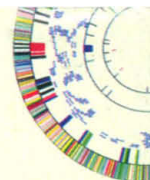
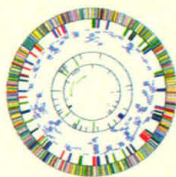




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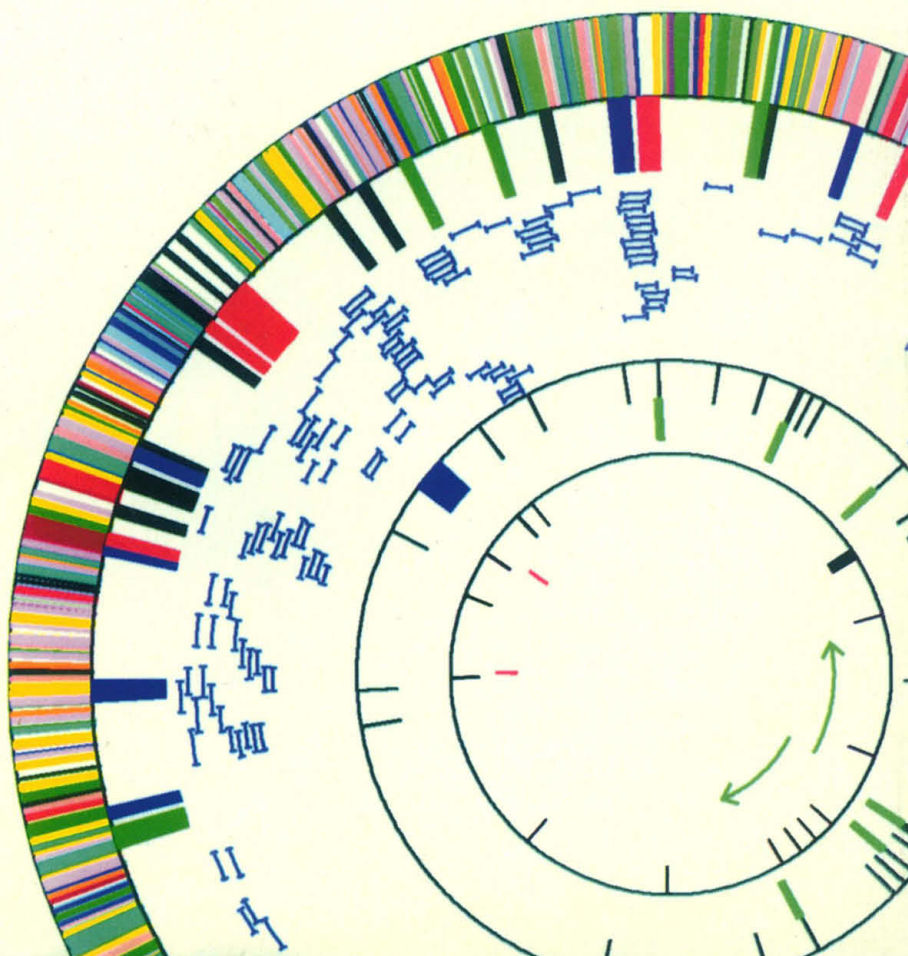
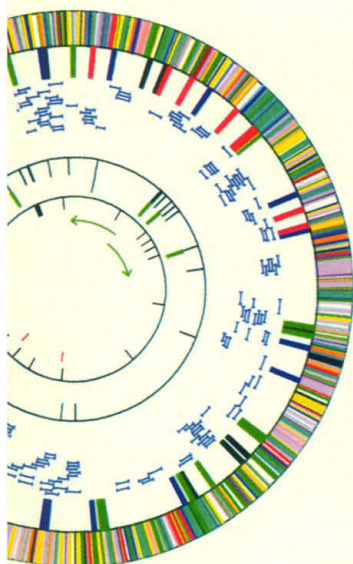
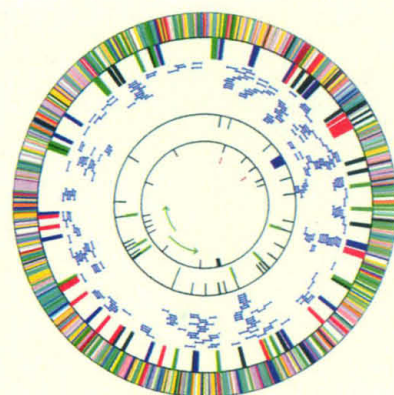
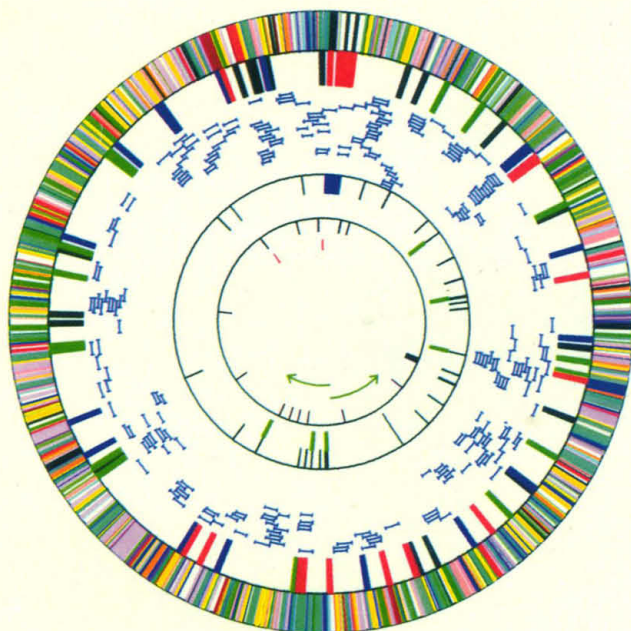


