (p. 1010; see also Perspective by MacDonald, p. 977) have directly demonstrated the existence of fractional charge by means of resonant tunneling of quasi-particles through a potential hill.

## Cellular control

Identification of important factors controlling the cell cycle and differentiation has begun to shed light on the coordination of these two processes. The muscle-specific transcription factor MyoD enhances expression of specific genes and promotes withdrawal from the cell cycle. Halevy *et al.* (p. 1018; see also news by Marx, p. 963) report that expression of MyoD enhanced production of p21, an inhibitor of cyclin-dependent protein kinases (Cdks). This may be one way that MyoD inhibits proliferation. Skapek *et al.* (p. 1022) show that activation of Cdks inhibited transactivation of muscle-specific genes by MyoD whereas inhibitors of Cdks enhanced expression of muscle-specific genes in cells induced to differentiate in culture. Parker *et al.* (p. 1024) found that expression of p21 correlated with terminal differentiation in mouse embryos, but enhanced expression of p21 in

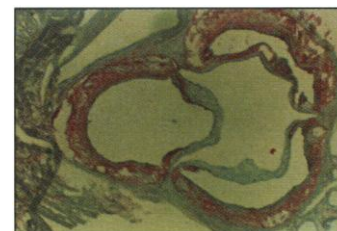
muscle did not require the presence of MyoD, indicating that MyoD, though sufficient to cause differentiation and cell cycle arrest in vitro, is not necessary for regulation of p21 in vivo.

## Timing is all

Humans are adept at deciphering information from temporal patterns, as in speech and music, but little is known of how the neural system recognizes and encodes such information. Neurons are known, however, to exhibit a variety of time-dependent responses, which Buonanno and Merzenich (p. 1028) have used to construct a neural network that can detect the temporal difference between the voiced and unvoiced phonemes /ba/ and /pa/.

## Low-cholesterol mice

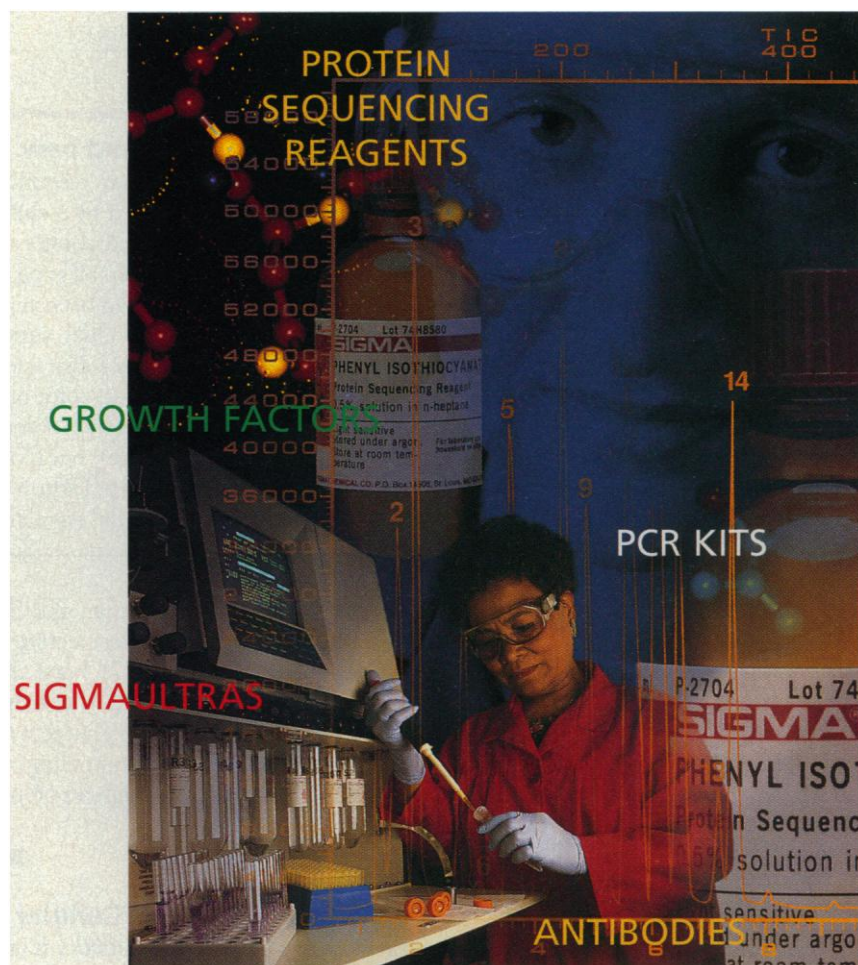
Apolipoprotein E (apoE) is widely involved in the processing of cholesterol. In humans, absence of apoE occurs in a rare genetic disorder characterized by premature atherosclerosis, and apoE-deficient mice have been used as a model for studies of hypercholesterolemia. Linton *et al.* (p. 1034) show that apoE-deficient mice that re-



