



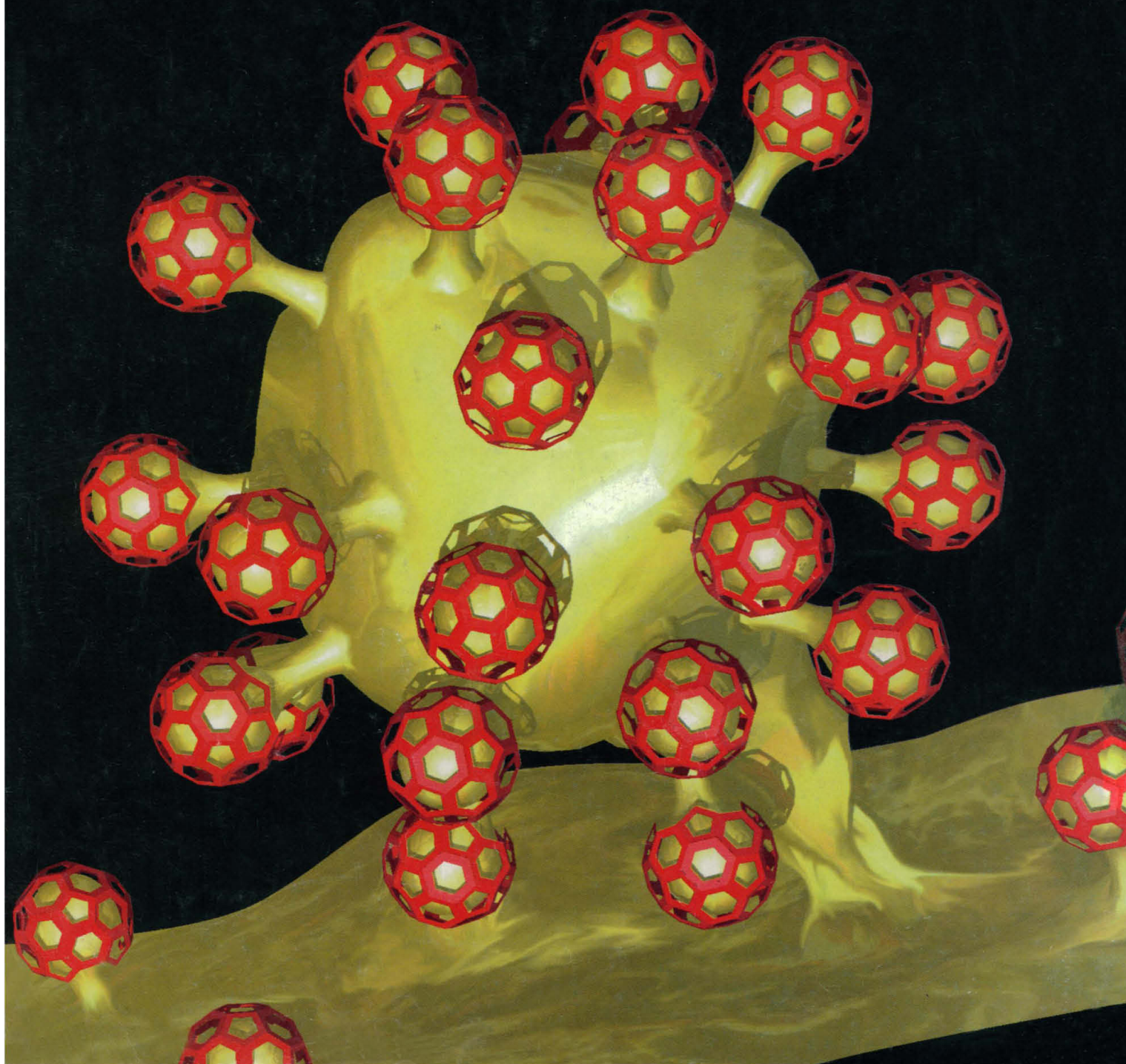
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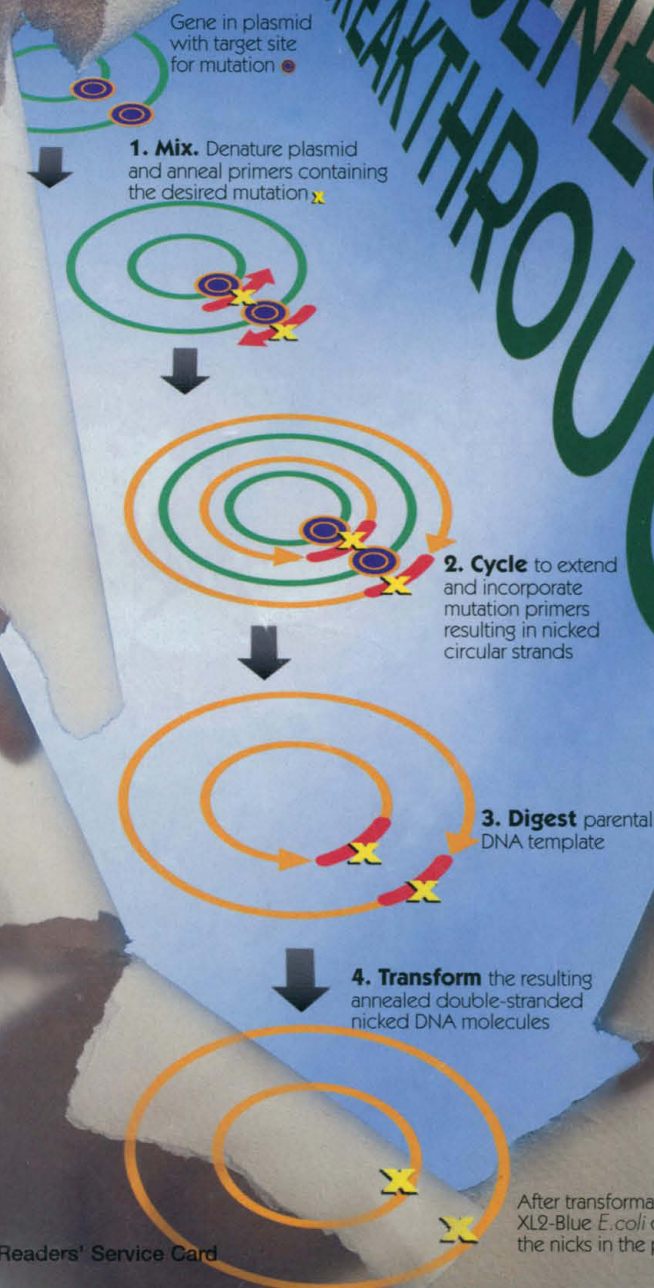
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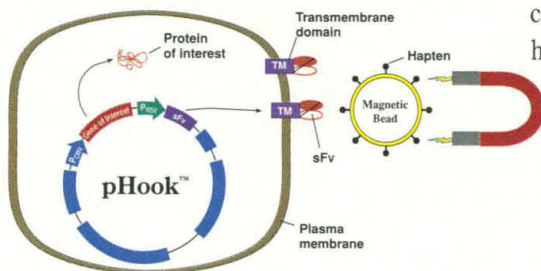
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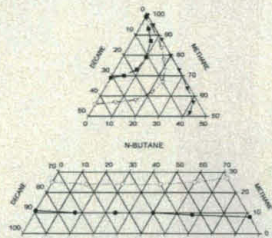
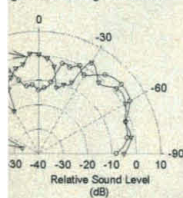
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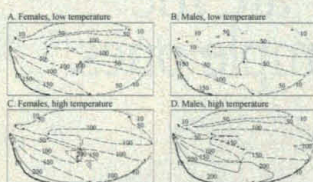
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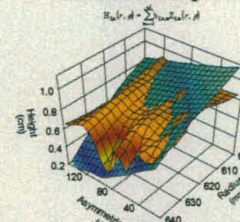
Transformer
g at Different Angular Positions



