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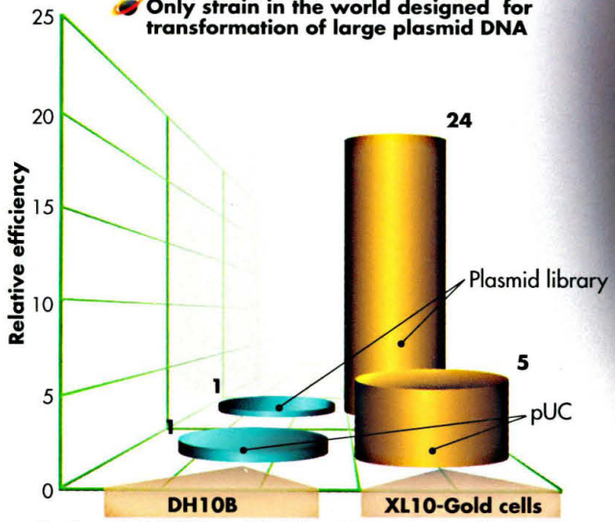
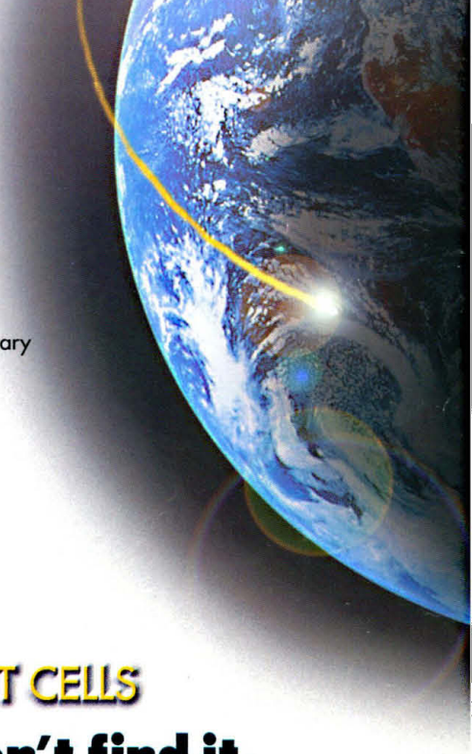
- **20- to 30-fold higher transformation efficiency of ligated DNA**
- **Only strain in the world designed for transformation of large plasmid DNA**



Equal amounts of pUC DNA or a cDNA ligation mixture were transformed into DH10B or XL10-Gold competent cells according to manufactures instructions. Efficiency (cfu/µg DNA) was calculated. Relative transformation efficiency for pUC and the cDNA ligation were determined seperately.



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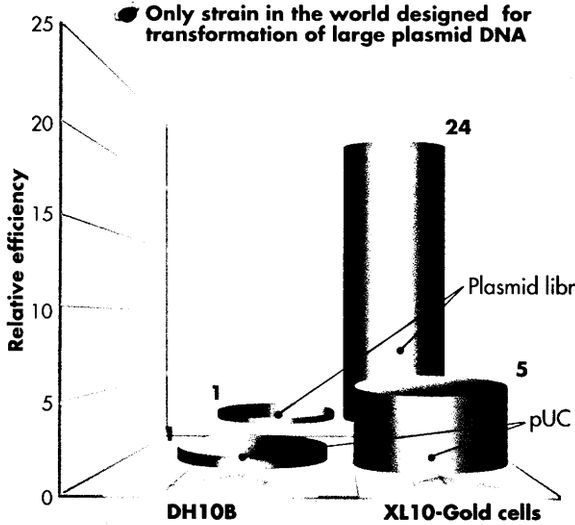

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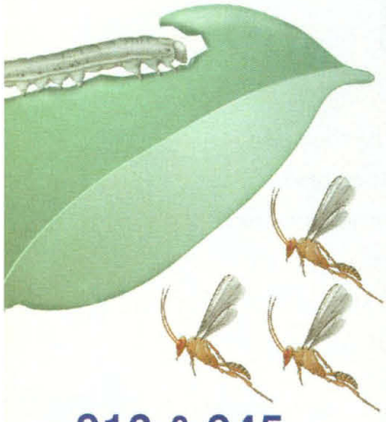
NRC at a crossroads