ceived bone marrow transplants from normal mice generate detectable, although subnormal, levels of apoE in the serum. These mice, moreover, suffered significantly less atherosclerotic damage than their untreated cousins when fed a fatty diet.



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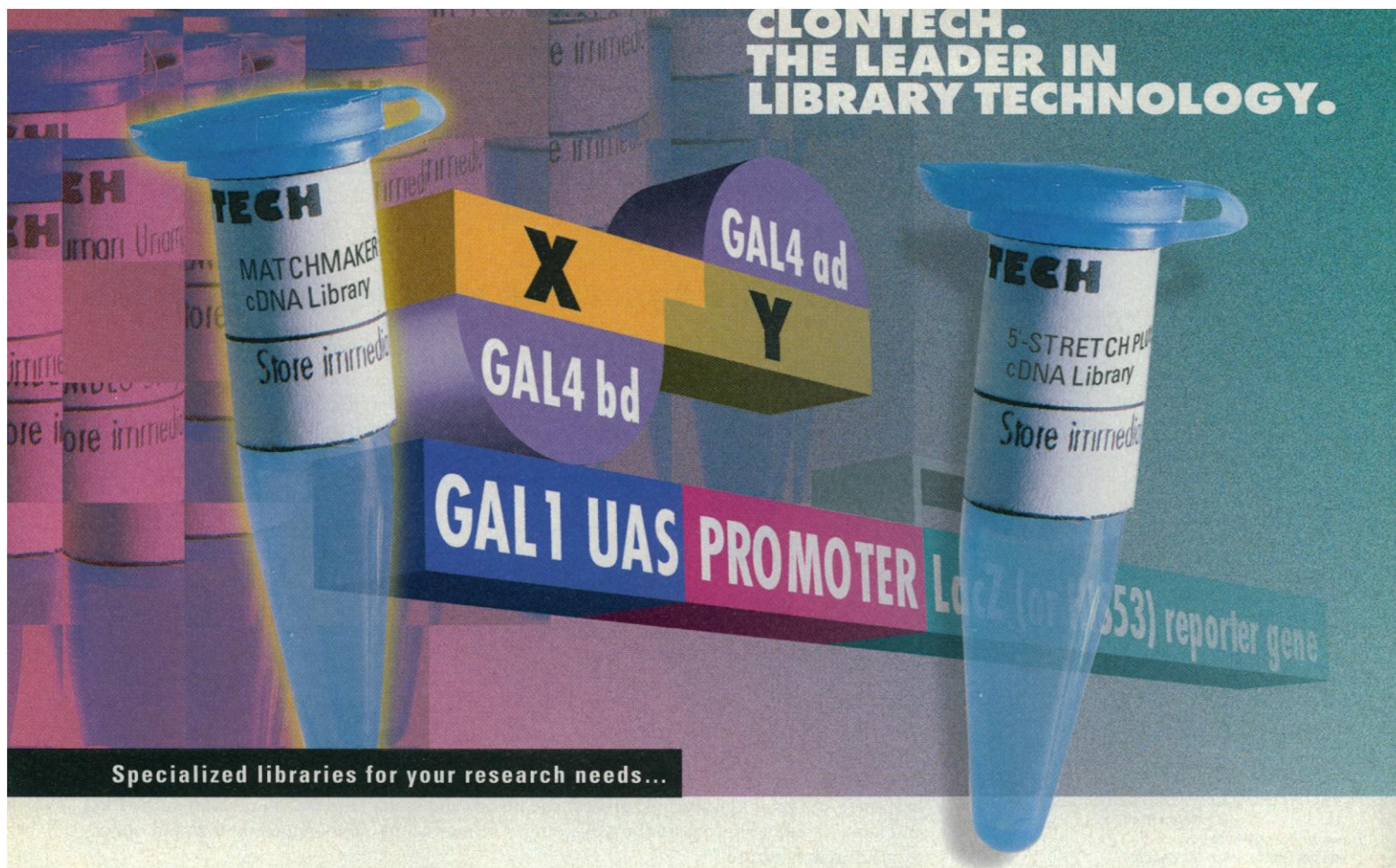
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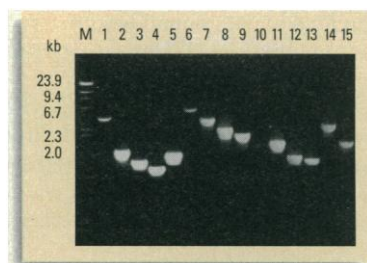