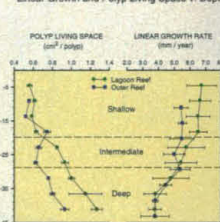
Wing Asymmetry by Sex for *Drosophila*
Under Elevated and Depressed Temperatures



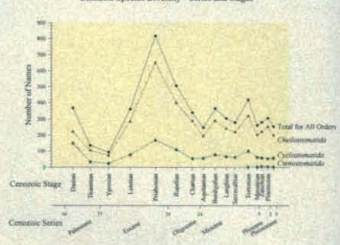
Plasma Wave in Electromagnetic Field



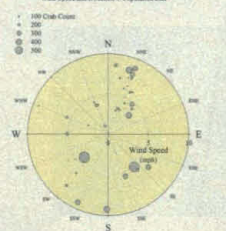
Linear Growth and Poly Living Space v. Depth



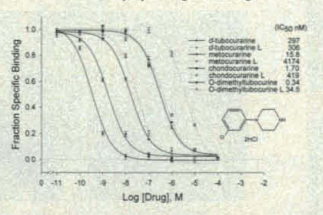
Cenozoic Species Diversity - Series and Stages



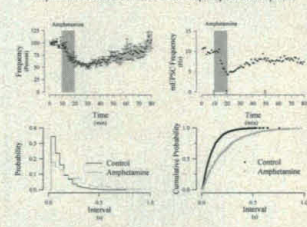
Effect of Wind on Blue Crab Megalopae Count
Wind Speed and Direction v. Population Size



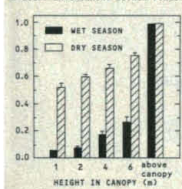
Inhibition of [³H]Radioligand Binding



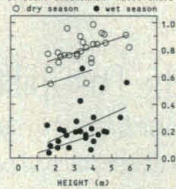
Amphetamine Reduces Miniature EPSC Frequency but not Amplitude



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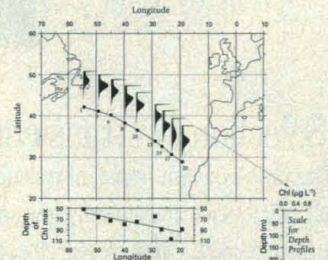


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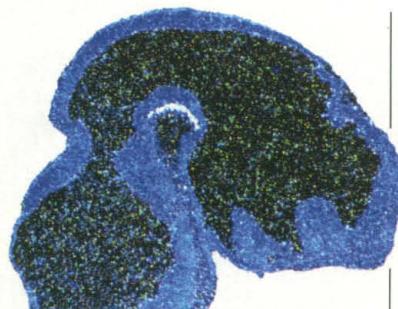
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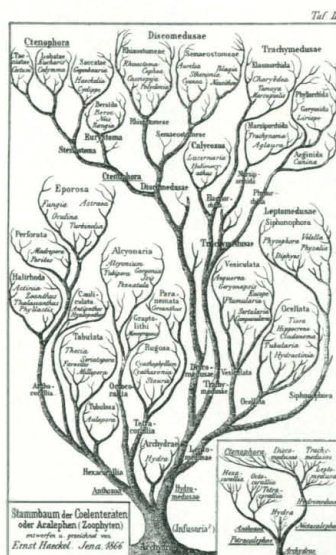
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202 & 248

Dopamine neuron
development



**218, 227, 253
& 256**

Phylogenetic analysis,
everywhere

NEWS & COMMENT

- Cracks in Europe's Framework? 188
Small Countries Make the Most of EU Largesse 189

- AIDS Research: Program Funding, Italian Style 191

- Military on Campus: Budget Threats Force Policy Reversal 191

- Nobel Prizes: U.S. Laureates Stand Out in Paying Tax 192

- Russia: Gallium Sell-Off Threatens Detector 193

- Space Science: Resurrected Cluster Gets the Green Light 193

- Slower Road for Clean-Car Program 194

- Canadian Social Science: Funding Council Hopes Plan Offers Port in Political Storm 195

RESEARCH NEWS

- What Makes Brain Neurons Run? 196

- A Fine-Grained Look at Forces in Sand 199

- Fermilab Group Tries Plain English 199

- In Search of the Cleansing Axion 200

- New Clues for Two Toxicological Mysteries 201

- Key Protein Found for Brain's Dopamine-Producing Neurons 202

PERSPECTIVES

- Biology Recapitulates Phylogeny D. M. Hillis 218

- Journey Across the Osteoclast K. Mostov and Z. Werb 219

- A Quick Look at Hydrogen Bonds A. Douhal 221

- Where Smokers Rule R. H. Crabtree 222

POLICY FORUM

- Copyright: Evolution, Not Revolution J. Lienes 223

ARTICLE

- Phylogenetic Methods Come of Age: Testing Hypotheses in an Evolutionary Context 227
J. P. Huelsenbeck and B. Rannala

