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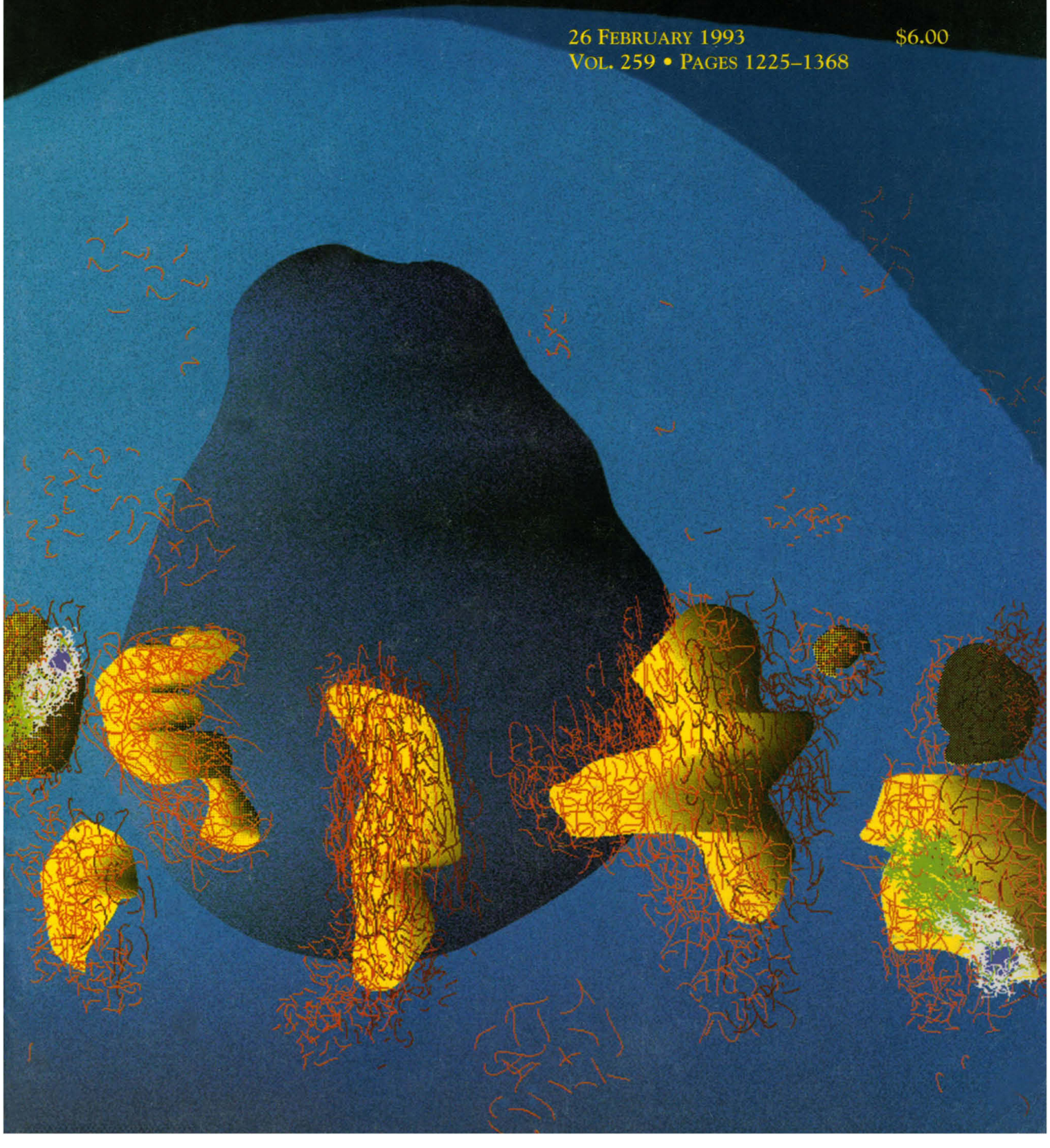

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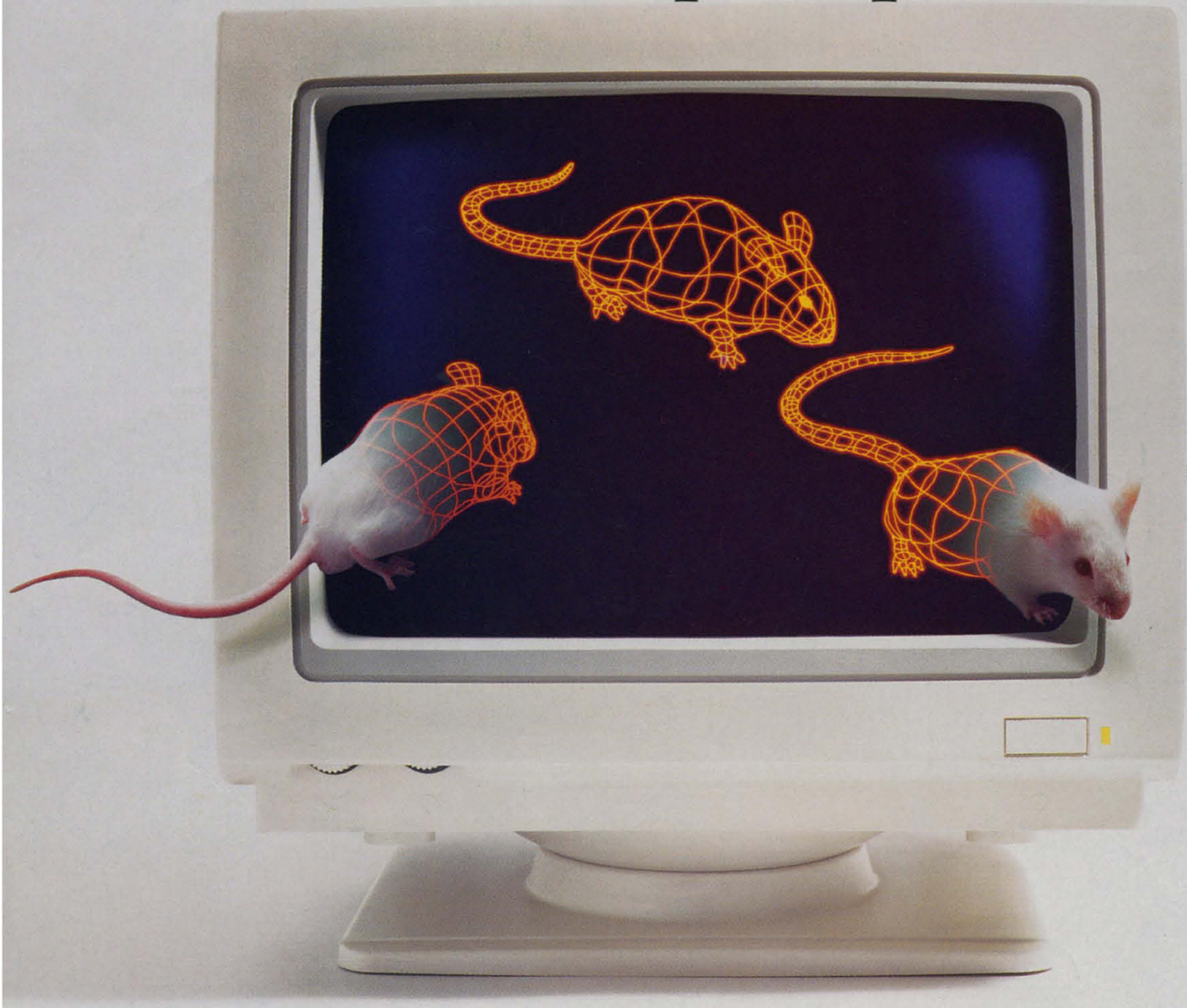

