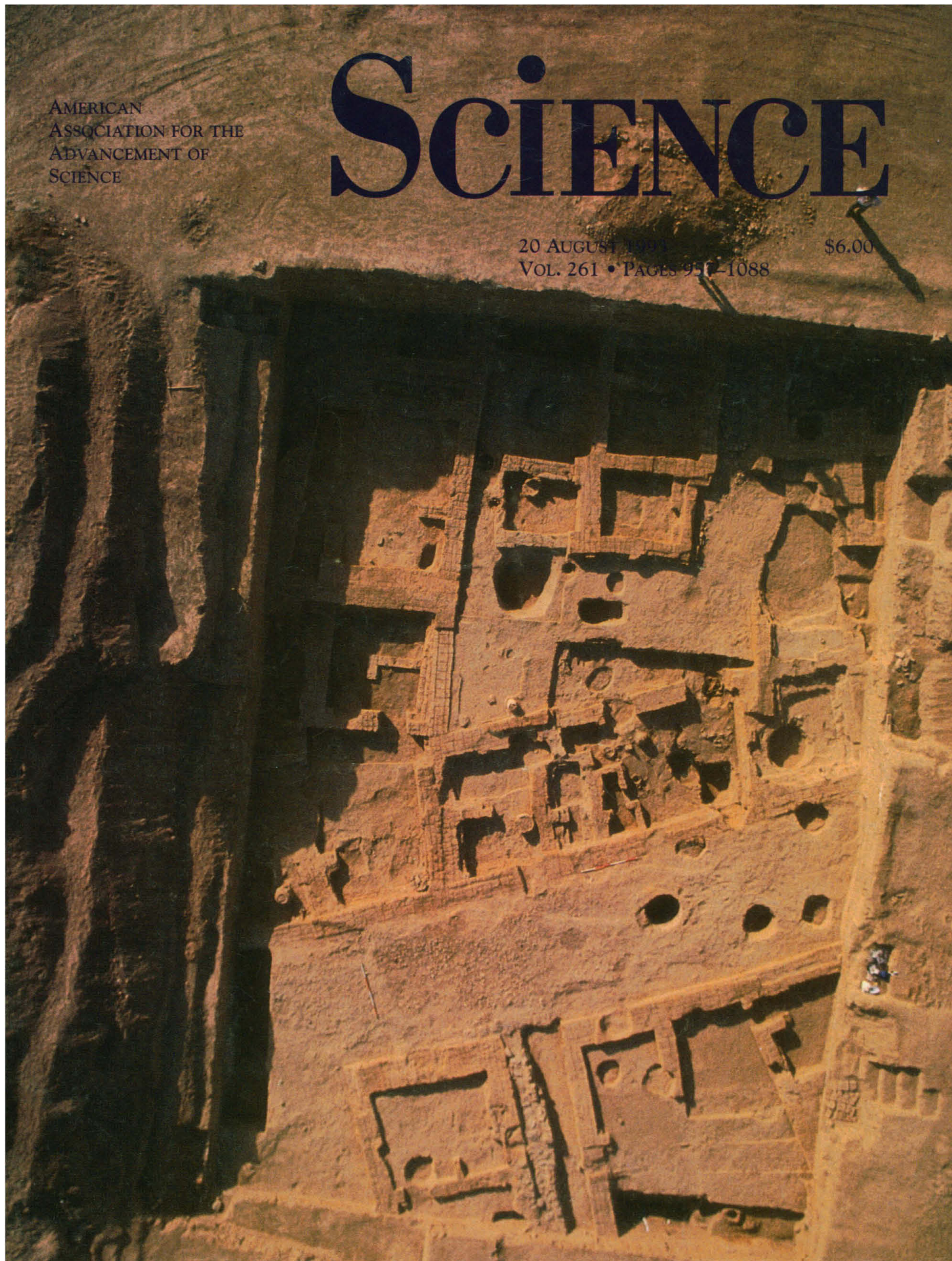


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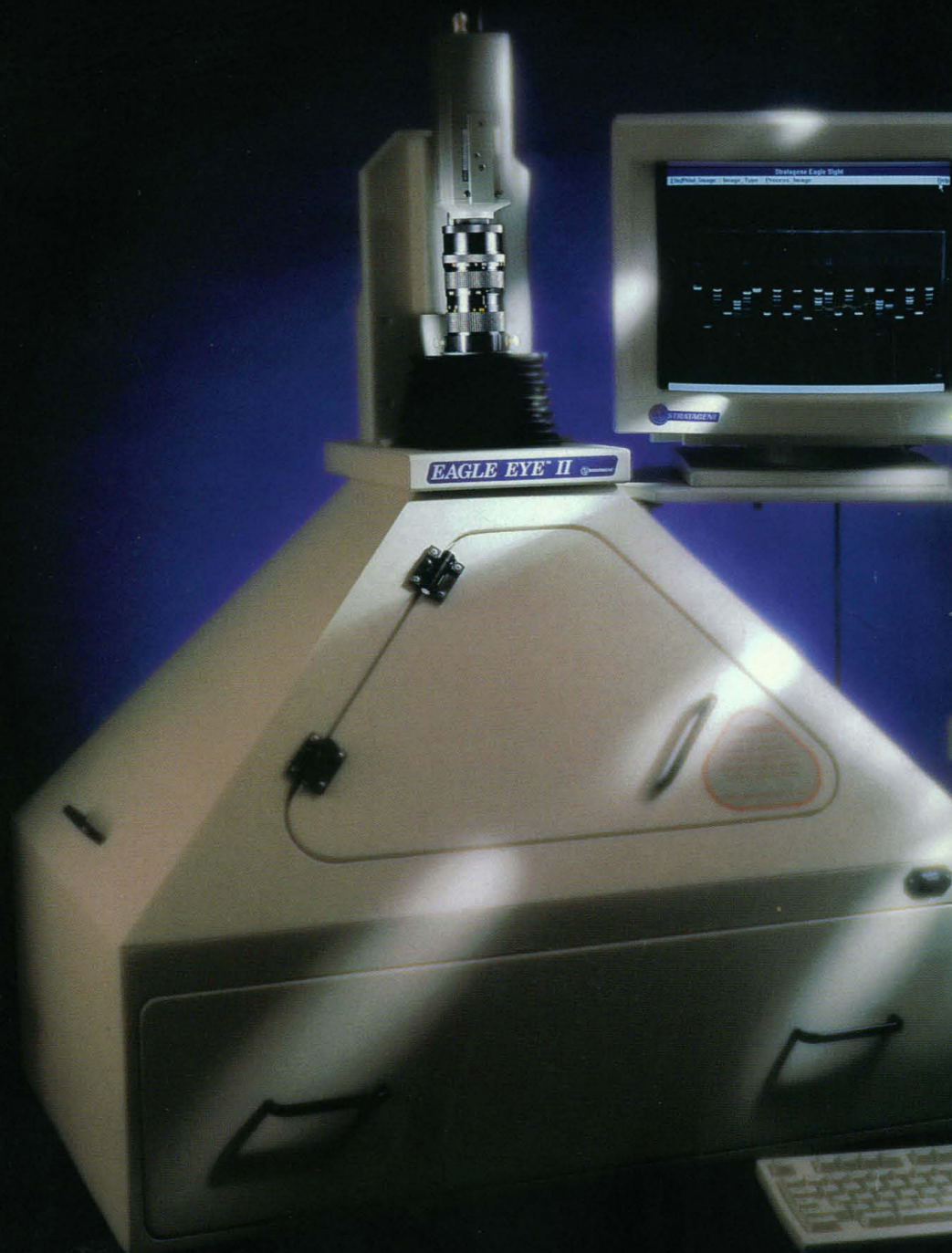
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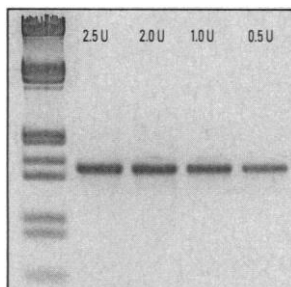


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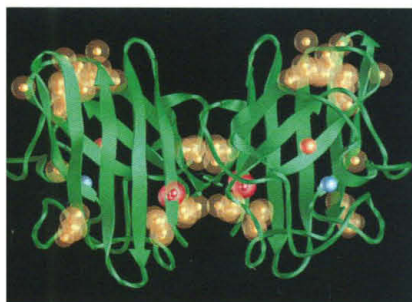
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COVER