DEPARTMENTS

- THIS WEEK IN SCIENCE 173

- EDITORIAL 179
Ratify the Chemical Weapons Convention

- LETTERS 181
Spin Studies: B. Richter • Mergers of Botany and Biology Departments: L. H. Rieseberg, G. J. Gastony, J. D. Palmer; J. Adams; D. Cipollini • Commitment to Graduate Students?: R. Floyd • Research and Regulation at FDA: I. Berkower • German Academe: S. Brody • Transcription Factors, Oncogenes, and Apoptosis: D. W. White and T. D. Gilmore

- SCIENCESCOPE 187

- RANDOM SAMPLES 203

Green Crabs Advance North • Healthy Gums for a Happy Heart • Crater Pattern Says Europa Still Active • Postdoc Population Plateau • Internet Link Brings China Into Focus • MIT: Cradle of Entrepreneurs • Early Music

- BOOK REVIEWS 216

Partnerships in Birds, reviewed by J. D. Ligon • *Before Big Science*, S. Mauskopf • Books Received

- PRODUCTS & MATERIALS 287

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COVER

Reconstruction of a membrane area in a presynaptic nerve cell of a lamprey. When the interaction between the proline-rich region of dynamin and the Src homology 3 domain of another protein was disrupted and the synapse subsequently activated, invaginations formed

and clathrin (red)-coated pits (diameter ~0.1 micrometer) accumulated because they were unable to pinch off from the membrane. The reconstruction was based on serial ultrathin sections. See page 259. [Image: O. Shupliakov, H. Gad, P. Löw, P. De Camilli, and L. Brodin]



REPORTS

Self-Assembly of Mesoscale Objects into Ordered Two-Dimensional Arrays 233

N. Bowden, A. Terfort, J. Carbeck, G. M. Whitesides

Permo-Triassic Boundary Superanoxia and Stratified Superocean: Records from Lost Deep Sea 235

Y. Isozaki

Ferroelectric Field Effect Transistor Based on Epitaxial Perovskite Heterostructures 238

S. Mathews, R. Ramesh, T. Venkatesan, J. Benedetto

Melting Temperature and Partial Melt Chemistry of H₂O-Saturated Mantle Peridotite to 11 Gigapascals 240

T. Kawamoto and J. R. Holloway

Death and Transfiguration of a Triple Junction in the South Atlantic 243

M. Ligi, E. Bonatti, G. Bortolouzzi, G. Carrara, P. Fabretti, D. Penitenti, D. Gilod, A. A. Peyve, S. Skolotnev, N. Turko

Activated Acetic Acid by Carbon Fixation on (Fe,Ni)S Under Primordial Conditions 245

C. Huber and G. Wächtershäuser

Dopamine Neuron Agenesis in Nurr1-Deficient Mice 248

R. H. Zetterström, L. Solomin, L. Jansson, B. J. Hoffer, L. Olson, T. Perlmann

Regulation of Lipid A Modifications by *Salmonella typhimurium* Virulence Genes *phoP-phoQ* 250

L. Guo, K. B. Lim, J. S. Gunn, B. Bainbridge, R. P. Darveau, M. Hackett, S. I. Miller

Insects on Plants: Macroevolutionary Chemical Trends in Host Use 253

J. X. Becerra

Phylogenetic Analysis of Glycolytic Enzyme Expression 256

V. A. Pierce and D. L. Crawford

Synaptic Vesicle Endocytosis Impaired by Disruption of Dynamin-SH3 Domain Interactions 259

O. Shupliakov, P. Löw, D. Grabs, H. Gad, H. Chen, C. David, K. Takei, P. De Camilli, L. Brodin

Separate Neural Bases of Two Fundamental Memory Processes in the Human Medial Temporal Lobe 264

J. D. E. Gabrieli, J. B. Brewer, J. E. Desmond, G. H. Glover

Trafficking of Matrix Collagens Through Bone-Resorbing Osteoclasts 266

S. A. Nesbitt and M. A. Horton

Removal of Osteoclast Bone Resorption Products by Transcytosis 270

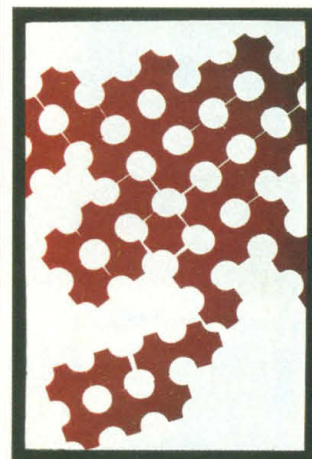
J. Salo, P. Lehenkari, M. Mulari, K. Metsikkö, H. K. Väänänen

Differential Regulation of HIV-1 Fusion Cofactor Expression by CD28 Costimulation of CD4⁺ T Cells 273

R. G. Carroll, J. L. Riley, B. L. Levine, Y. Feng, S. Kaushal, D. W. Ritchey, W. Bernstein, O. S. Weislow, C. R. Brown, E. A. Berger, C. H. June, D. C. St. Louis

Potent Inhibition of HIV-1 Infectivity in Macrophages and Lymphocytes by a Novel CCR5 Antagonist 276

G. Simmons, P. R. Clapham, L. Picard, R. E. Offord, M. M. Rosenkilde, T. W. Schwartz, R. Buser, T. N. C. Wells, A. E. I. Proudfoot



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233

Self-assembly

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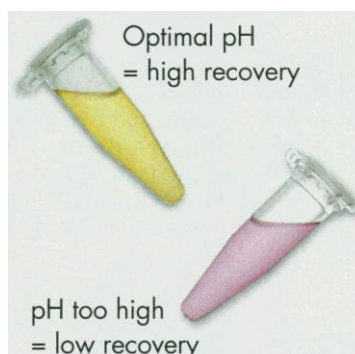
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THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Out of oxygen

The extinction at the end of the Permian (250 million years ago) is the largest in the fossil record. Anoxia in the deep oceans has been suggested as a likely cause, but most of the exposed rocks that provide a record of this time were deposited at shallow depths. Isozaki (p. 235) describes two sections of deep-ocean deposits, one in Japan, the other in British Columbia, which indicate that at least the large paleo-Pacific Ocean was anoxic at depth and thus was stratified for up to 20 million years around the time of the extinction.