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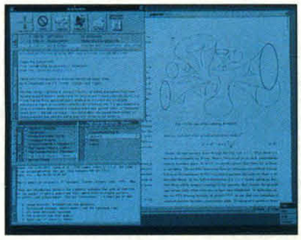

1246
Instant publication in physics

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVE

ARTICLES

RESEARCH ARTICLE

DEPARTMENTS

COVER

Model of precursor messenger RNA metabolism in a mammalian cell nucleus. Polyadenylated RNA (red) concentrates in topologically arranged centers, which have discrete cores of spliceosome assembly factor SC-35 (yellow). Closely associated with these centers are specific RNA transcript tracks (exons, green; introns, white; and fibronectin gene, lavender) within which both transcription and splicing occur. The dark blue area represents the nucleolus. See the Carter *et al.* report on page 1330 and the Xing *et al.* report on page 1326; also see the News story on page 1257. [Art: Ken Carter and John McNeil]

REPORTS

TECHNICAL COMMENTS

1324
An exercise in learning

1308
Episodic mantle mixing

Indicates accompanying feature

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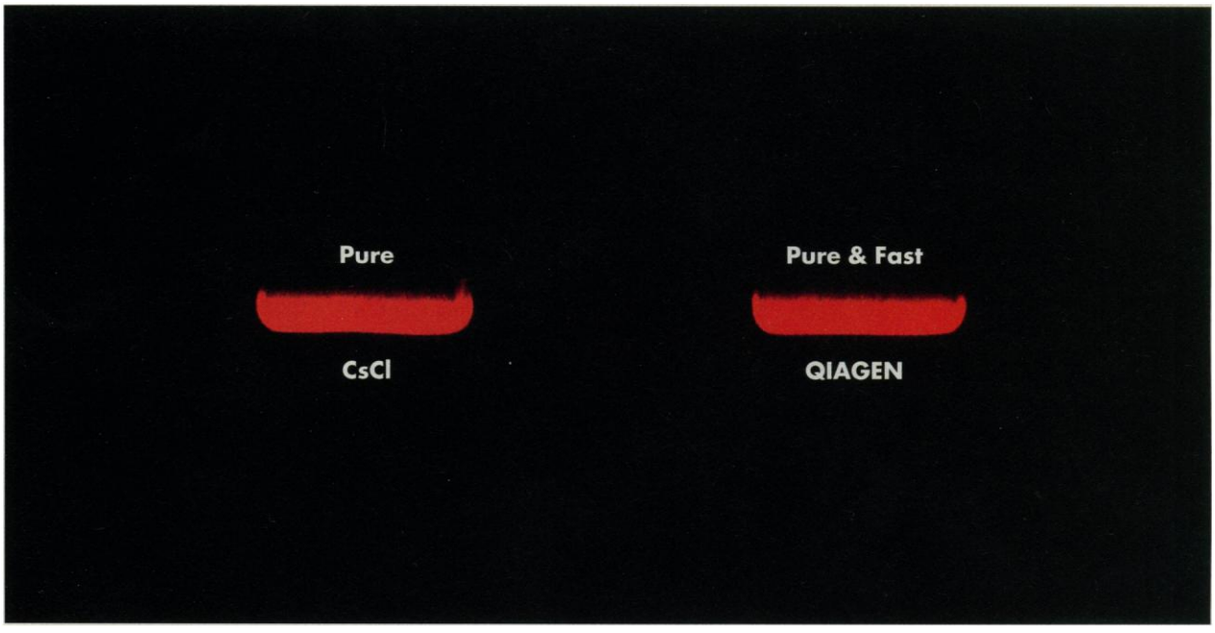

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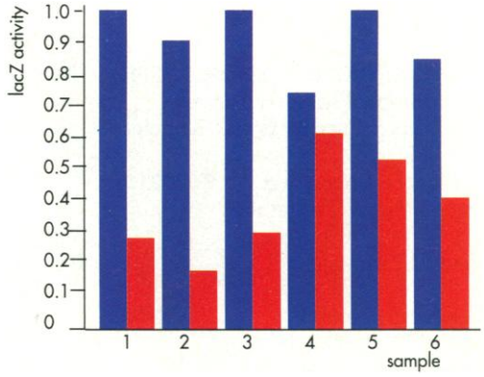

QIAGEN purified DNA for transfection: *NIH 3T3 cells were transfected with 1, 2 and 3 µg of the plasmid pRSVlacZ according to the standard calcium phosphate method. Plasmid DNAs used for transfection were prepared with QIAGEN Plasmid Mega Kit (blue bar) or by CsCl gradient centrifugation (red bar). The transfection efficiencies were determined by measurement of ß-galactosidase activity. Samples 1 and 2: 1 µg DNA: samples 3 and 4: 2 µg DNA; samples 5 and 6: 3 µg DNA. Data kindly provided by Frauke Ehlert, Institute for Molecular Biology and Tumor Research, Marburg, Germany.*

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edited by PHIL SZUROMI

Where the ocean meets the sea

Evaporation or cooling of ocean surface waters in marginal seas leading to the formation of dense bottom waters is an important part of ocean circulation and has a large impact on climate. During warmer climates, in particular, much bottom water may form in marginal basins such as the Mediterranean Sea, where evaporation increases the salinity of the seawater. Price *et al.* (p. 1277) examine the dynamics of the warm, saline outflow from the Mediterranean Sea as it mixes with waters in the Atlantic Ocean. Because of the mixing, the outflow becomes neutrally buoyant at depths of about 800 to 1300 meters. The saline outflow can be traced across the North Atlantic and north to the Norwegian Sea.

■

Simple replicators

One of the goals of artificial life research is to understand how information is processed in replicating systems, whether physical, chemical, or biological. Reggia *et al.* (p. 1282) discuss the use of cellular automata models to examine simple systems that self-replicate. The authors find that modification of certain kinds of looped automata leads to substantially smaller and simpler self-replicating structures. The results suggest that self-replication, rather than being an inherently complicated process, can emerge from local interactions in simple systems.