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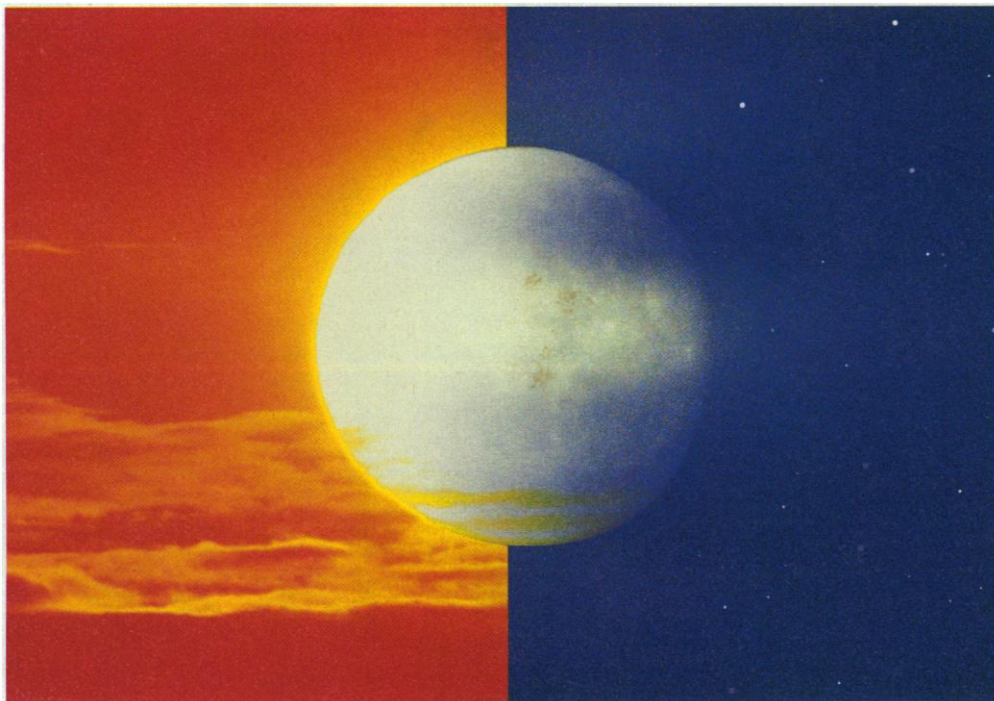
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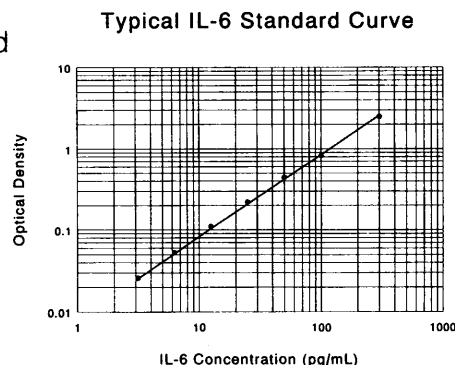


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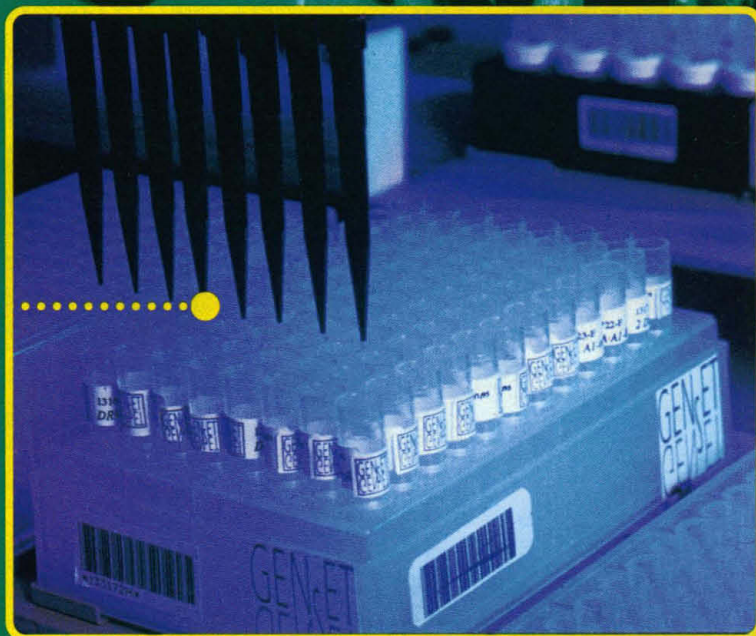
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BamH I	BamH I	EcoR I	BamH I
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Nco I	Pst I	Eag I	Pst I
Aat II	EcoR I	Mlu I	Hind III
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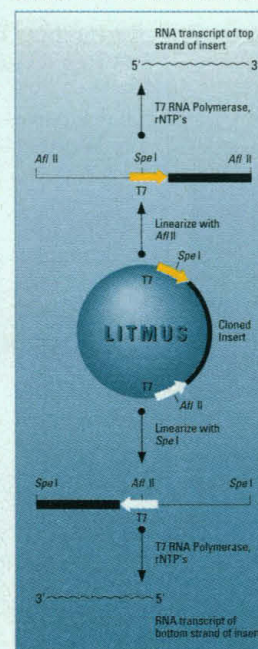
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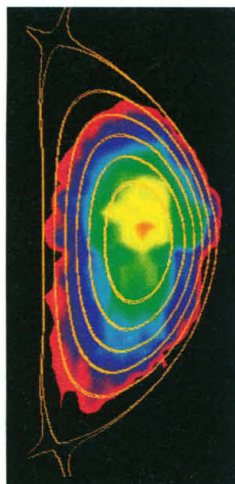
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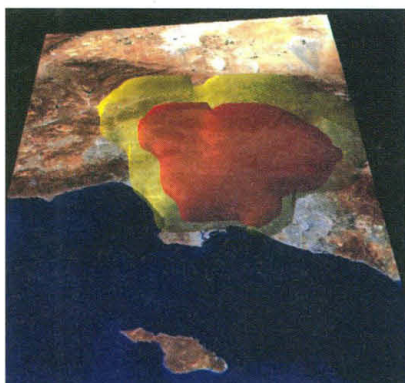
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478