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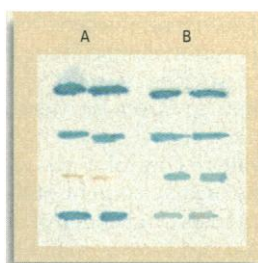


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Fifteen randomly selected clones were subjected to PCR using the  $\lambda$ gt10 Insert Screening Amplimer Set (#5411-1). Fifteen clones were randomly selected from the Human Brain, amygdala 5'-STRETCH PLUS cDNA Library in  $\lambda$ gt10 (#HL3008a). Lanes 1–15: PCR products. Lane M:  $\lambda$ /Hind III DNA size markers.



**MATCHMAKER cDNA Libraries were screened using pVA3 (pGBT-murine p53 fusion plasmid) as the probe.** A: HL4001AC, Human Hela S3 cell line. B: HL4002AB, Human liver. Approximately  $2.5 \times 10^5$  clones from each library were screened according to the MATCHMAKER Two-Hybrid System (#K1605-1) protocol. Representative positive clones from the initial screening were patched to SD<sup>-</sup>LWH plates and a lift assay for  $\beta$ -galactosidase activity was performed according to the same protocol. Total exposure to the X-Gal solution was 8 hr at 30°C. The results indicate that the degree of color intensity among different positive clones varied. Clones that showed the least color intensity in this lift assay gave positive readings in the liquid  $\beta$ -Gal assays.