■

Double coiled coils turn triple

One test of our understanding of protein folding and assembly is to design proteins from basic structural elements such as α-helices. Lovejoy *et al.* (p. 1288) find that even simple designs, such as that for a double-stranded parallel coiled coil, can lead to proteins with rather different structures. They present the x-ray structure of the peptide coil-Ser, which has design origins in the two-stranded coiled coil of tropomyosin; coil-Ser differs from naturally occurring proteins in that it has leucine residues at certain interface positions (a and d) instead of some smaller side chains. Instead, a triple-stranded structure was found with one strand running antiparallel to the other two. The leucine side chains form a hydrophobic interface that dominates the stabilization of the coiled-coil geometry, although electrostatic interactions also contribute.

Tracks in the nucleus from RNA splicing

The sites of gene transcription and RNA splicing in the mammalian cell nucleus have been visualized by means of fluorescent probes and three-dimensional microscopy. Xing *et al.* (p. 1326) show that nascent fibronectin messenger RNA does not freely diffuse but rather accumulates in elongated tracks along which transcription and splicing seem to occur in assembly-line fashion. These tracks overlap with "transcript domains," previously defined nuclear regions that are rich in polyadenylated RNAs and splicing factors. Carter *et al.* (p. 1330; cover) show by quantitative image analysis that these transcript domains, which themselves have a specific substructure, are arranged as noncontiguous entities in a horizontal array in the nucleus. A related news story by Hoffman (p. 1257) focuses on how the structure of the nuclear matrix might control processes such as splicing and gene expression.

■

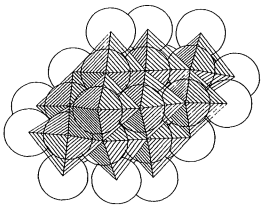
Chaotic tilt

The obliquity of Mars—the angle between the equatorial and orbital planes—might have undergone large chaotic variations, according to a numerical simulation by Touma and Wisdom (p. 1294). The authors used a supercomputer to integrate the equations of motion of the planets in the solar system and then examined the simulated history of Mars' rotation backwards in time. Over a period of 80 million years, the calculation shows that the obliquity executes large irregular variations from 11° to 49°. These large changes in planetary tilt could have important consequences for the history of Mars' climate.

■

Modeling ferritin's mineral core

When iron is stored by the protein ferritin, iron(II) is oxidized and hydrolyzed to form iron(III). Taft *et al.* (p. 1302) have synthesized a mixed-valence polyiron oxo complex containing four iron(III) atoms and eight iron(II) atoms that resembles ferritin in its structural and magnetic properties. This complex may serve as a model for the intermediates formed as iron(II) is converted to iron(III). The arrangement of iron and oxygen atoms forms a three-dimensional close-packed array.



The complex and a reduced form that has two iron(II) atoms both contain oxo-bridged di-iron(III) linkages that may serve to nucleate larger aggregates.

■

Potential errors

Although there is strong evidence for the involvement of the hippocampus in spatial learning, it has been difficult to identify specific cellular changes, such as increased synaptic connections, in freely moving animals undergoing learning tasks. One promising avenue has been the observation of increases in the excitatory field potentials in the dendate gyrus of rats that freely explore their environment. Moser *et al.* (p. 1324) show that such changes result from the increase in brain temperature that accompanies exertion; passive heating of the brain could produce similar results. These studies also show that brain temperature is not as well regulated as has been previously thought.

■

Interferons and HIV-1 expression

Expression of structural proteins that form the viral envelope of human immunodeficiency virus–1 (HIV-1) depends on another viral protein, the Rev protein. Constantoulakis *et al.* (p. 1314) screened a human complementary DNA library for proteins that bind to the Rev-responsive element (RRE) of HIV-1. The protein product of the interferon-inducible 9-27 gene, RBP9-27, binds specifically to the RRE. Transfection and expression of this gene in human cells inhibited HIV-1 expression. These results may help clarify the antiviral effects of interferon.

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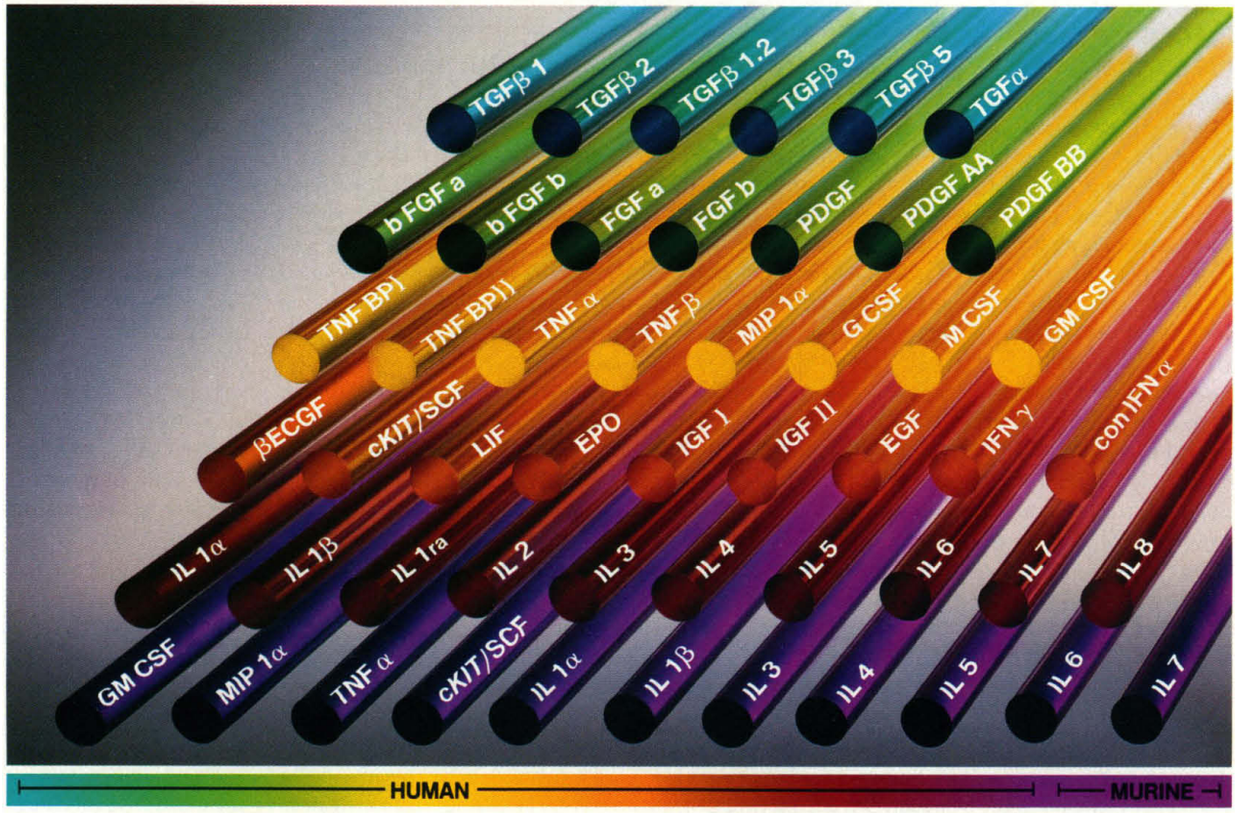