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491

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## NEWS & COMMENT

- Bacterial Genome Sequence Bagged ■ 468  
Homing In on the Human Genome 469

- R&D Budget Takes Shape in Congress, 471  
Piece by Piece

- Building a Wall Against Toxic Waste 473

- From Russia With Love: U.S. Cloud Data 473

- Japan Picks First Centers of Excellence 474

## RESEARCH NEWS

- "Obese" Protein Slims Mice ■ 475

- New Foot Steps Into Walking Debate ■ 476

- At Quadrennial Geophysics Fest, 477  
Earth Scientists Think Globally

- Researchers Build a Secure Plasma Prison 478  
A Reprieve for Princeton Tokamak? 479

- Developmental Biology: In Toulouse, 480  
the Weather—and the Science—Are Hot

## PERSPECTIVE

- One Signal, Two Body Axes 489  
K. Anderson

## ARTICLE

- Urban Ozone Control and Atmospheric 491  
Reactivity of Organic Gases  
A. Russell, J. Milford, M. S. Bergin, S. McBride,  
L. McNair, Y. Yang, W. R. Stockwell, B. Croes

## RESEARCH ARTICLE

- Whole-Genome Random Sequencing ■ 496  
and Assembly of *Haemophilus influenzae* Rd  
R. D. Fleischmann, M. D. Adams, O. White,  
R. A. Clayton, E. F. Kirkness, A. R. Kerlavage,  
C. J. Bult, J.-F. Tomb, B. A. Dougherty, J. M.  
Merrick, K. McKenney, G. Sutton, W. FitzHugh,  
C. Fields, J. D. Gocayne, J. Scott, R. Shirley,  
L.-I. Liu, A. Glodek, J. M. Kelley, J. F. Weidman,  
C. A. Phillips, T. Spriggs, E. Hedblom, M. D.  
Cotton, T. R. Utterback, M. C. Hanna, D. T.  
Nguyen, D. M. Saudek, R. C. Brandon, L. D.  
Fine, J. L. Fritchman, J. L. Fuhrmann, N. S. M.  
Geoghagen, C. L. Gnehm, L. A. McDonald, K. V.  
Small, C. M. Fraser, H. O. Smith, J. C. Venter

## DEPARTMENTS

- THIS WEEK IN SCIENCE 457

- EDITORIAL 459  
A Paine-ful Start

- LETTERS 461  
Soil Erosion Estimates and Costs: P. Crosson; D.  
Pimentel, C. Harvey, P. Resosudarmo, K. Sinclair,  
D. Kurz, M. McNair, S. Crist, L. Shpritz, L. Fitton,  
R. Saffouri, R. Blair

- SCIENTESCOPE 467

- RANDOM SAMPLES 483  
Deliberate Poisoning at NIH? • Blood Woes in  
Canada • Stop Worrying and Love the Bomb •  
Ocean Crackup

- BOOK REVIEWS 565  
*Rethinking Objectivity and Telling the Truth About  
History*, reviewed by P. Forman • Vignettes •  
Books Received • Publishers' Addresses

- INSIDE AAAS 572

- PRODUCTS & MATERIALS 576

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## COVER

Circular representations of the *Haemophilus influenzae* Rd genome, which has now been sequenced and assembled. The illustration depicts the locations of genes color coded by their role in the organism, the underlying clone scaffolding used to confirm the struc-

ture, locations of ribosomal RNA operons, and other global characteristics of the DNA sequence. See page 538 and the related News story (page 468) and Research Article (page 496). [Image: A. R. Kerlavage]



## REPORTS

**Force Fluctuations in Bead Packs** 513  
C.-h. Liu, S. R. Nagel, D. A. Schecter, S. N. Coppersmith, S. Majumdar, O. Narayan, T. A. Witten

**Total Alignment of Calcite at Acidic Polydiacetylene Films: Cooperativity at the Organic-Inorganic Interface** 515  
A. Berman, D. J. Ahn, A. Lio, M. Salmeron, A. Reichert, D. Charych

**Direct Observation of Dislocation Core Structures in CdTe/GaAs(001)** 519  
A. J. McGibbon, S. J. Pennycook, J. E. Angelo

**Sterkfontein Member 2 Foot Bones of the Oldest South African Hominid** 521  
R. J. Clarke and P. V. Tobias

**Synthesis and Application of Modulated Polymer Gels** 525  
Z. Hu, X. Zhang, Y. Li

**Importance of Historical Contingency in the Stereochemistry of Hydratase-Dehydratase Enzymes** 527  
J. R. Mohrig, K. A. Moerke, D. L. Cloutier, B. D. Lane, E. C. Person, T. B. Onasch

**Interaction of Papillomavirus E6 Oncoproteins with a Putative Calcium-Binding Protein** 529  
J. J. Chen, C. E. Reid, V. Band, E. J. Androphy