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NEWS

SPECIAL NEWS REPORT

PERSPECTIVES

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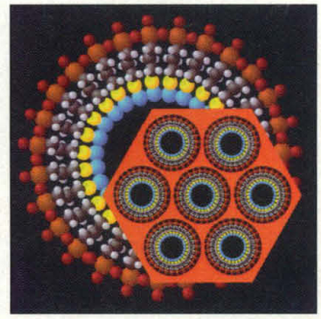
COVER

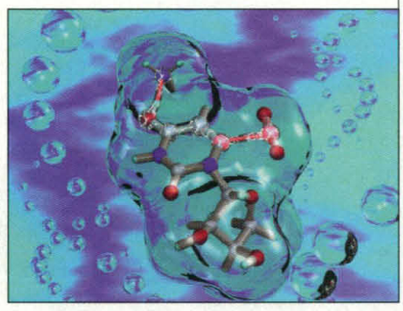
One of the well-preserved squash seeds (*Cucurbita pepo*) (13.8 millimeters long) excavated from Guilá Naquitz cave in Oaxaca, Mexico, that has been dated by the accelerator mass spectrometer carbon-14 technique. The seeds provide evidence that this plant species was first domesticated in Mexico 10,000 years ago. See page 932 and the News story on page 894. [Photo: Carl C. Hansen, National Museum of Natural History, Smithsonian Institution]

REPORTS

TECHNICAL COMMENTS



923
Organic films on mesoporous scaffolds



942
A radical environment

Indicates accompanying feature

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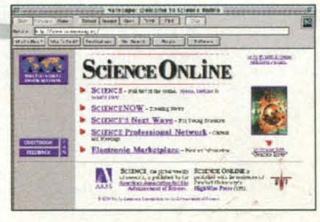
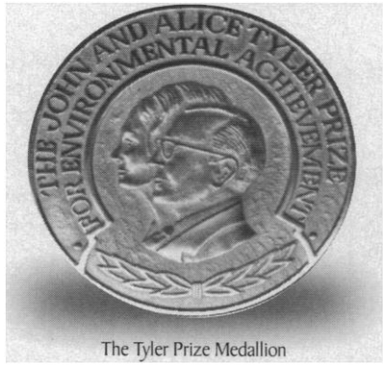


1997 Tyler Prize

for Environmental Achievement



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Dr. George B. Schaller

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From decades of field research in remote corners of the earth, this year's Tyler Laureates have provided the scientific community and millions of people in all walks of life with unparalleled insights into the behavior of large mammals, including man's closest non-human relatives, and a better understanding of the need to protect wildlife habitats.

Each has been a catalyst bringing international funds and expertise together with local governments to develop wildlife sanctuaries for the preservation of endangered species and fragile ecosystems.

Tyler Prize

The Tyler Prize was established in 1973 by the late Alice and John Tyler as an international award honoring significant scientific achievements in all disciplines of environmental research and environmental protection. The Tyler Prize is in the sum of $150,000, divided equally among the 1997 Tyler Prize Laureates.

The Tyler Prize is administered by the University of Southern California. Tyler Prize web site: http://www.usc.edu/dept/provost/Tyler_Prize/

THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Mesoporous materials

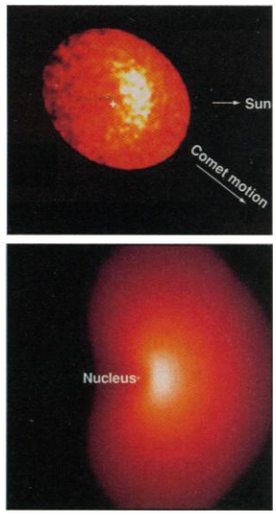
Two reports focus on mesoporous materials, which have cavity diameters of a few nanometers and which have potential applications in separations, and catalysis. Feng *et al.* (p. 923) were able to coat the inside of a mesoporous silicate with a functionalized organic layer. The coating contained thiol groups and made the material an efficient scavenger of mercury and other heavy metals from both aqueous and organic solutions. Most mesoporous materials are insulators that have amorphous wall structures. Tian *et al.* (p. 926) have synthesized a crystalline mesoporous manganese oxide that is semiconducting and highly thermally stable.