Excavation in 1989 of the Lower Town of Tell Leilan, a large third millennium city in northern Mesopotamia (present-day northeast Syria); the excavation exposed 600 square meters of an urban street and a residential area occupied from 2600 to 2200 B.C. After a volcanic

event, which deposited tephra on the roofs of these houses, and a subsequent abrupt change in climate, much of northern Mesopotamia was abandoned. See page 995 and the News story on page 985. [Photo: Anwar abd el-Ghafour]



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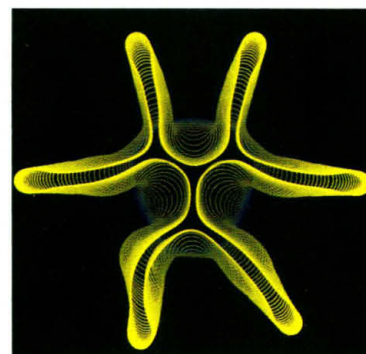
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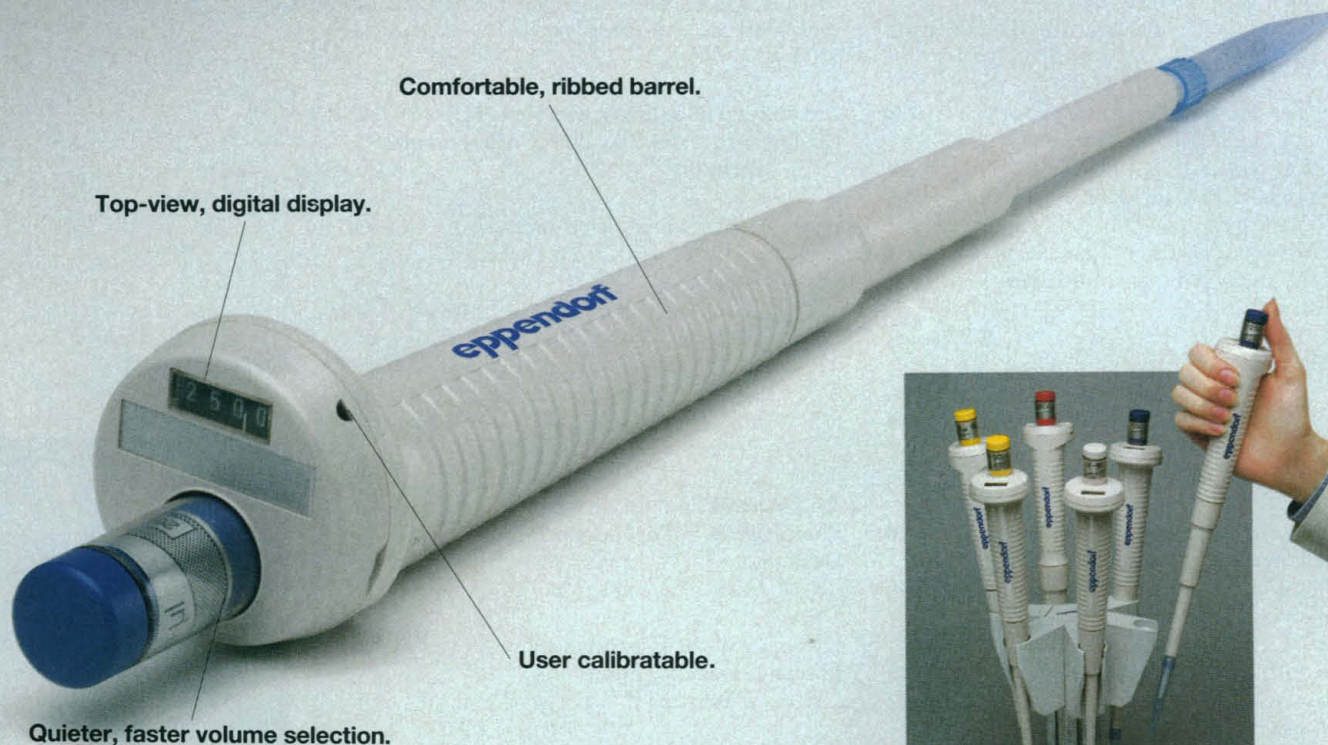
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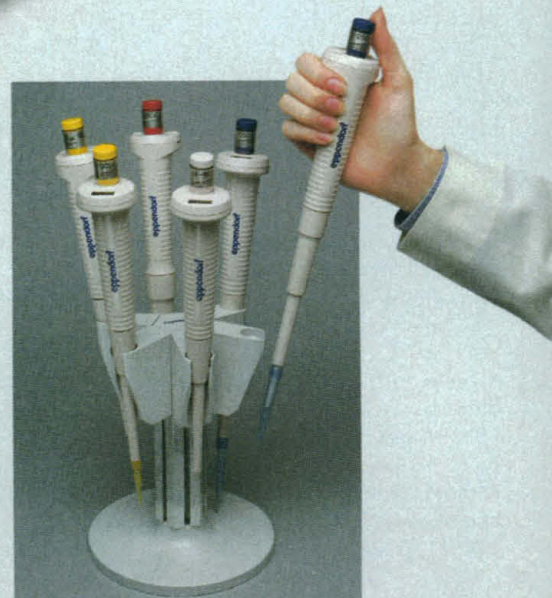
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Labyrinth landscape