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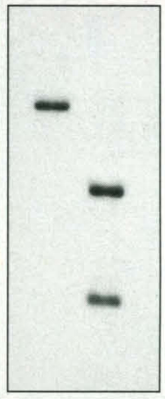
Nucleic acids detection



Analysis of microbial genomes: Southern blot of genomic DNA from (i) *Yersinia pestis* and (ii)(iii) *Yersinia enterocolitica* digested with *Eco*R1 on Hybond™-N, hybridized with an IRP2 gene specific probe, using ECL random prime labelling and detection system. 6 minute exposure to Hyperfilm™-ECL *Data supplied by Dr Carniel, Laboratoire de Bacteriologie Moléculaire Médicale, Institut Pasteur, Paris, France.*

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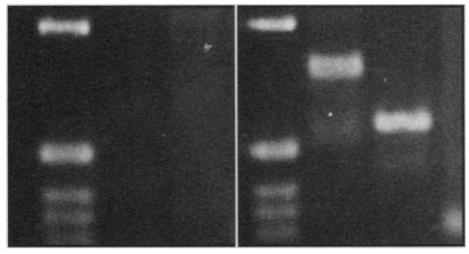

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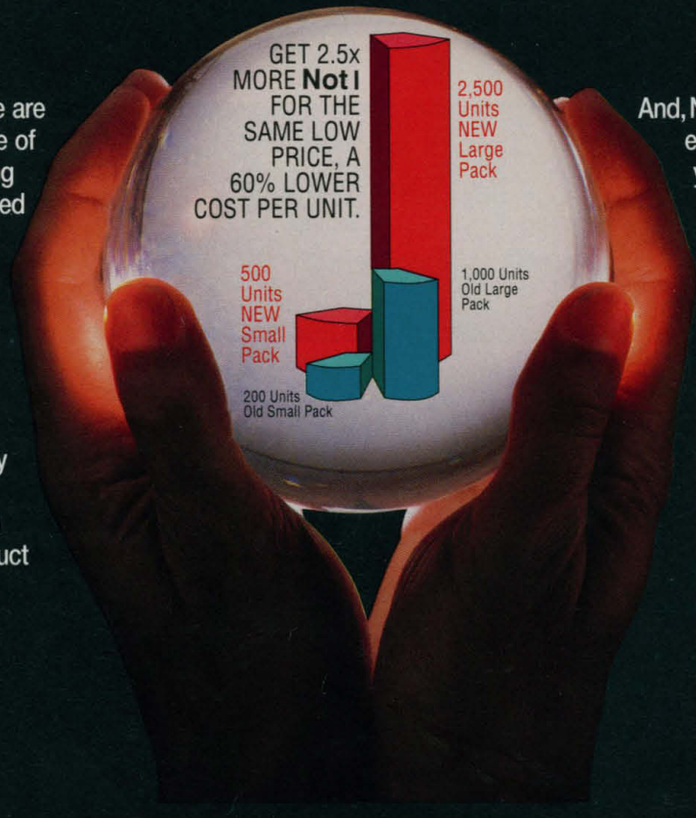

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Alice Wolf, D.V.M., DIP.A.C.V.I.M., Associate Professor, Department of Small Animal Medicine, College of Veterinary Medicine, Texas A & M University, College Station, Texas

The Merck Index

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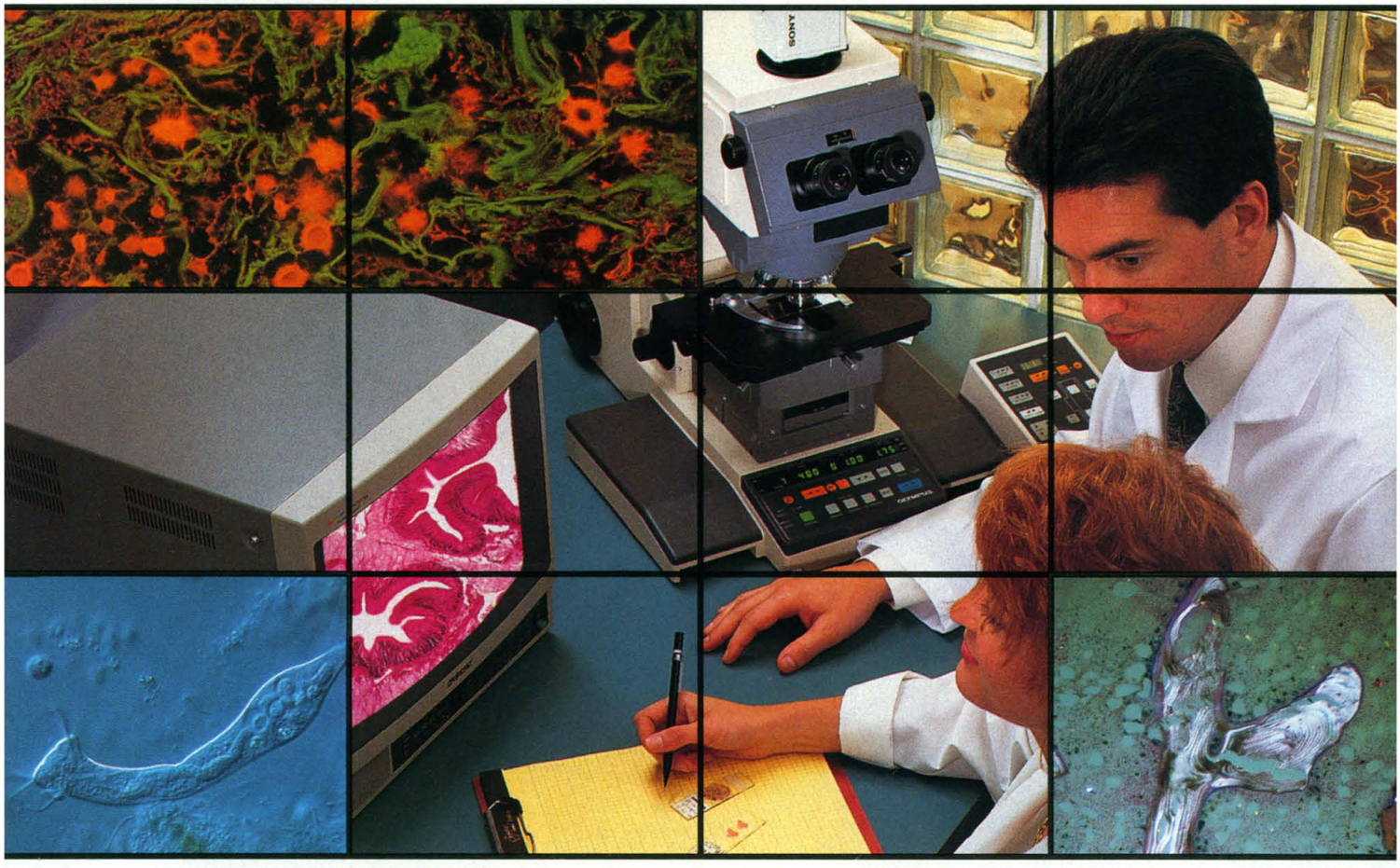