Trapping wet melts

Adding water to a silicate melt affects its physical and chemical properties (such as its density and the sequence of minerals that crystallize as the melt cools). It has been difficult to study these properties experimentally in water-rich melts at high pressure (equivalent to hydrous partial melts in Earth's upper mantle). Kawamoto and Holloway (p. 240) were able to trap melts in a multi-anvil apparatus and study a hydrous mantle peridotite to a pressure of 11 gigapascals. Their results provide some of the basic phase equilibria needed to understand the role of water in mantle magma dynamics and the origin of rarer, mafic-rich rocks that are presumed to be derived from great depths in Earth's mantle, in part through the effects of hydration.

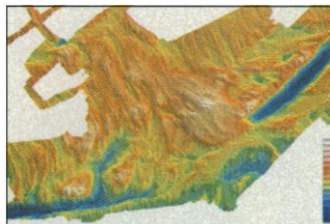
Three are crowded

A triple junction is where three tectonic plates meet, and the evolution and changes in triple

Breaking HIV-1 entry into cells

Infection of human cells with the human immunodeficiency virus-type 1 (HIV-1) is facilitated by the chemokine receptors CXCR4 (Fusin) and CCR5. Two reports focus on the blocking of CCR5 function to achieve resistance to the virus that may also prove useful therapeutically. Resistance to macrophage-trophic HIV-1, which makes use of the CCR5 cofactor, can be induced by activating CD4⁺ T cells with immobilized antibodies to CD3 and CD28. Carroll *et al.* (p. 273) show that such activation upregulates CXCR5/Fusin transcription but that transcripts for CCR5 could not be detected. The chemokine RANTES can interact with CCR5 to block infection but not efficiently. Simmons *et al.* (p. 276) show that an aminooxypentane derivative of RANTES is effective in vitro in blocking HIV-1 infection of macrophage and lymphocytes at nanomolar concentrations.

junctions mark key transitions in the geometry of plate tectonics. Ligi *et al.* (p. 243) used a variety of geophysical data to catch such a transition in prog-



ress in the South Atlantic Ocean. In this region, the Antarctic plate is increasing its size at the expense of the Mid-Atlantic Ridge.

Building blocks

In order to understand the origin of life, it is important to identify reactions and conditions that could have allowed the fixing of carbon into larger molecules. In several experiments, Huber and Wächtershäuser (p. 245; see the Perspective by Crabtree, p. 222) show that the presence of iron-nickel sulfides catalyzes carbon-carbon bond-forming reactions of carbon monoxide (CO). When these sulfides were doped with selenium, CO reacted with hydro-

gen sulfide to form acetic acid under conditions typical of low-temperature hydrothermal systems.

Ferroelectric memories

Ferroelectric field effect transistors (FETs) offer the possibility of active devices that retain their memory state even when switched off. Such devices were conceived in the 1950s, but materials issues have limited their practical use. Mathews *et al.* (p. 238) show that device performance can be improved by using rare-earth manganates, which recently have been shown to have large magnetoresistive effects, as the semiconducting channel component of ferroelectric FETs.

Neurons sans dopamine

Parkinson's disease results from degeneration of dopamine neurons in the midbrain. Zetterström *et al.* (p. 248) show that very early in development, before dopamine expression is apparent, these neurons are dependent on expression of the

orphan nuclear receptor Nurr1. The ligand for Nurr1 remains unknown, but it may prove to be significant in the development and maintenance of these critical neurons.

Regulating lipid A

Expression of bacterial virulence genes is regulated to respond to the host environment. In *Salmonella typhimurium*, the PhoP-PhoQ proteins regulate more than 40 genes, some of which help defend it against antimicrobial host peptides. Guo *et al.* (p. 250) used mass spectrometry to show that the PhoP-PhoQ proteins also regulate structural modifications to lipid A, a component of lipopolysaccharide (LPS). The modified form altered the cytokine expression that LPS stimulates in cultured host cells.

Bone disposal

Bones are dynamic structures that are continuously being formed and resorbed. Two reports present microscopy studies that reveal how osteoclasts, large multinucleated cells, process degraded bone (see the Perspective by Mostov and Werb, p. 219). Osteoclasts attached to bone form a sealed zone that contains the ruffled border membrane, which secretes acid and digestive enzymes. Nesbitt and Horton (p. 266) and Salo *et al.* (p. 270) labeled bone proteins and show that products such as degraded collagen are endocytosed into vesicles at the ruffled border membrane and transported across the cell, where they are then released to the extracellular space. Such vesicular traffic may also regulate the resorption process.

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Human RNA Master Blot. Type and position of poly A⁺ RNAs and controls. Actual size of membrane is 80 x 120 mm.