Many physical systems, including magnetic films and amphiphilic monolayers, have interfaces that form labyrinthine patterns. Complex patterns form and evolve because of the competition between the surface tension associated with the boundary, which tends to minimize its length, and repulsive long-range forces that tend to extend the boundary. Dickstein *et al.* (p. 1012), in an experimental and theoretical study of ferrofluid drops, show that labyrinths can have multiple energetically stable minima and that the particular pattern formed is highly dependent on initial conditions.

Hot rocks

The infrared spectra of some asteroids resemble laboratory spectra of meteoritic chondrites, and by careful searching Hiroi *et al.* (p. 1016) found a particularly good match with three unusual chondrites that have suffered thermal metamorphism. Comparison of the spectra of C, G, B, and F type asteroids with powdered samples of the archetypal Murchison meteorite heated in the laboratory at several hundred degrees for 1 week indicates that the surface material of most of these asteroids has been subject to prolonged heating at some point in its evolution.

Useful magnetoresistance

For some layered materials, changes in electrical resistivity induced by an applied magnetic field can be unusually high—the giant magnetoresistance effect (GMR). In many cases, however, the magnetic fields needed are too high for practi-

Climactic climate in ancient Mesopotamia

What caused ancient thriving civilizations to suddenly collapse? Weiss *et al.* (p. 995 and cover; see news story by Gibbons, p. 985) describe the growth and sudden collapse of Subir, an agricultural-based civilization in the Habur Plains of Syria, from 2600 to 2200 B.C. At its peak, this region was a thriving economy united under southern Mesopotamian rule and containing perhaps close to 100,000 inhabitants. Focusing on the record at Tell Leilan, one of the city centers of the region, the authors show that this region was abandoned abruptly at about 2200 B.C. Stratigraphic evidence indicates that the abandonment coincided with the onset of a prolonged deterioration of the regional climate and a coeval volcanic eruption.

cal applications. Hylton *et al.* (p. 1021) report the fabrication of nickel-iron-silver multilayer thin films that exhibit GMR at low magnetic fields. Only films that were annealed in a hydrogen-argon atmosphere showed low-field GMR. Applications may include magnetic field sensors and read-write heads (see news story by Pool, p. 984).

Sulfur energy

Sulfur is inexpensive and low in weight, which makes it an attractive candidate for lightweight battery applications such as electric cars. The high resistivity of solid sulfur has limited its use, and molten sulfur systems require high operating temperatures (300° to 350°C). Peramunge and Licht (p. 1029) show that an aqueous polysulfide (S_4^{2-}) solution can be used to electrolytically dissolve sulfur. The polysulfide anion can accept electrons and form S_3^{2-} , which can react with elemental sulfur to regenerate S_4^{2-} .

RNA editing

Messenger RNA transcripts are normally used in vivo with no more modification than splicing. In certain cases, such as in

the mitochondria of trypanosomes and other kinetoplastid protozoa, the mRNA



undergoes editing, the insertion or replacement of specific residues. Reiter *et al.* (p. 1032) show that the self-splicing group II intron from the mitochondria of *Saccharomyces cerevisiae* inserts individual nucleotides from the 3' end of a donor RNA into the 5' end of an acceptor RNA. This two-step reverse polymerization (3' to 5') may occur through an initial charging step in which the phosphorus atom 5' to the canonical charging site is transesterified by the 3' oxygen atom of the intron lariat.