**Unimpaired Thymic and Peripheral T Cell Death in Mice Lacking the Nuclear Receptor NGFI-B (Nur77)** 532  
S. L. Lee, R. L. Wesselschmidt, G. P. Linette, O. Kanagawa, J. H. Russell, J. Milbrandt

**A Role for CD5 in TCR-Mediated Signal Transduction and Thymocyte Selection** 535  
A. Tarakhovsky, S. B. Kanner, J. Hombach, J. A. Ledbetter, W. Müller, N. Killeen, K. Rajewsky

**Frequency and Distribution of DNA Uptake Signal Sequences in the *Haemophilus influenzae* Rd Genome** 538  
H. O. Smith, J.-F. Tomb, B. A. Dougherty, R. D. Fleischmann, J. C. Venter

**Effects of the *obese* Gene Product on Body Weight Regulation in *ob/ob* Mice** 540  
M. A. Pelleymounter, M. J. Cullen, M. B. Baker, R. Hecht, D. Winters, T. Boone, F. Collins

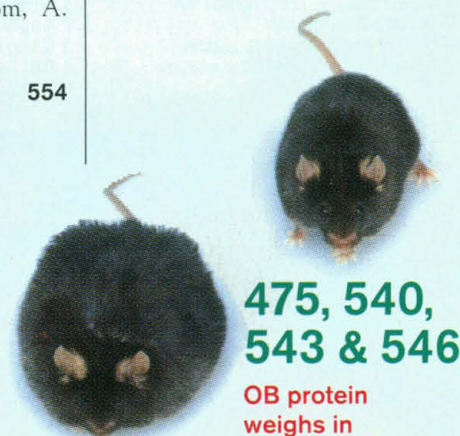
**Weight-Reducing Effects of the Plasma Protein Encoded by the *obese* Gene** 543  
J. L. Halaas, K. S. Gajiwala, M. Maffei, S. L. Cohen, B. T. Chait, D. Rabinowitz, R. L. Lallone, S. K. Burley, J. M. Friedman

**Recombinant Mouse OB Protein: Evidence for a Peripheral Signal Linking Adiposity and Central Neural Networks** 546  
L. A. Campfield, F. J. Smith, Y. Guisez, R. Devos, P. Burn

**Induction of MHC Class I Genes in Neurons** 549  
H. Neumann, A. Cavalié, D. E. Jenne, H. Wekerle

**Monitoring Release of Neurotrophic Activity in the Brains of Awake Rats** 552  
C. Humpel, E. Lindqvist, S. Söderström, A. Kylberg, T. Ebendal, L. Olson

**Activation of Yeast PBS2 MAPKK by MAPKKs or by Binding of an SH3-Containing Osmosensor** 554  
T. Maeda, M. Takekawa, H. Saito



**475, 540, 543 & 546**

**OB protein weighs in**

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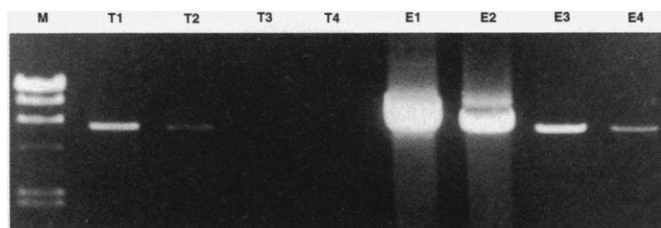
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1: 10 ng of Template/50 µl reaction  
2: 1 ng of Template/50 µl reaction  
3: 0.1 ng of Template/50 µl reaction  
4: 0.01 ng of Template/50 µl reaction  
M: λDNA/Hind III Marker

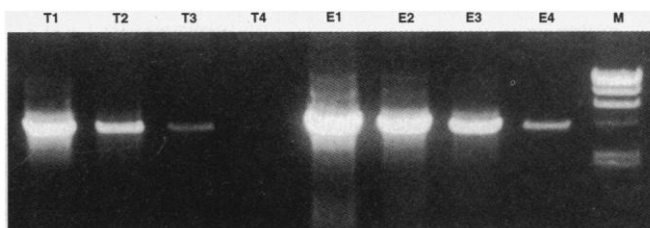


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E: 0.9 U of *Ex Taq*/50 µl reaction

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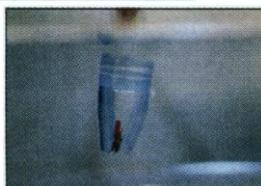
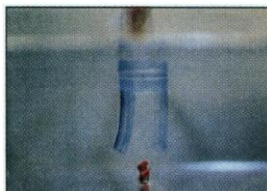


## Hard hitting

A runner along a sandy beach momentarily compresses the sand with each stride; how does this applied stress distribute within this granular material? Liu *et al.* (p. 513) have performed experiments on a polymeric granular material and measured stress-induced birefringence by using an index-matching fluid to reduce scattering effects. The forces are not uniform but maximize along chains. The force distribution, which is exponential, can be reproduced by including the inhomogeneous nature of the bead packing.

## Handy gel polymers

Polymer gels can be made that expand or contract in response to changes in temperature or solvent. Hu *et al.* (p. 525) have made interpenetrating networks



of such polymers; the differential response of the two polymers causes the material to bend and change shape. One application is a "gel hand" that can grasp and release objects.