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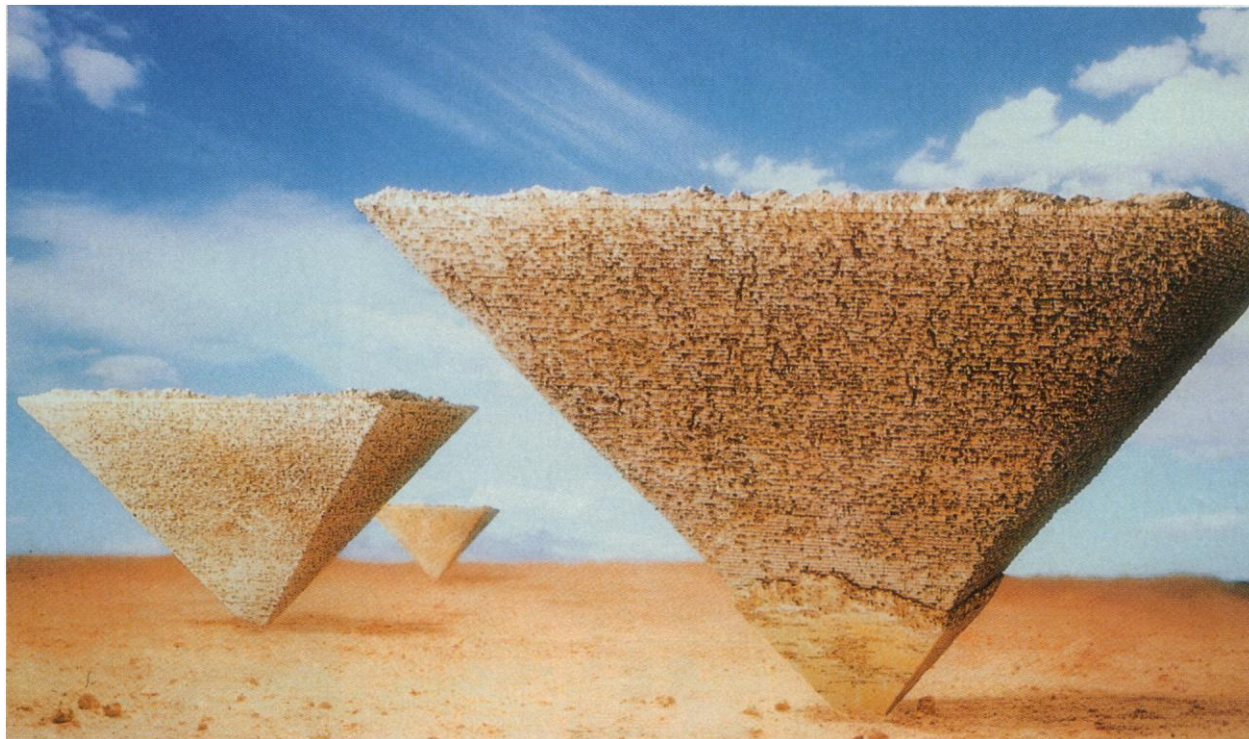
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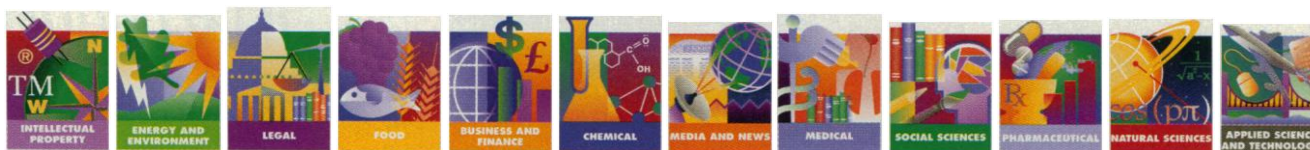
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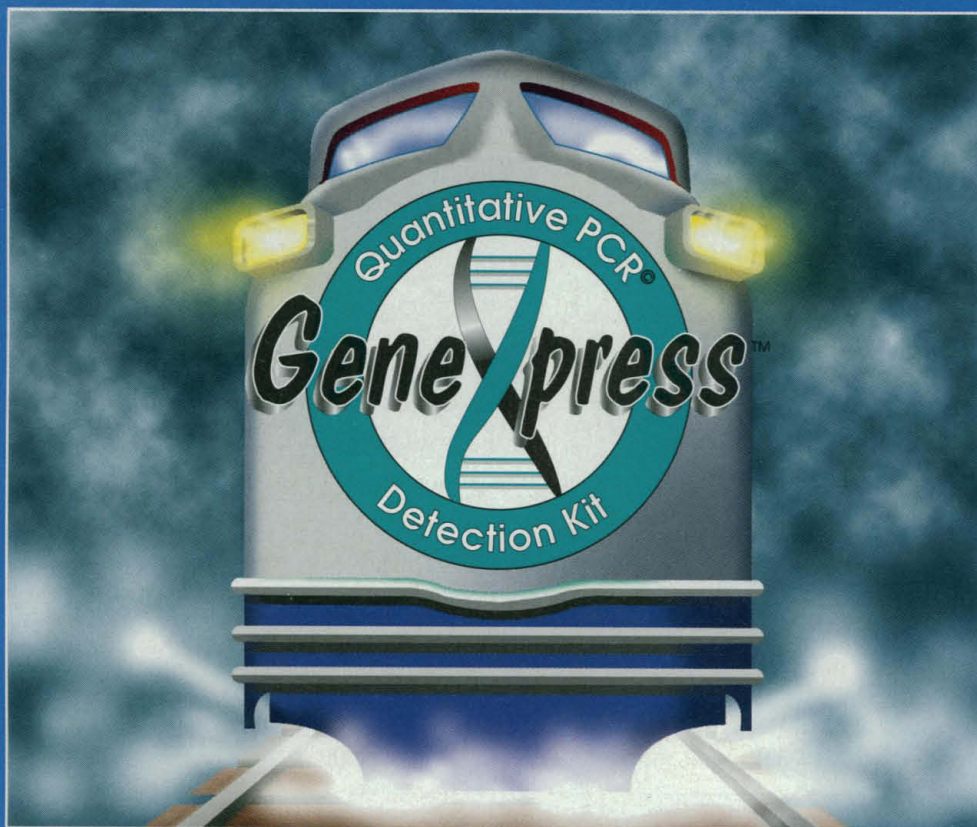
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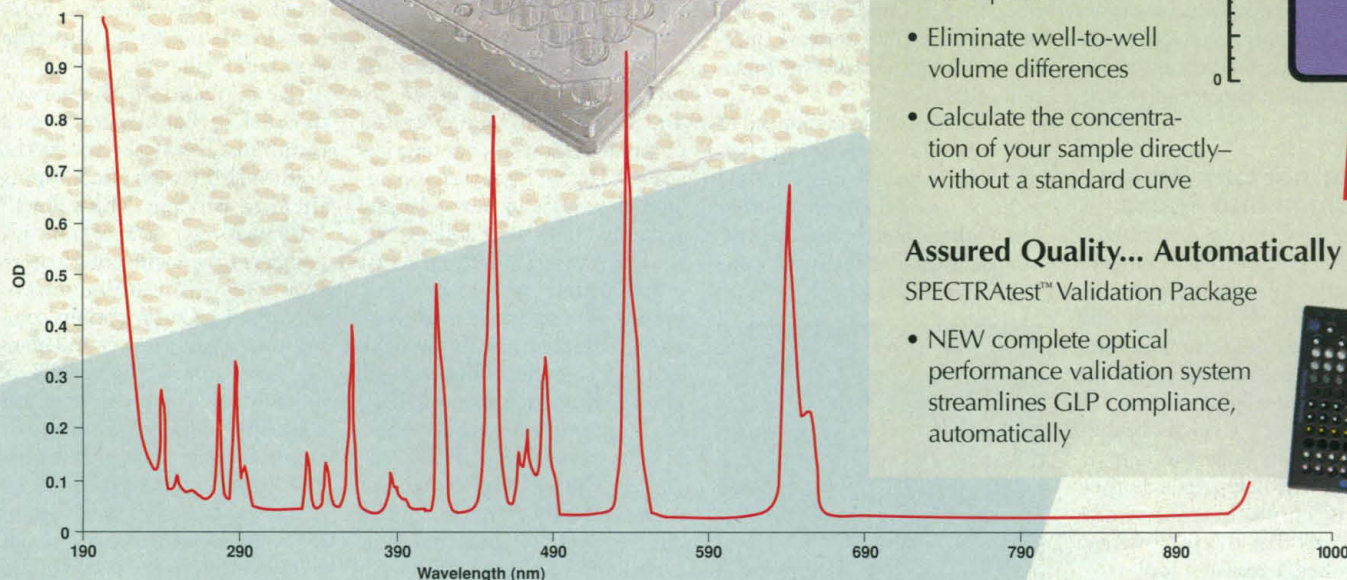
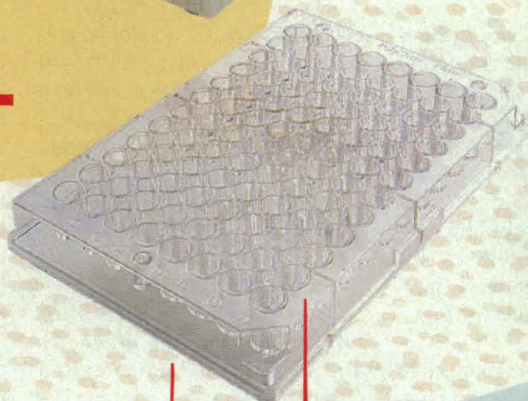