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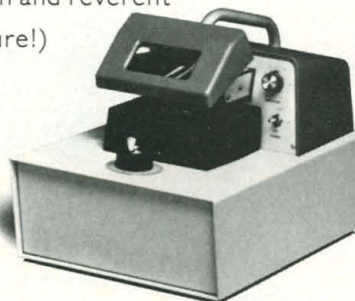
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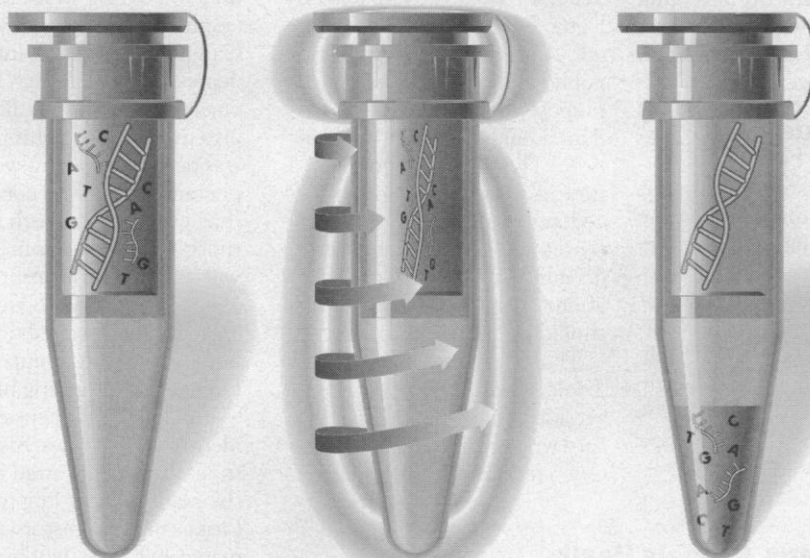
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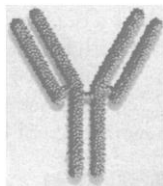
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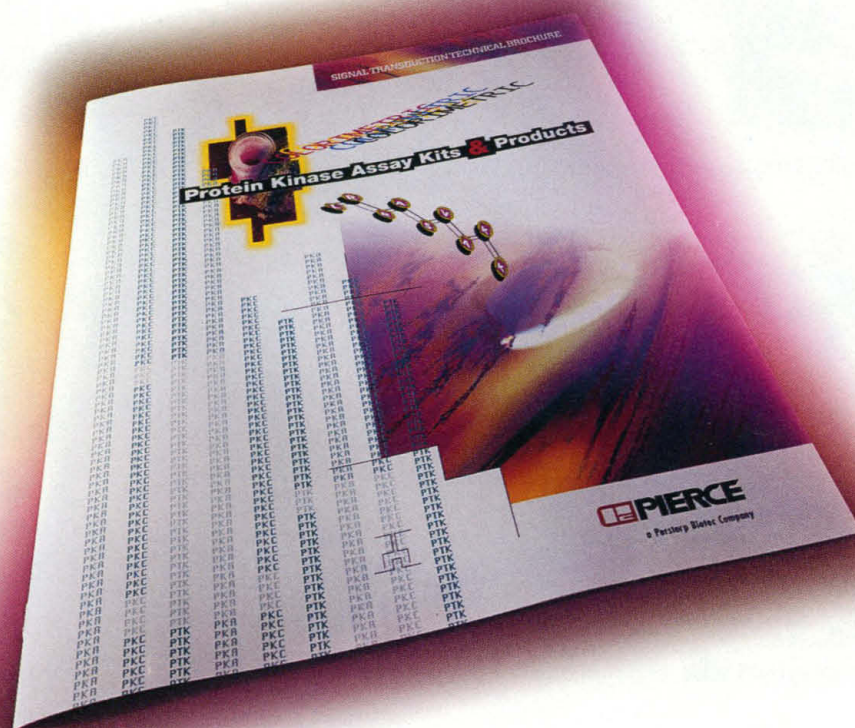
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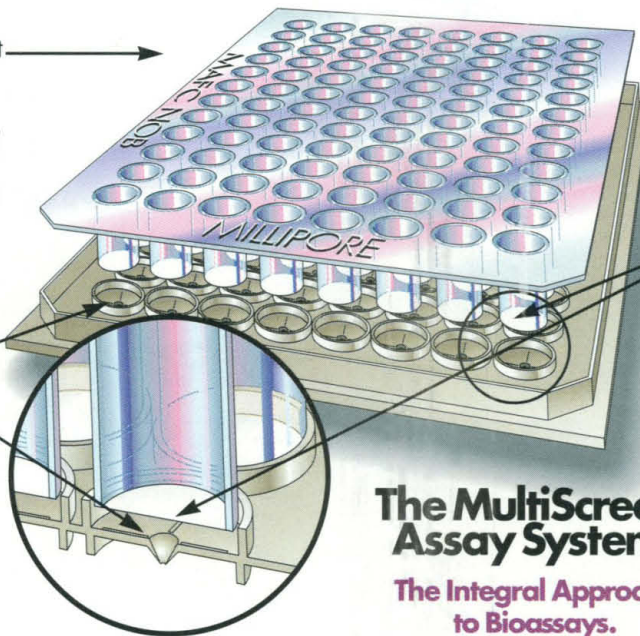
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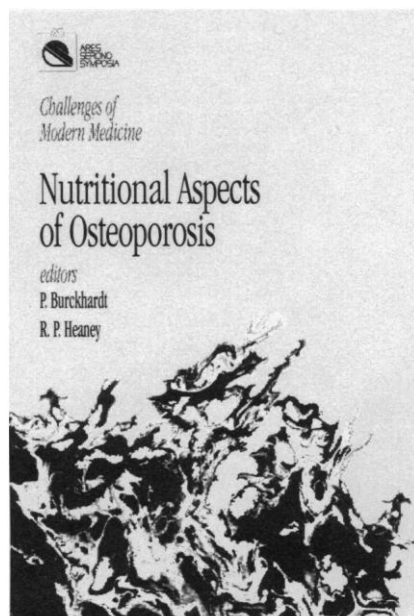
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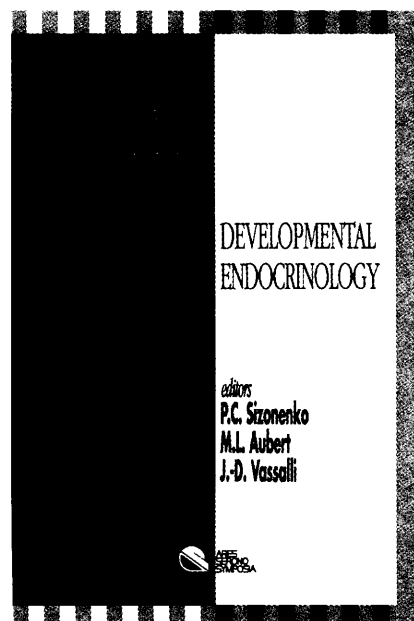
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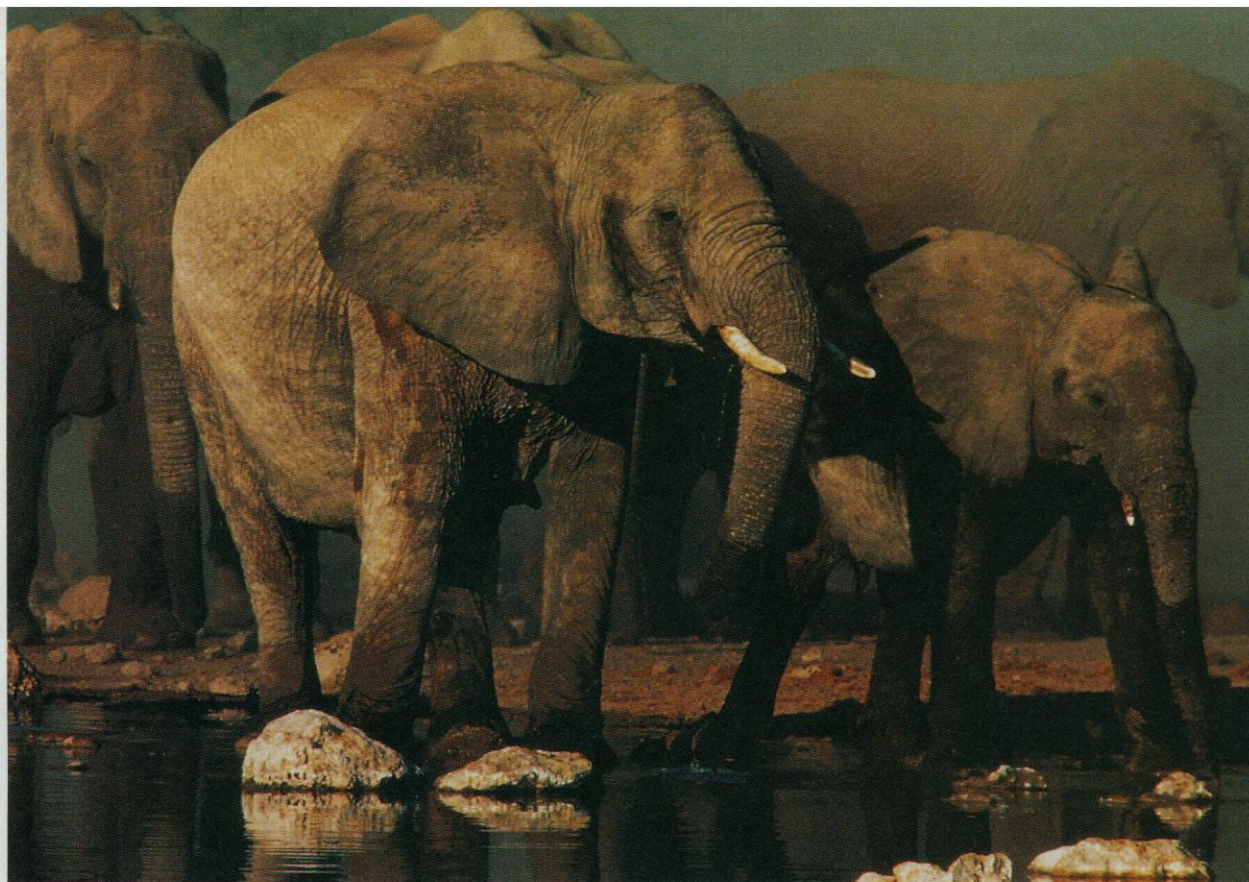
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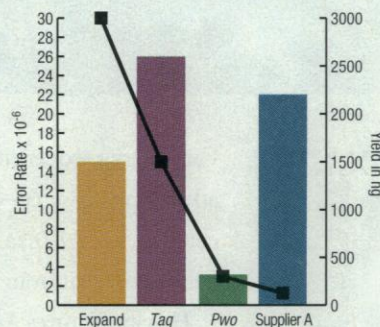
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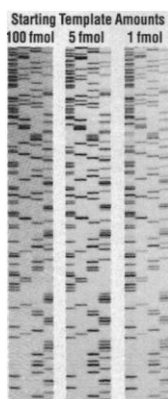
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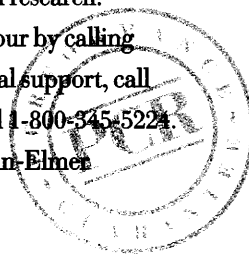
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Because ISF is providing its services free of charge, non-profit and government organizations are asked to assume direct costs associated with the transfer of resources. Direct costs for money transfers consist of bank fees ranging from 0.5 percent to 2.0 percent of the total amount transferred; for equipment transfers, shipping and insurance costs commensurate with the value of the transferred equipment. Please note, this is *not a new grant-making program*. The ISF is only able to provide GAP services free of charge for existing third-party donations and programs.