## Displaying dislocations

Dislocations of atoms in semiconductors can affect their electron transport and optoelectronic properties, but the struc-

## Early steps in hominid bipedalism

The discovery of four articulating hominid foot bones from South Africa by Clarke and Tobias (p. 521; see the news story by Oliwenstein, p. 476) suggests that while bipedal, early hominids were also capable of arboreal and climbing activities. The foot bones, recovered from Sterkfontein Member 2, probably belonged to a member of *Australopithecus africanus* or another early hominid and may be as old as 3.5 million years. The foot may have evolved for bipedalism in a mosaic fashion because these fossils have apelike forefoot characteristics and human traits in the hindfoot.

ture of these defects has been difficult to observe. McGibbon *et al.* (p. 519) have imaged 60° and Lomer dislocations of CdTe grown on a GaAs(001) surface. They used a maximum entropy method to interpret Z-contrast (atomic number) scanning transmission electron microscope images. Some of the atomic arrangements were unexpected asymmetrical structures, indicating the importance of techniques that do not rely upon model building.

## Lining up

Organisms can control the growth direction of inorganic crystals such as calcite through organic polymer matrices of highly acidic macromolecules. Berman *et al.* (p. 515) have mimicked this approach and used Langmuir-Schaefer films on 10,12-pentacosadiynoic acid to nucleate the growth of the (012) plane of calcite. The polymer side chains reorganized to accommodate the growing crystal.

## Protein diet plan

Mutation of the *obese* gene in mice produces a syndrome that resembles morbid obesity in humans. The normal gene product (OB) might in fact be an endocrine factor that regulates body weight and fat deposition.

Three research groups (Pelleymounter *et al.*, p. 540; Halaas *et al.*, p. 543; and Campfield *et al.*, p. 546; see news story by Barinaga, p. 475) show that daily administration of recombinant OB protein to *ob/ob* mutant mice results in a significant loss of body weight (20 to 30%) with no apparent toxicity. A smaller but consistent weight loss was seen when the protein was given to normal lean mice. The OB protein affected food intake and energy expenditure, consistent with clinical studies showing that alterations of both systems regulate body weight.

## Taking sides

Enzymes that catalyze the hydration of double bonds conjugated to carboxylic acids proceeded with *anti* stereochemistry (in which the proton and the hydroxyl are added from opposite sides of the plane of the double bond), whereas enzymes that help hydrate double bonds conjugated to thioesters use a *syn* (same side) pathway. Mohrig *et al.* (p. 527) examined parallel non-enzymic reactions and observed a greater preference for *anti* versus *syn* in the hydration of thioesters as compared to carboxylic acids. To explain the apparent choice of enzymes for the chemically less favored path, these authors propose a historical contingency.

## MHC induction in neurons

Healthy neurons do not express major histocompatibility complex (MHC) class I molecules. Neumann *et al.* (p. 549) examined induction of expression in individual cultured rat hippocampal neurons. Electrically active (healthy) cells rarely express mRNA for either component of the class I molecule. In electrically silent cells there was less rigorous control: mRNA for the heavy chain or for  $\beta$ 2-microglobulin often occurred singly, but not together. Co-expression of both mRNAs and surface expression of the molecule required interferon- $\gamma$  treatment of electrically silent cells. This expression may mimic conditions induced by viral infections and be critical to the development of central nervous system pathology.

## Ready to respond to signals

A series of protein kinases that sequentially activate one another, known as the mitogen-activated protein (MAP) kinase cascade, functions in transduction of signals from cell surface receptors to cytoplasmic or nuclear targets. Similar cascades are present in eukaryotic cells from yeast to mammals. Maeda *et al.* (p. 554) found that a MAP kinase kinase in yeast that is activated in response to increased extracellular osmolarity can receive two different stimulatory signals. The MAPKK could be activated either by the first kinase in the cascade (a MAP kinase kinase kinase) or by a second mechanism that appears to require direct binding of the MAPKK to a Src-homology 3 (SH3) domain of a transmembrane protein that is a putative osmosensor.