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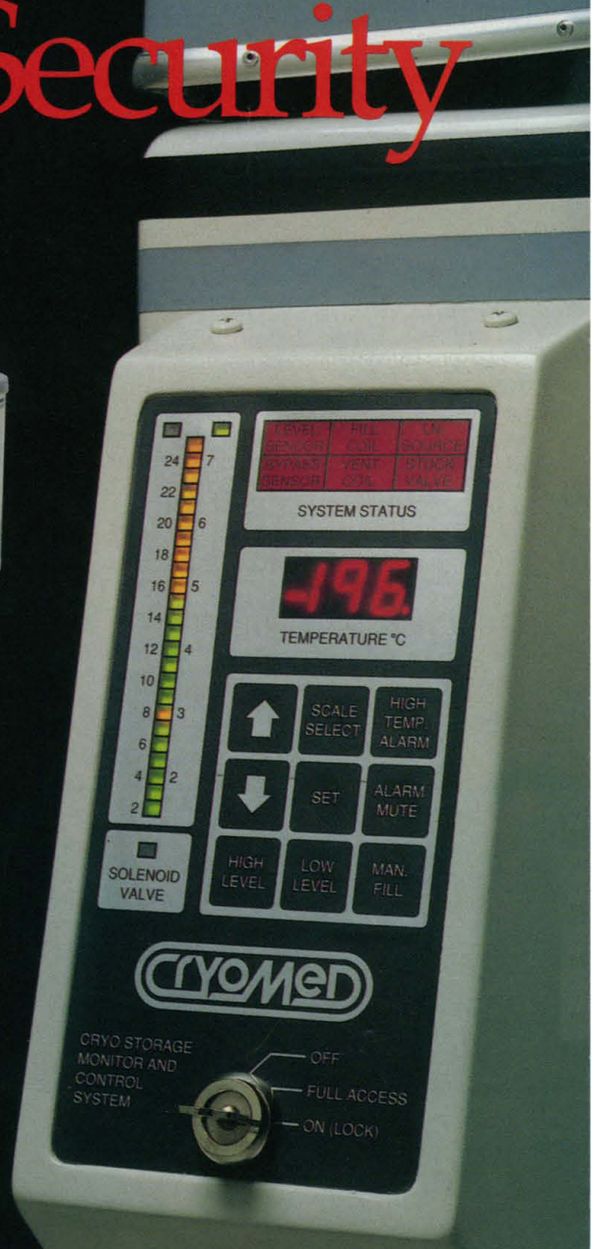

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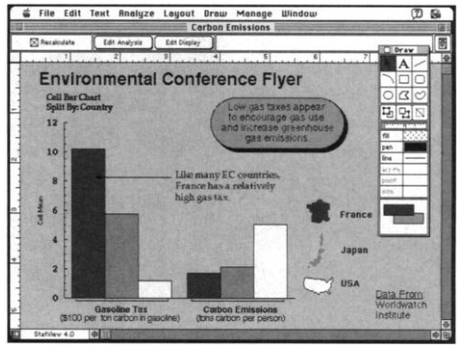
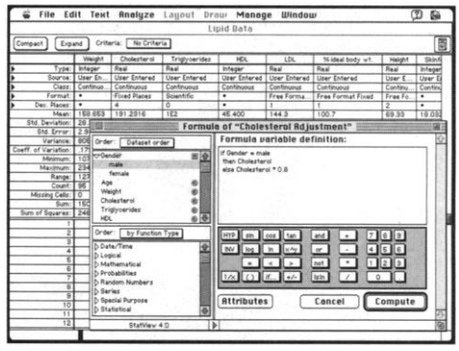
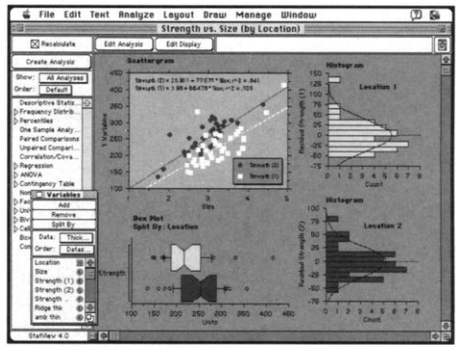


StatView 4.0's presentation capabilities rival those of the most powerful stand-alone graphing packages.



StatView 4.0's data management capabilities go beyond the features of conventional spreadsheet programs.



With StatView 4.0, you can save your analyses as templates and apply them to any dataset.

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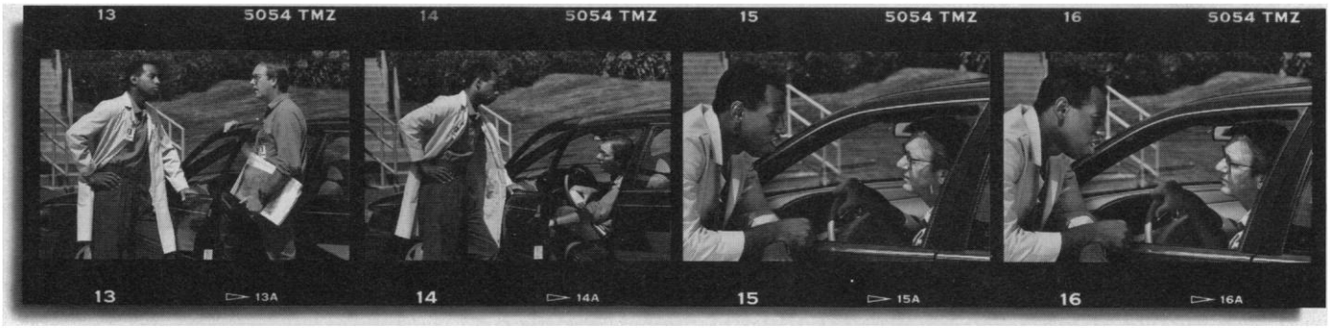