Hydrocarbons in the Kuiper belt

In the last 5 years, our view of the Kuiper belt, a band of objects just beyond the orbit of Neptune, has become clearer with the direct observation of about 40 objects. Detection of these distant objects is hampered by their small size and unknown composition. Brown *et al.* (p. 937) used the Keck I telescope to obtain a near-infrared spectrum of Kuiper belt object 1993SC and infer that the surface of 1993SC is composed of a hydrocarbon ice. The similarity of the spectrum of 1993SC to that of Pluto and Triton suggests a Kuiper belt origin for these bodies.

Comet x-rays and the solar wind

Comets were not considered to be strong x-ray emitters until they were observed recently from comet Hyakutake. Häberli *et al.* (p. 939) modeled the interaction of the solar wind with the cometary plasma. A three-



dimensional, single-fluid magnetohydrodynamic model reproduced the energy and shape of the x-ray emissions caused by charge exchange excitations of solar wind ions with neutral molecules or atoms in the comet's plasma.

Signaling to friendly troops

In an unusual interaction of three trophic levels, plants respond to attack by certain insects by calling in predators of these insects. Alborn *et al.* (p. 945; see the Perspective by Farmer, p. 912) have identified the chemical signal from a caterpillar that induces the wounded corn seedling to emit volatile signals attractive to parasitic wasps, the natural enemy of the caterpillar. This initial signal, volicitin, resembles precursors of eicosanoids and prostaglandins and may be part of the octadecanoid signaling pathway.

Started with squash

Recent radiocarbon dates have implied that agriculture in North America originated about 6000 years ago with the use of maize, beans, and other crops, although there have been earlier suggestions and some dates implying that the origin was perhaps 10,000 years ago. Smith (p. 932; see the cover and the news story by Roush, p. 894) analyzed and dated squash seeds, peduncles, and fruit rind fragments recovered from Archaic period deposits in Guilá Naquitz cave in Oaxaca, Mexico. The seeds are larger than wild types and, along with other features, imply that these seeds and fragments were from an early domesticated plant. The calibrated radiocarbon ages on the seeds and peduncle specimens vary up to about 10,000 years ago.

Uncommonly fast

The enzyme that catalyzes the conversion of orotidine 5′-monophosphate (OMP) to the corresponding uridine nucleotide, OMP decarboxylase, accelerates the rate of this reaction rate by several orders of magnitude. The origin of this unsurpassed acceleration, which occurs in the absence of metals or cofactors, has been unclear. Lee and Houk (p. 942), on the basis of quantum mechanical computations, propose that protonation of the substrate occurs in concert with decarboxylation to yield an unconventional stabilized carbene as an intermediate. This protonation can occur only within a nonpolar environment, which would account for the great advantage of the enzyme active site.

Inhibiting tyrosine kinases

Activity of protein tyrosine kinases contributes to stimulation of cell growth and can contribute to uncontrolled growth in cancer cells, and inhibitors of such enzymes may have therapeutic value. Mohammadi *et al.* (p. 955) present the crystal structure of the tyrosine kinase domain of the fibroblast growth factor receptor 1 with relatively specific inhibitors based on an oxindole group. Although the inhibitors bind to the adenosine triphosphate binding site that is similar in the various kinases, they preferentially inhibit certain kinases. The results reveal the structural basis of the specificity and may permit development of more effective inhibitors.

Contrasting result

The overall level of contrast in a visual scene can vary greatly, yet our sight adapts rapidly. How do we adjust our cortical neurons, which have limited contrast sensitivity, to operate within the appropriate range? Helmholtz studied the psychophysics of this phenomenon in the 19th century (see the Perspective by Barlow, p. 913), and physiological studies, carried out with extracellular electrodes, have led to theories of contrast gain control. Carandini and Ferster (p. 949) present data obtained from intracellular recordings that support an unexpected interpretation—chronic excitatory input is used to adjust neurons to the most recent average level of contrast. This mechanism functions independently from the well-known fluctuations in membrane potential that encode the changing visual scenery.