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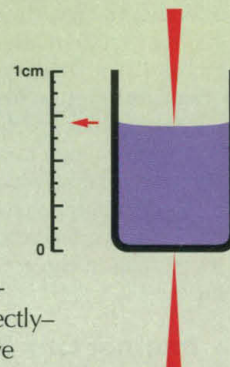
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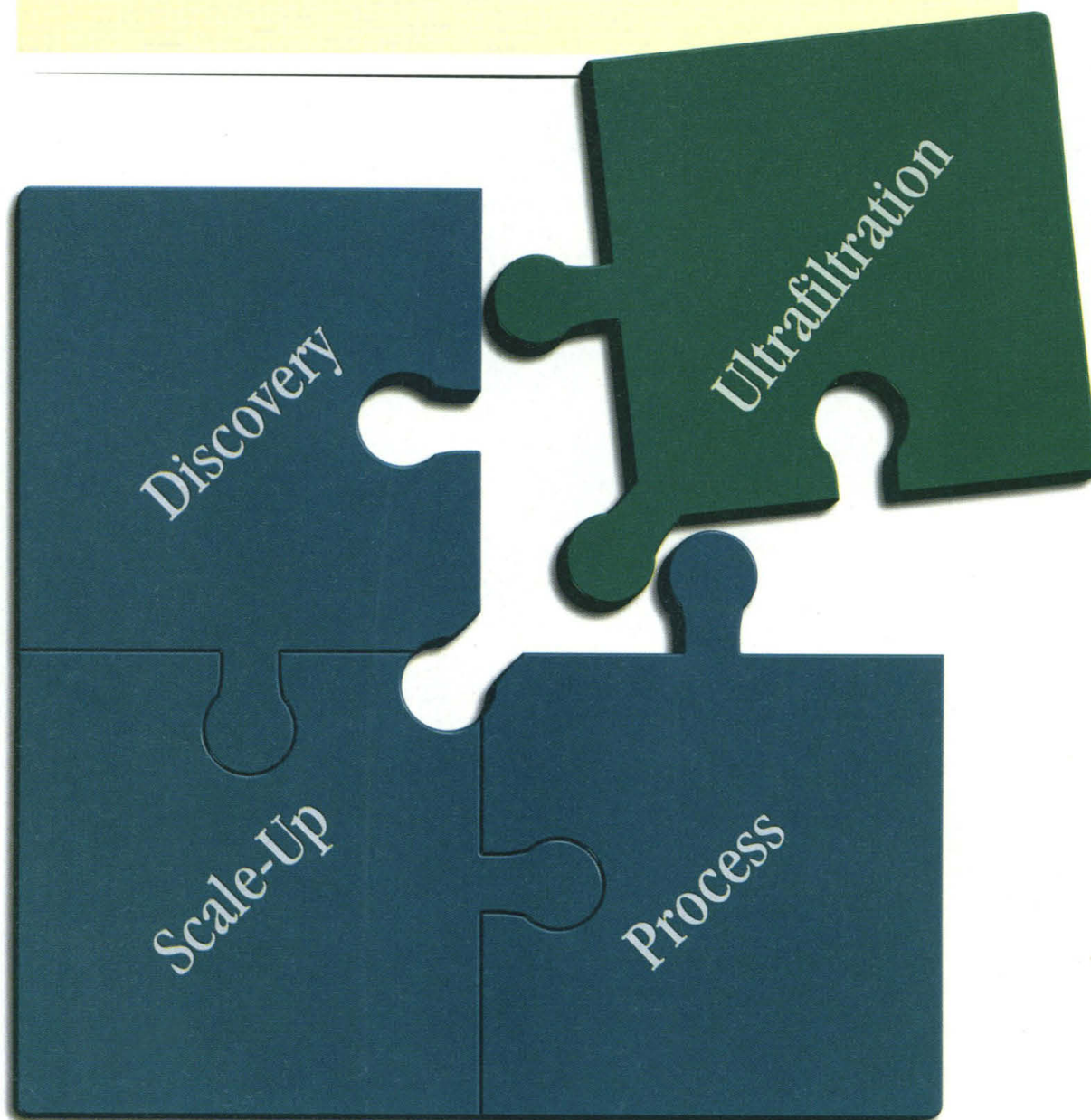
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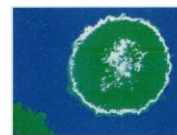
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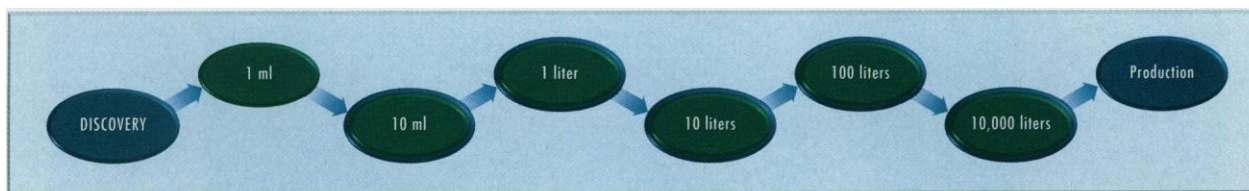