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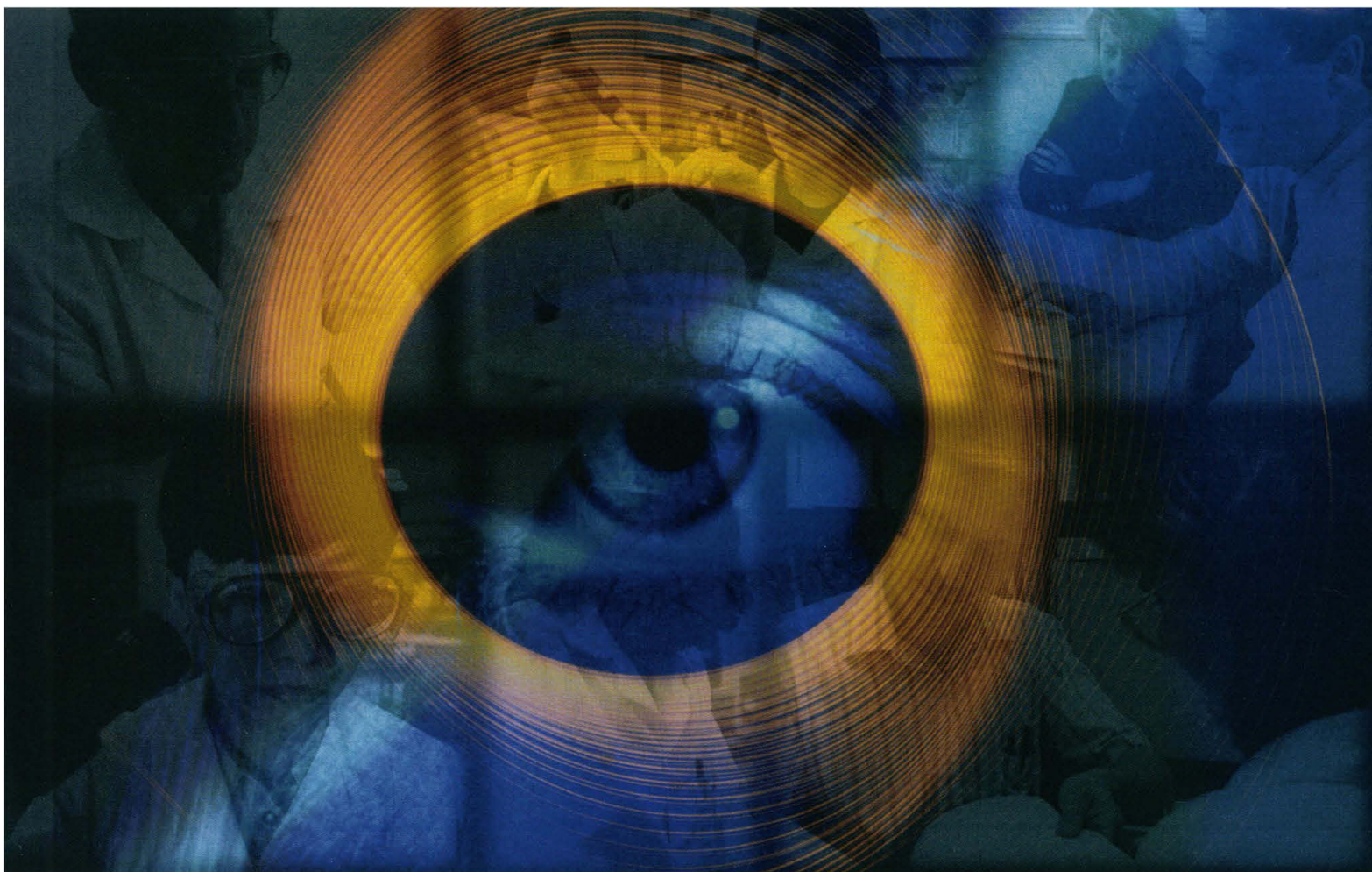
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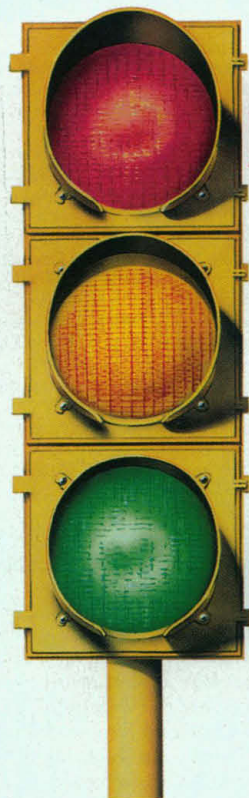
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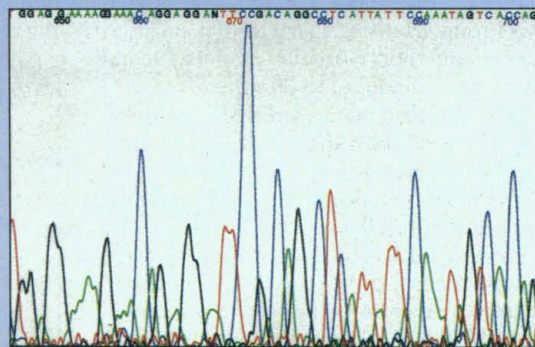
F.S. Leach *et al.* (1993) *Cell* 75:1215.

"Sequencing of RT-PCR products and genomic PCR products was performed with SequiTherm Polymerase (Epicentre)..."

B. Liu *et al.* (1995) *Nature Genetics* 9:48.

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R. A. Philibert *et al.* (1995) *Analytical Biochemistry* 225:372.