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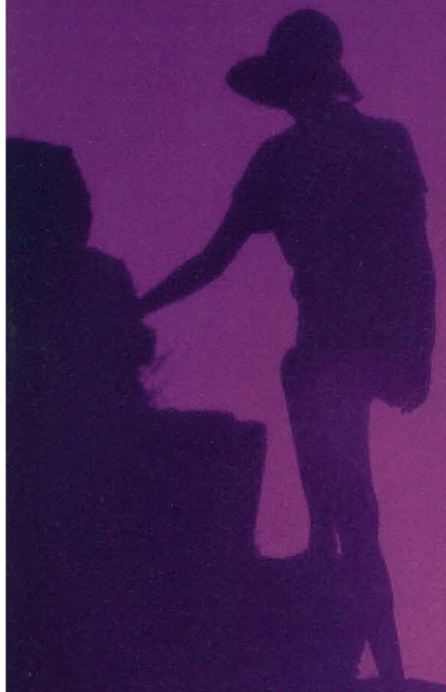

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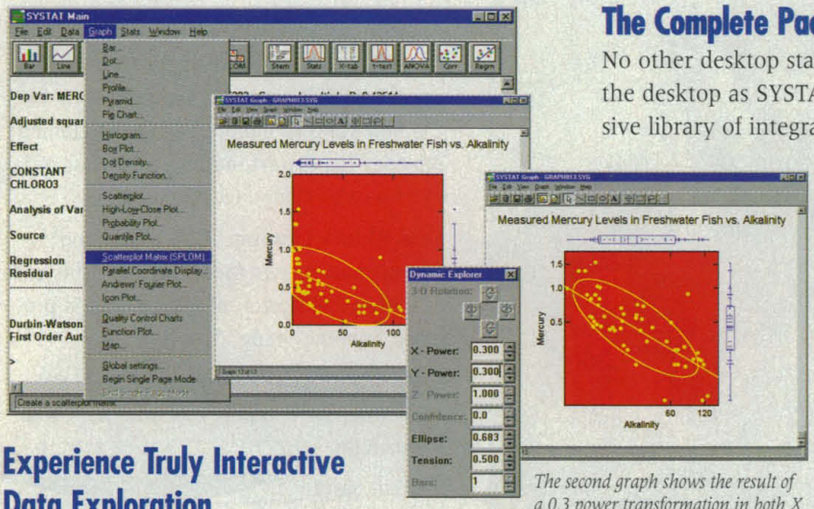

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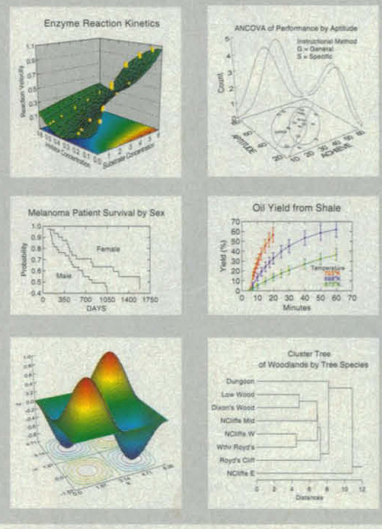

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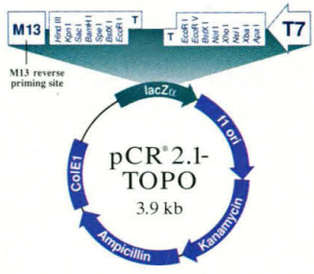