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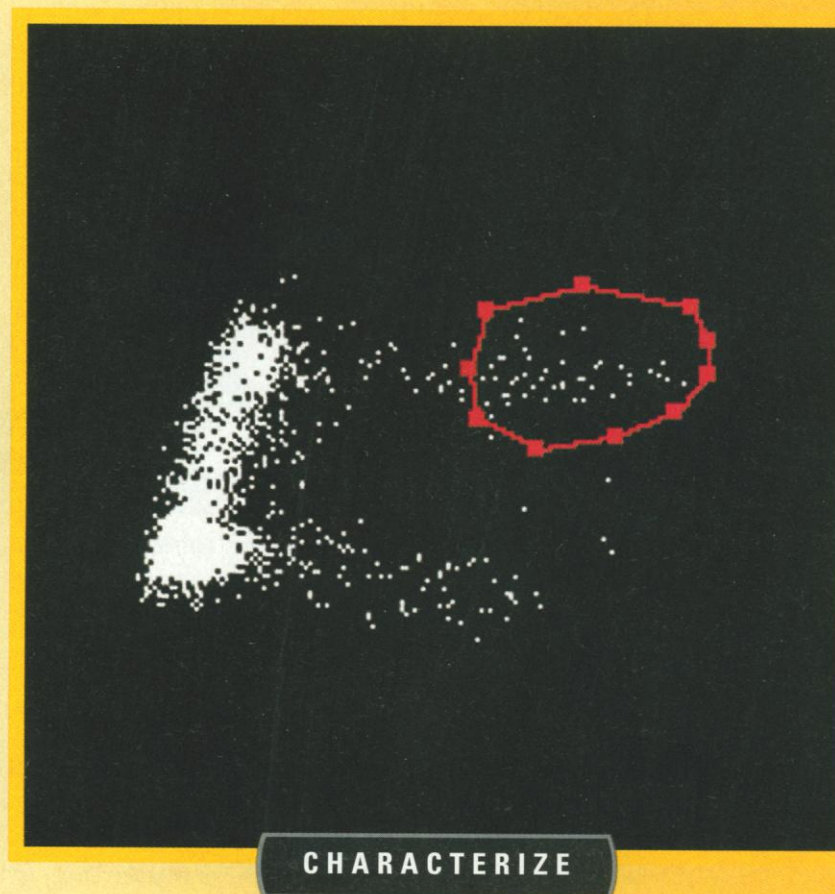
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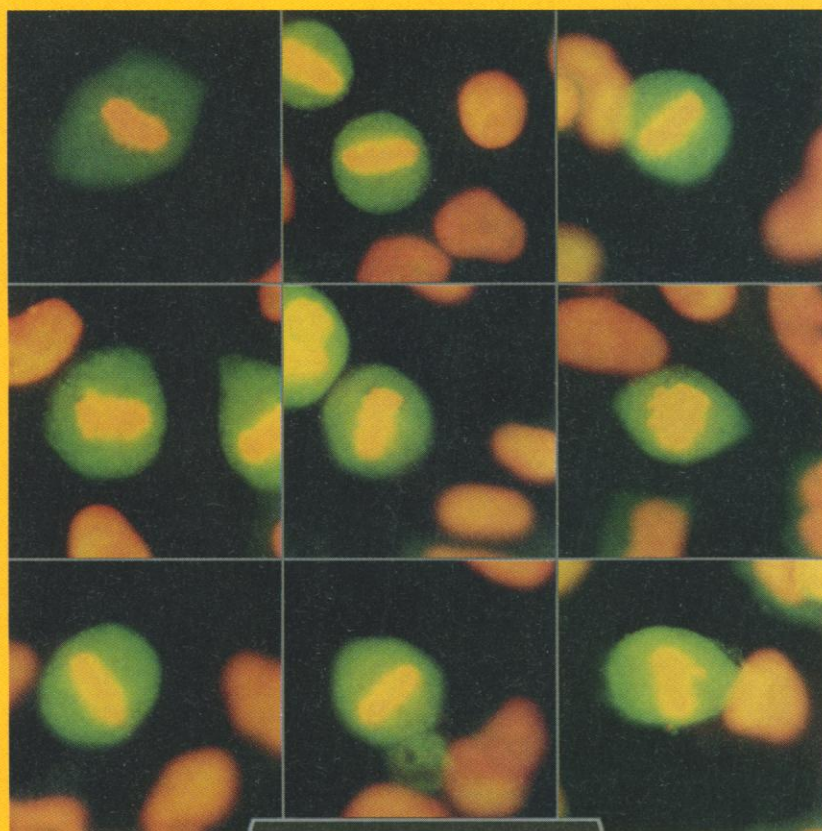
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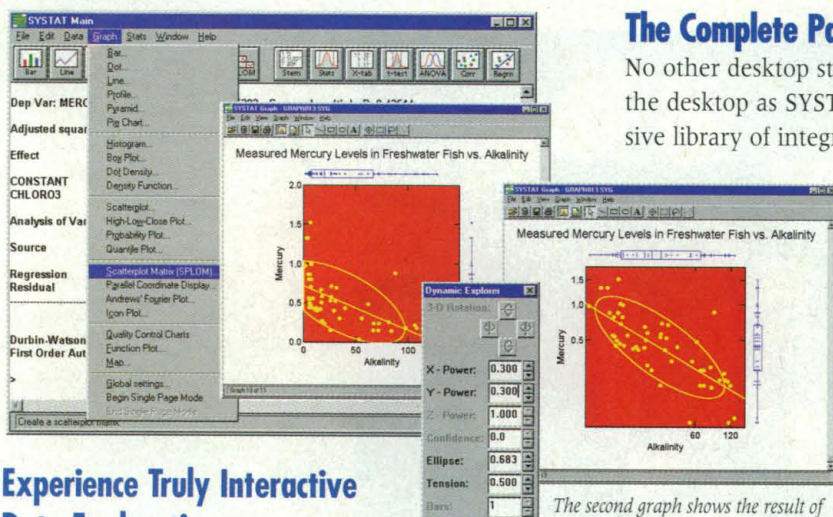
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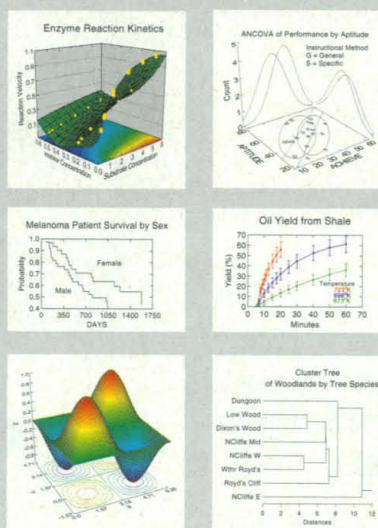
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Fig. 2