Into the wall

Isolation of *Arabidopsis* mutants deficient in L-fucose, a monosaccharide, has led to insights into the structure and development of plant cell walls. Mueller *et al.* (p. 1035), who screened thousands of ethyl methane-sulfonate mutants, identified L-fucose-deficient plants that were dwarfed and which had relatively fragile cell walls. L-Fucose is a component of xy-

loglucan; cross-linking of cellulose to xyloglucan is thought to impart mechanical strength to plant cell walls.

Muscle-bound transcription factor

About 8 percent of patients with acute myeloid leukemia show a characteristic chromosomal abnormality in their leukemic cells—an inversion of sequences on chromosome 16. Liu *et al.* (p. 1041) have found that this inversion creates a fusion protein consisting of the b subunit of core-binding factor, a transcription factor that activates genes expressed in T cells, and the smooth muscle myosin heavy chain. The myosin sequences may contribute to leukemic transformation by disrupting normal transcriptional regulation.

Phosphatases and long-term depression

Protein kinases play an important role in the maintenance of long-term potentiation (LTP), a process that increases the strength of synaptic connections in response to certain types of synaptic activation. Mulkey *et al.* (p. 1051) studied a form of long-term depression (LTD), an activity-dependent process that decreases synaptic strength, that can reverse the effects of LTP in cells from the CA1 area of the rat hippocampus. They show that the induction of this form of LTD can be blocked by inhibitors of serine-threonine protein phosphatases in the postsynaptic cell. These results suggest that the activity-dependent modulation of synaptic strength may be regulated by a balance between kinase and phosphatase activities.

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62 Recombinant Restriction Endonucleases

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Afl II	Dde I	HinP I I	Pvu II
Afl III	Dpn I	Hpa I	Sac II
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Ava I	EcoO109 I	Mbo II	Sfi I
Ava II	EcoR I	Msc I	Sma I
Avr II	EcoR V	Msp I	Sph I
BamH I	Fok I	Mwo I	Sty I
Ban I	Fsp I	Nae I	Taq ^o I
Bbv I	Hae II	Nco I	Xba I
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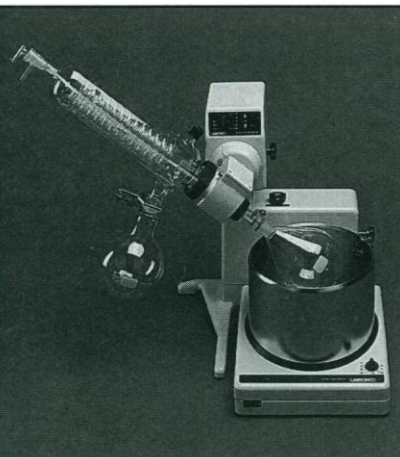
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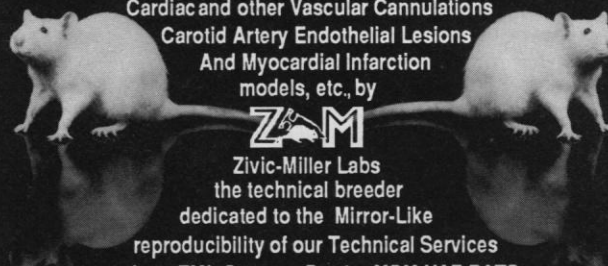
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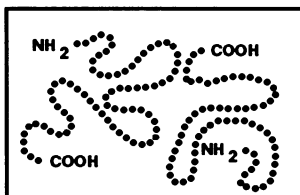
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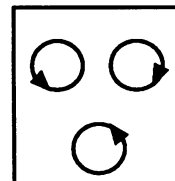
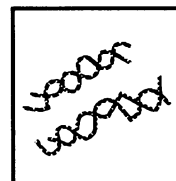
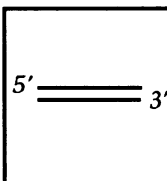