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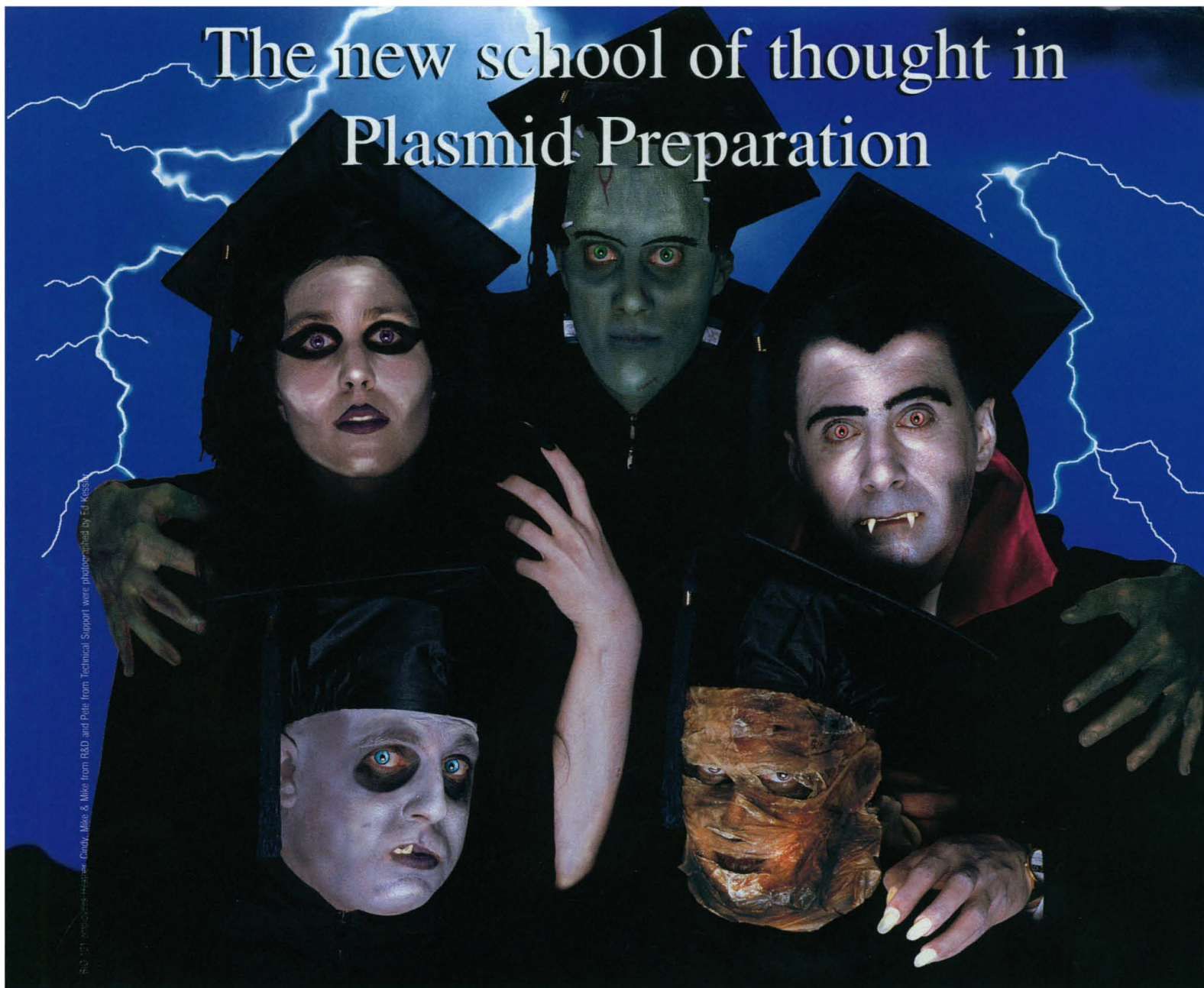
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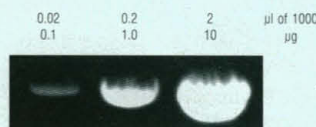
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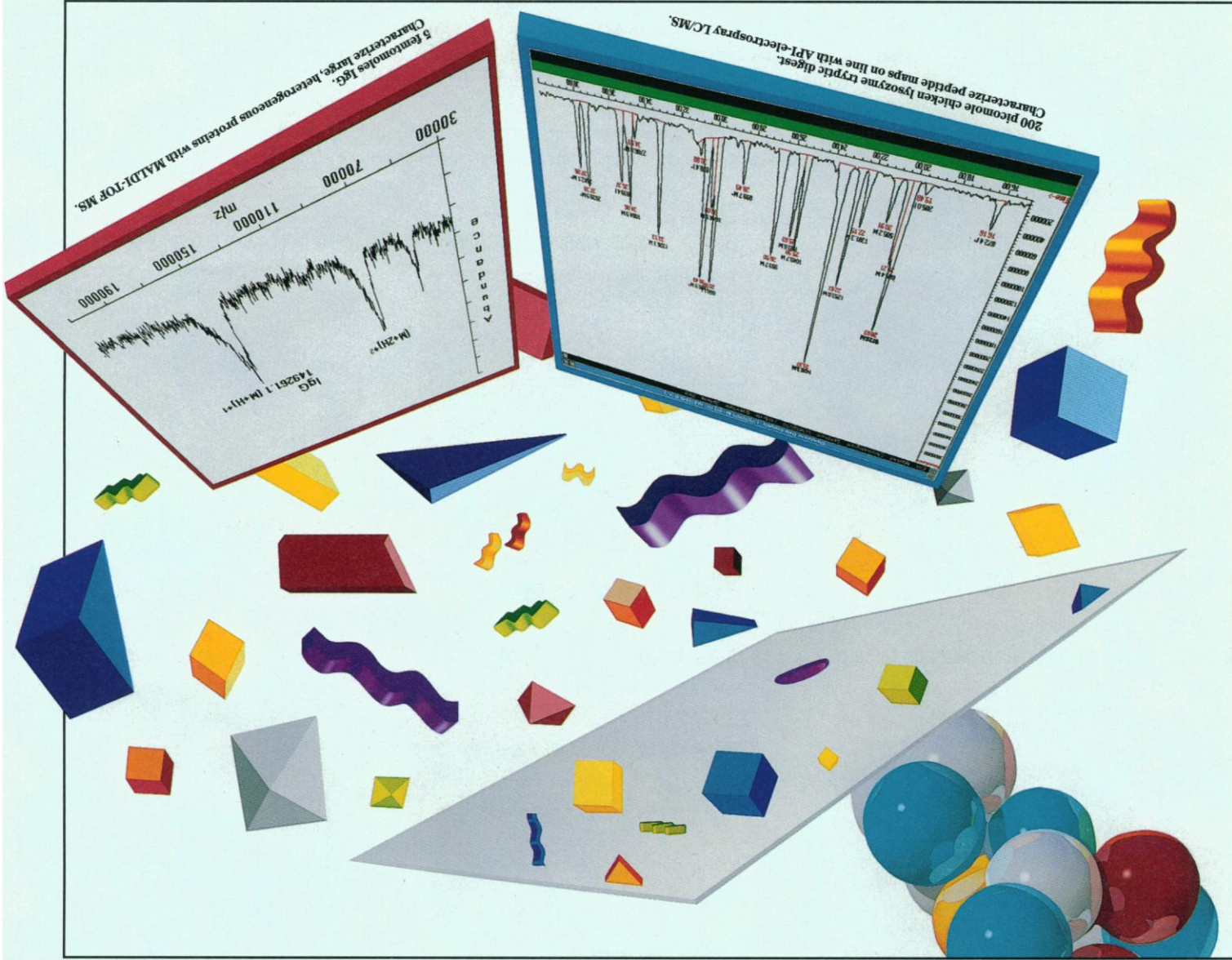
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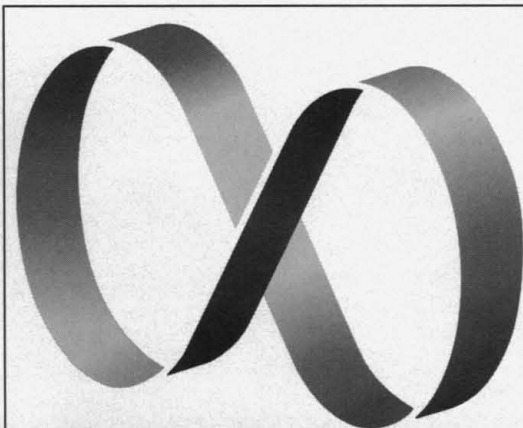
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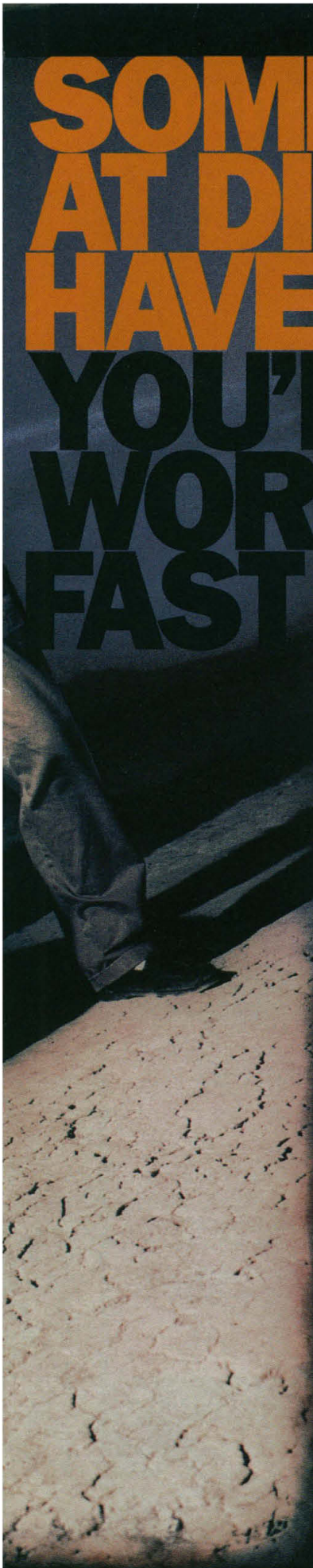