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Figs. 2 a-b. Fluorescent detection of chromosome centromere probes in metaphase spreads.
Figs. 2 c-d. In situ chromogenic detection of oxytocin in rat brain tissue sections.

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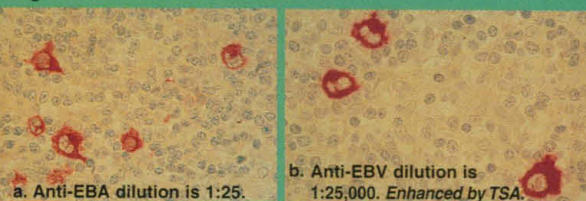
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Fig. 3



Figs. 3 a-b. IHC of EBV antigen in Hodgkin's Lymphoma of mixed cellularity.
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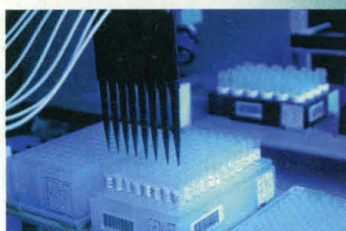
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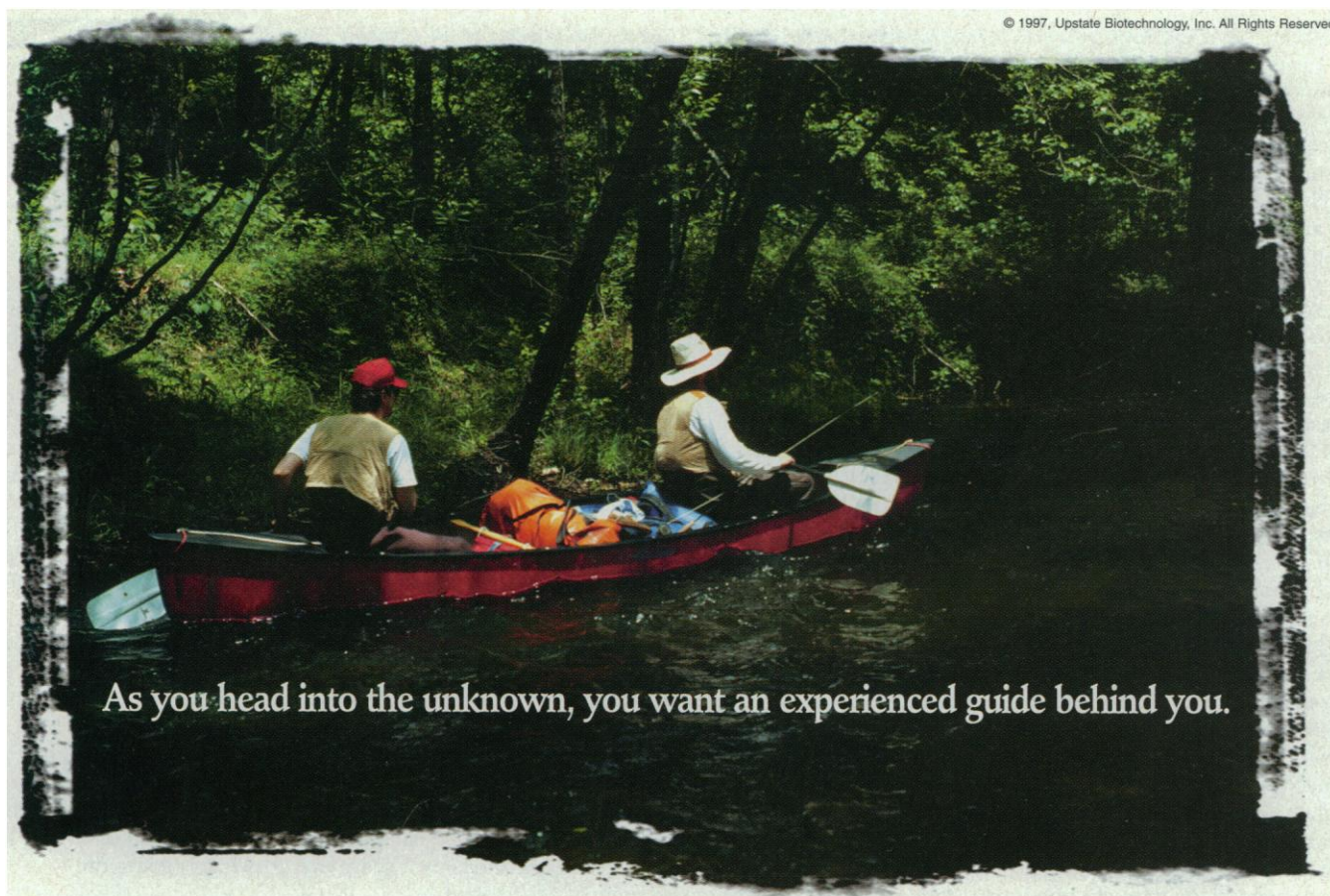
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