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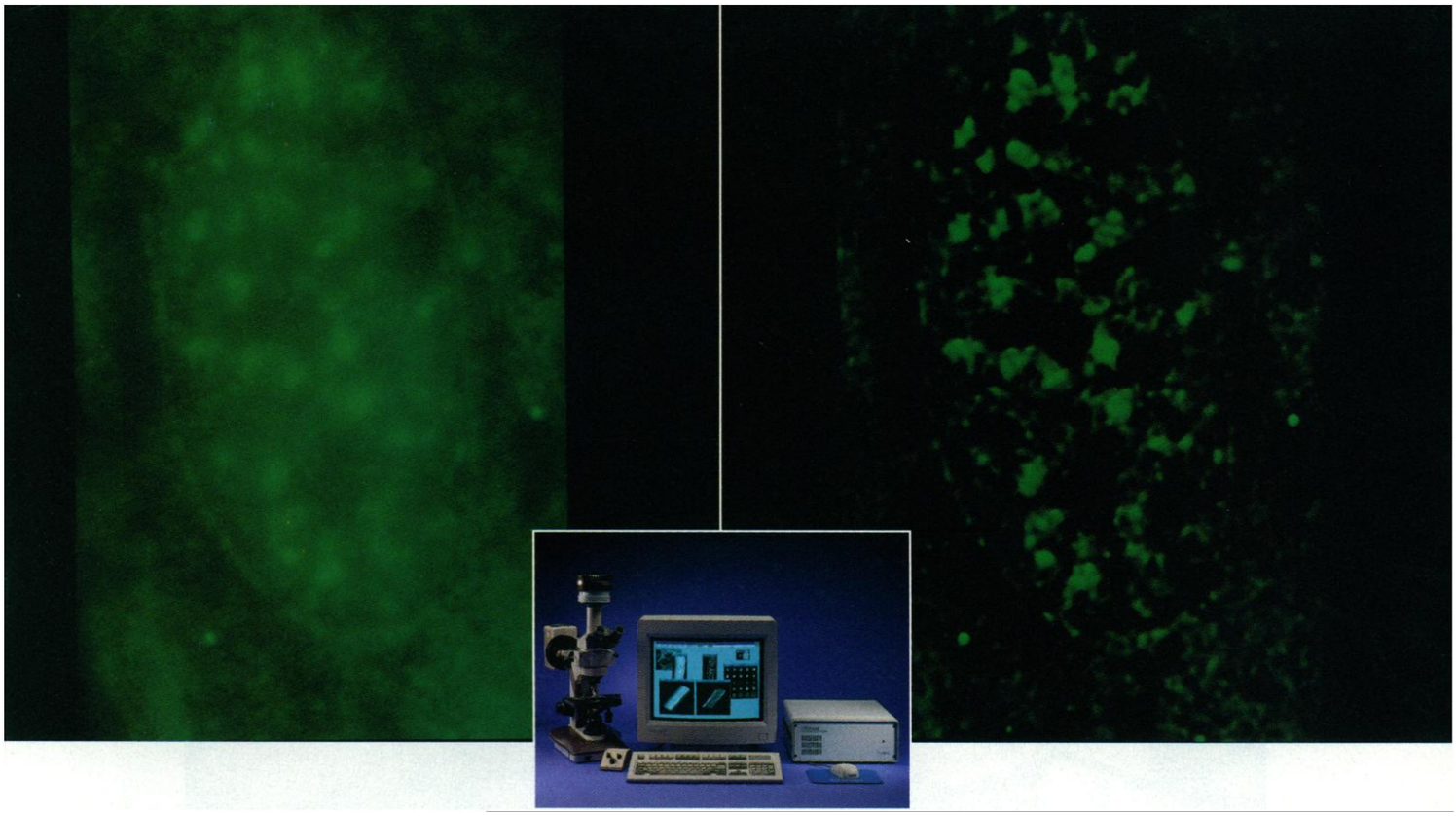

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Above: Unprocessed image *(left)* and processed image *(right)* showing the distribution of fluorescein-labeled poly(A) RNA in human diploid fibroblasts as visualized by fluorescence *in situ* hybridization and immunofluorescence. Images acquired and processed by Dr. Jeanne Bentley Lawrence and the Biomedical Imaging Group at the University of Massachusetts Medical School in Worcester, MA using a Zeiss IM-35 equipped with a Zeiss 100X 1.4 NA objective.

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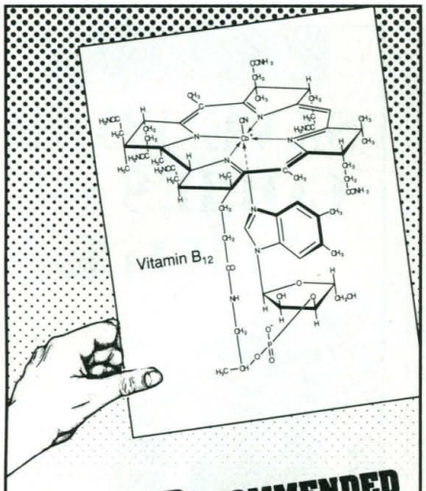

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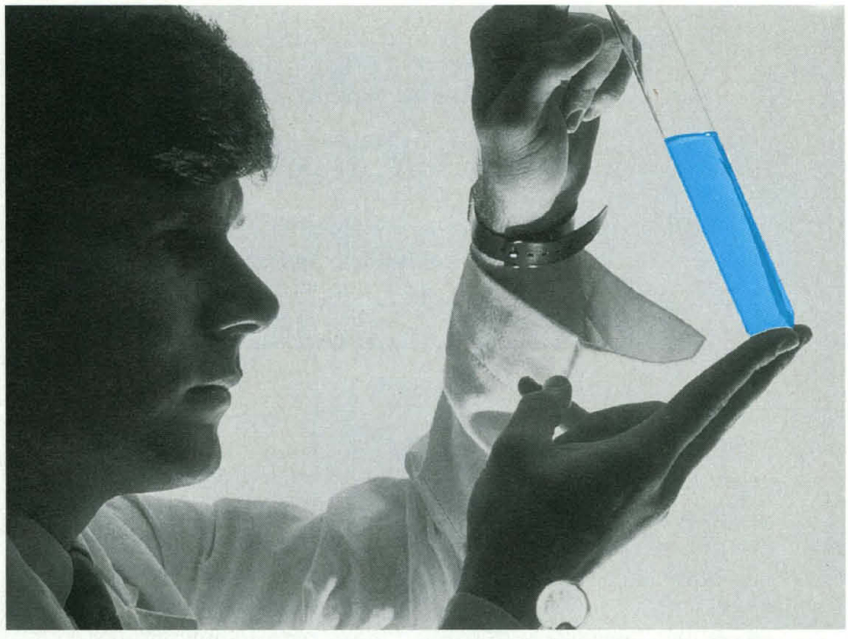

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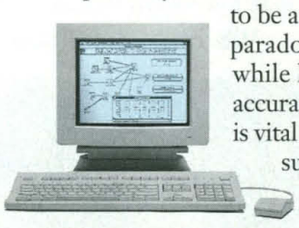