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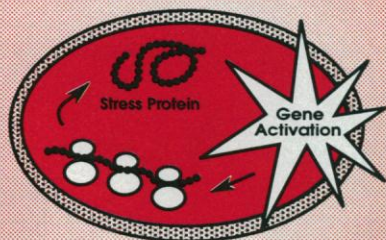
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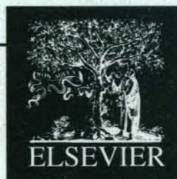
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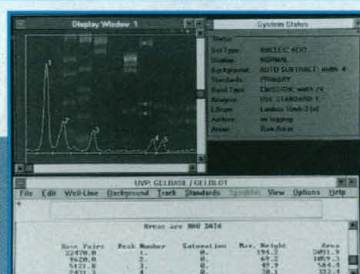


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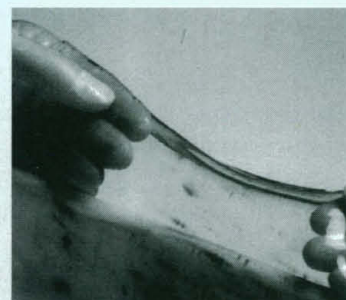
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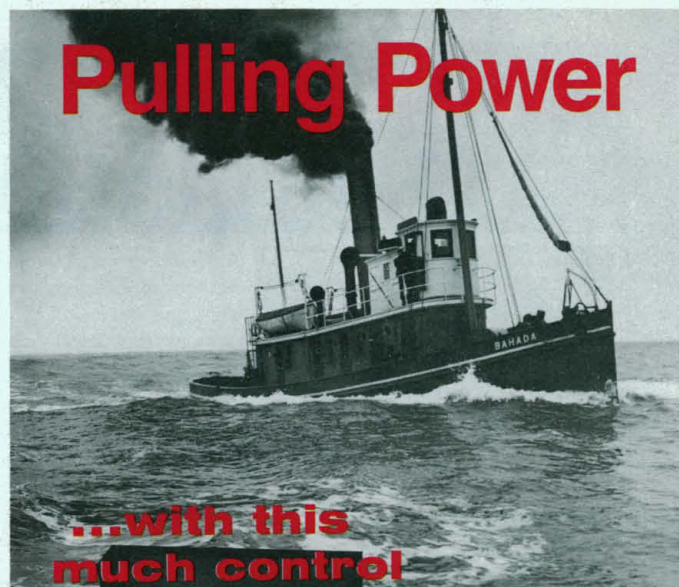
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