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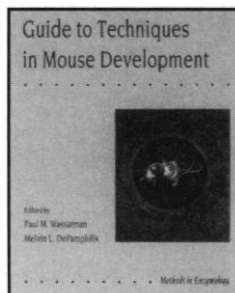
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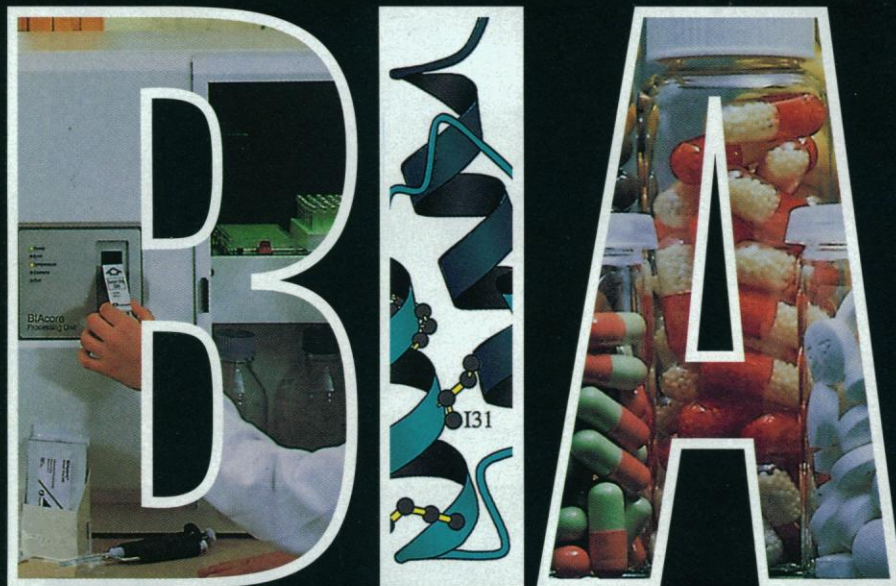
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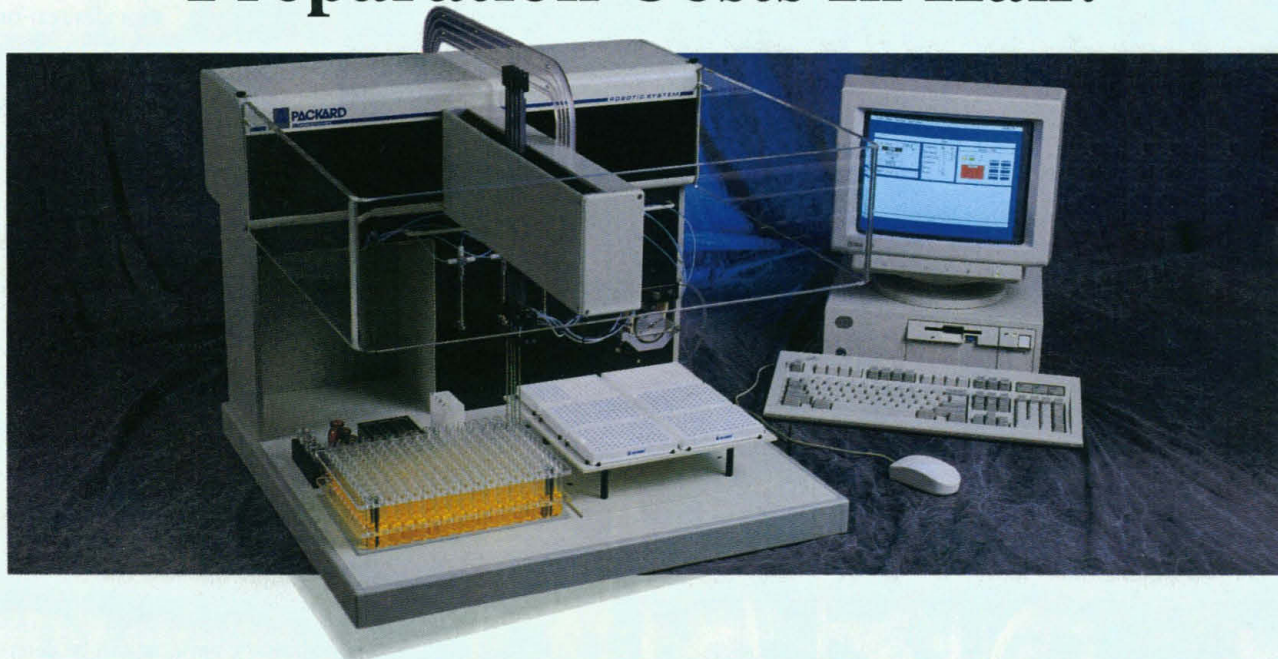
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