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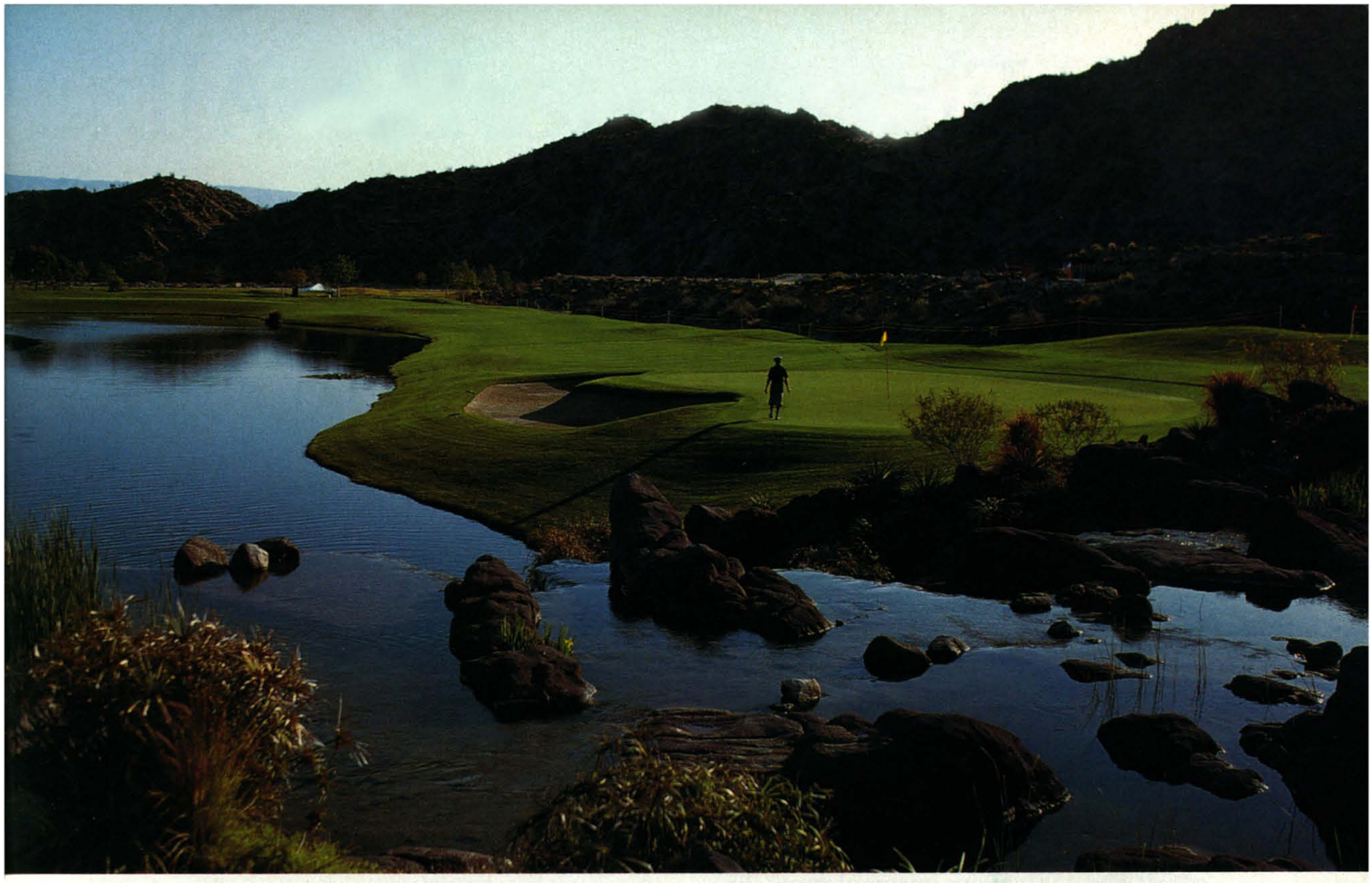

There Are Places You Expect To Find Water Hazards. Your Lab Shouldn't Be One Of Them.

Water hazards on a golf course can cost you a couple of strokes. In a lab, however, water hazards in the form of ions, pyrogens and organics can cost you months of research work.

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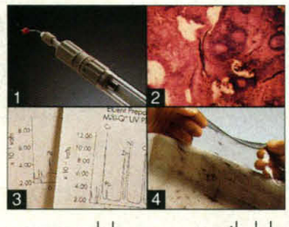

1. A lab doing protein purification with HPLC found that endotoxins in its water system contaminated proteins.

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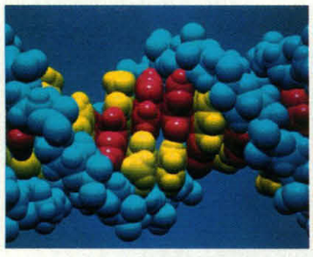
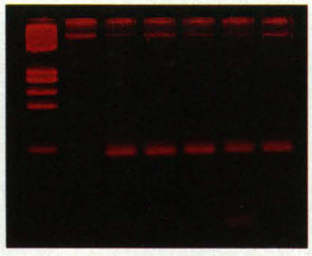
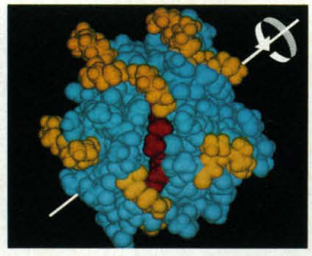


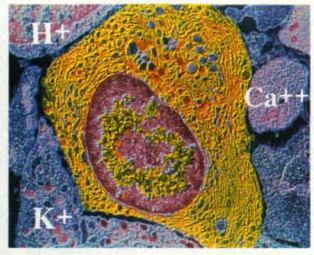
DNA Quantitation



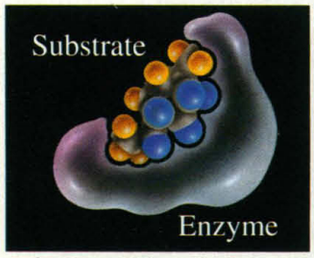
Gel Scanning



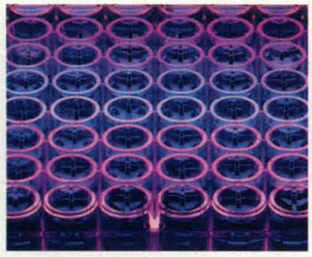
Macromolecular Anisotropy Measurements



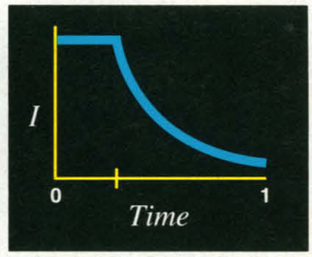
Intracellular Ion Determinations



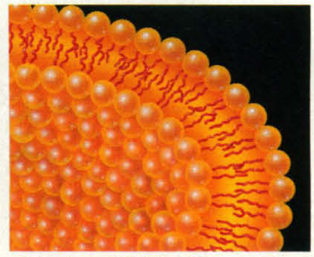
Enzyme Kinetic Analysis



Microplate Assays



Stopped-Flow Kinetic Analysis



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New Directions in Science & Technology Policy

18th Annual AAAS Colloquium on Science & Technology Policy

15–16 April 1993 ✦ The Capital Hilton ✦ Washington, DC

The AAAS Science & Technology Policy Colloquium provides a forum in which federal and industrial policymakers and members of the scientific and engineering community can participate in an open discussion of issues relating to science and technology policy.