For further information, please contact: **Grant Assistance Program**, International Science Foundation, 1054 31st Street, NW, Suite 110, Washington, DC 20007 (telephone 202-342-2760, fax 202-342-2765, e-mail: [info@isf.org](mailto:info@isf.org)).

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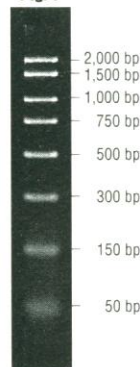
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Fig. 1



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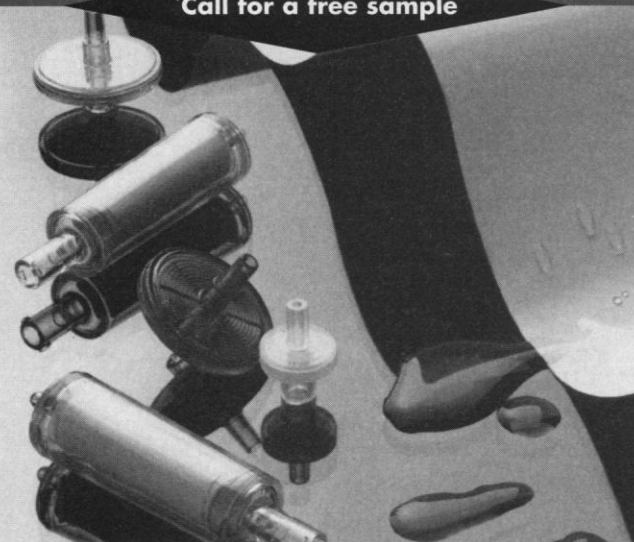
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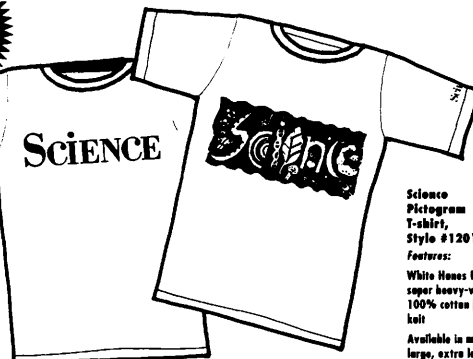


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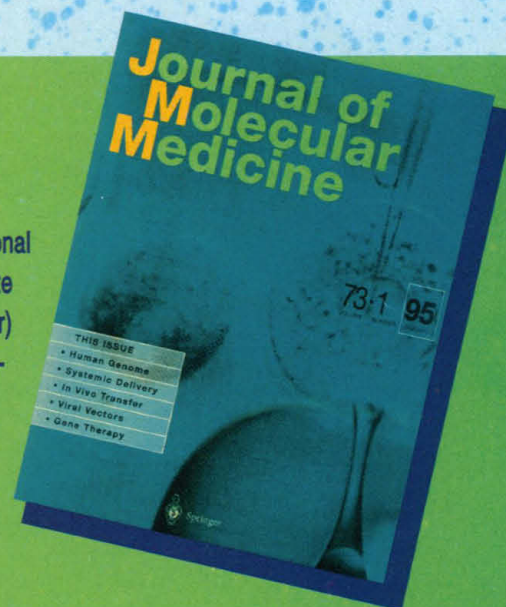
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