The Colloquium occurs after the release of the President's budget but before final congressional action, thus allowing for the timely exchange of information about the budget and the consequences of various policy issues involving science and technology.

Who should attend: Scientists, administrators, industrial R&D managers, policymakers, academicians, association officials, federal grant recipients, students, and others with an interest in science and technology policy.

PROGRAM

Thursday, 15 April

Welcome: Eloise E. Clark, *Vice President for Academic Affairs, Bowling Green State University*, and *President, AAAS*

Keynote: John H. Gibbons*, *Assistant to the President for Science and Technology*, and *Director, OSTP*

The Administration's New Directions in Technology Policy (Symposium)

- ✦ The New Technology Policy and the Department of Commerce
- ✦ An Industrial View of the New Technology Policy -- Ian Ross*, *Former President, AT&T Bell Laboratories*
- ✦ Science and the New Administration -- J. Michael Bishop*, *University of California, San Francisco*
- ✦ The Cultural Context of Technology Development -- Langdon Winner, *Rensselaer Polytechnic Institute*

Luncheon Address: Laura D'Andrea Tyson*, *Chairman, President's Council of Economic Advisors*

The Ferment in Science & Technology Policy (Panel)

- ✦ A Policymaker's Perspective on the Social Accountability of Science
- ✦ The PCAST Report and the Role of Research-Intensive Universities
- ✦ Academic Science and Demands for Accountability

Major R&D Agency Budgets for FY 1994 (Concurrent small group sessions)

✦DOD ✦DOE ✦ NASA ✦ NIH ✦ NSF

** Invited speaker*

Friday, 16 April

Breakfast Address: Tom Hockin*, *Minister of Science, Canada*

Concurrent Symposia

- ✦ Manufacturing: Issues and Policies
- ✦ Restructuring Environmental R&D
- ✦ Defense Conversion: The Changing Roles of Defense and Civilian Resources

Luncheon Address: George E. Brown, Jr., *Chairman, Committee on Science, Space, and Technology, U.S. House of Representatives*

Closing Remarks: Richard S. Nicholson, *Executive Officer, AAAS*

Budget discussions will be supplemented by ***AAAS Report XVIII: Research and Development, FY 1994,*** a comprehensive analysis of the proposals for the FY 1994 budget, prepared by AAAS and a group of its affiliated scientific, engineering, and higher education associations. Registrants will receive this report following the Colloquium (due to the late release of the President's budget); the 1993 ***AAAS Science and Technology Policy Yearbook*** (containing most of the colloquium addresses, plus other significant items) in late summer; and ***Congressional Action on R&D in the FY 1994 Budget*** in the fall.

Register now by completing and returning the enclosed form. For further information, contact: Directorate for Science and Policy Programs, 1333 H Street, NW, Washington, DC 20005; (202) 326-6600.

Advance Registration Form

AAAS Colloquium on Science & Technology Policy

15–16 April 1993 ✦ The Capital Hilton ✦ Washington, DC

Please print or type:

Mailing Address:

Name _____
(last name first)

Institution/Company _____

Street address _____

City _____ State _____

Zip _____ Phone # _____

❑ Check here if you need special services due to a disability.

To register by mail *(25 March deadline[1]),* send this top half (registration form) to: Registration, AAAS S&T Policy Colloquium, P.O. Box 630285, Baltimore, MD 21263.

To register by FAX *(25 March deadline[1]; VISA or MasterCard only),* send this top half (registration form) to 202-289-4021.

To register by phone *(25 March deadline[1]; VISA or MasterCard only),* call 202-326-6600 (9am – 5pm Eastern Time).

[1] **Deadline for advance registrations** is 25 March 1993. Thereafter, register in person at the Capital Hilton beginning at 8:00 am, 15 April. On-site registration fees are $15 higher than advance registration fees. [2] **Special rates:** Nonprofit rates apply only to employees of government, academic, and nonprofit organizations. Student rates apply only to full-time undergraduate and graduate students and retirees. [3] **Refund requests** for registration fees and meal tickets must be submitted in writing (to the address or FAX number above) by 8 April 1993 and will be processed after the Colloquium; no refunds will be made on cancellations received after 8 April. [4] **Publications:** All registrants receive *AAAS Report XVIII: Research & Development, FY 1994*; the 1993 *AAAS Science and Technology Yearbook,* after the meeting; and *Congressional Action on R&D in the FY 1994 Budget* in the fall. [5] **Program materials** will be mailed to those who preregister by 25 March.

Registration Fees

Regular	$200	$ _____
Nonprofit[2]	$150	$ _____
Student[2]	$ 50	$ _____

Meal Tickets

Lunch (Thur 15 Apr)	$ 35	$ _____
Breakfast (Fri 16 Apr)	$ 18	$ _____
Lunch (Fri 16 Apr)	$ 35	$ _____
TOTAL AMOUNT		$ _____

Payment[3]

❑ Check enclosed ❑ VISA ❑ MasterCard
(no other cards accepted)

❑ Original institutional purchase order attached
(facsimile POs not accepted)

Card # _____

Expiration date _____

Signature _____

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The Capital Hilton Hotel Reservation Form

AAAS S&T Policy Colloquium ✦ 15–16 April 1993

(Reservations received after 25 March cannot be guaranteed)

Send confirmation to:

Name _____ Street _____

City _____ State _____ Zip _____ Phone # _____

Other occupants of room: Name _____ Name _____

Special housing needs: ❑ Wheelchair-accessible room ❑ Nonsmoking room ❑ Other _____

Room: ❑ Single (1 person, 1 bed) — $160* ❑ Double (2 persons, 1 bed) — $175* ❑ Twin (2 persons, 2 beds) — $175*

*Add 11% DC sales tax and $1.50 occupancy tax.

Arrival: Date: _____ Time: _____ **Departure:** Date _____ Time _____

Please list definite arrival and departure dates and times. Check-in time is 3:00 pm; check-out time is 12 noon.

Enclose check, made out to **The Capital Hilton,** for first night's room deposit or provide major credit card information:

Credit card type _____ Card # _____ Exp. date _____

Cardholder's signature _____

Mail bottom half (hotel reservation form) to: Reservations, The Capital Hilton, 16th & K Streets, NW, Washington, DC 20036