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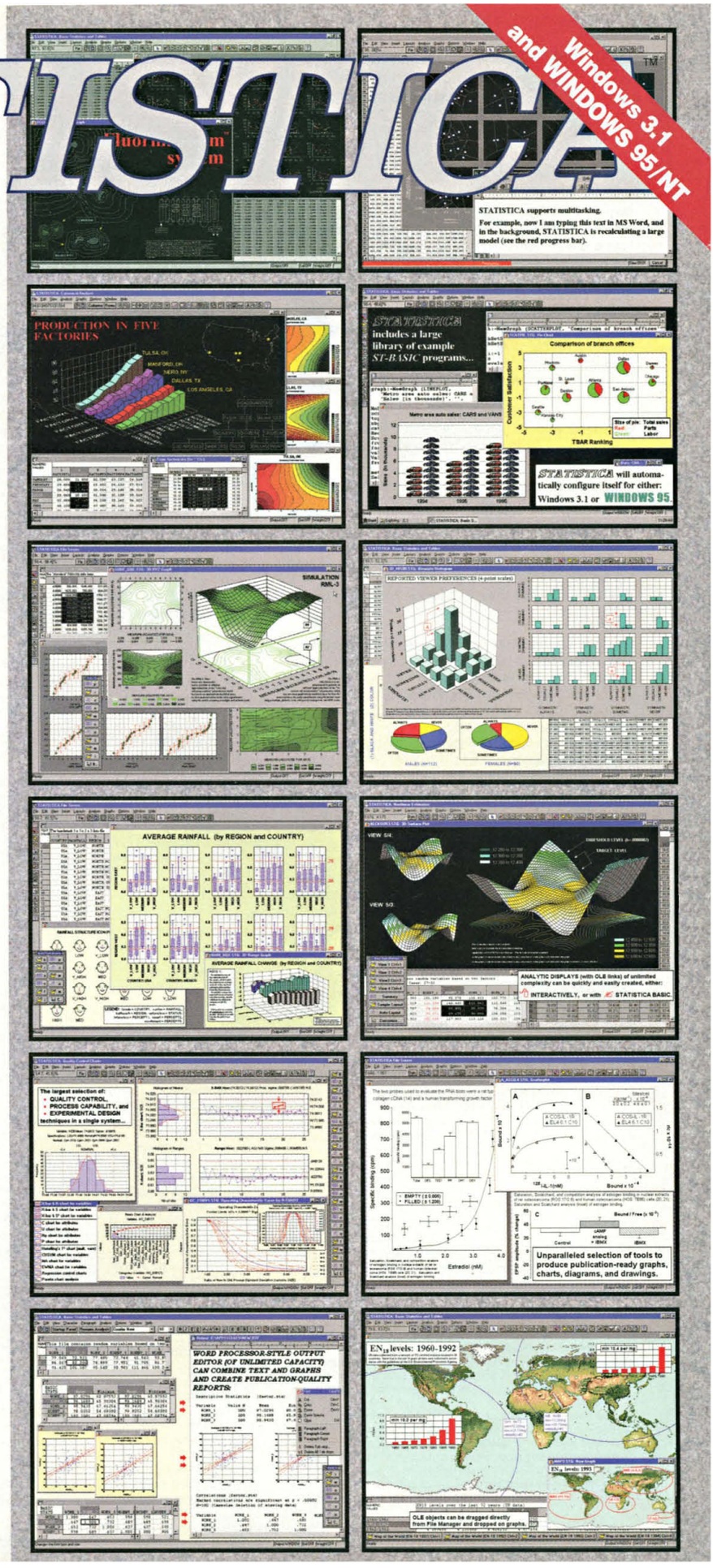

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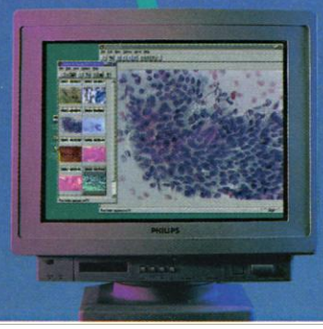

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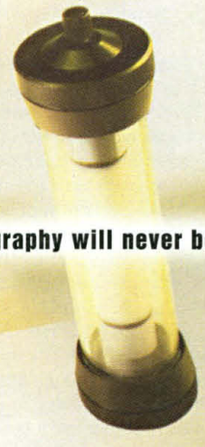

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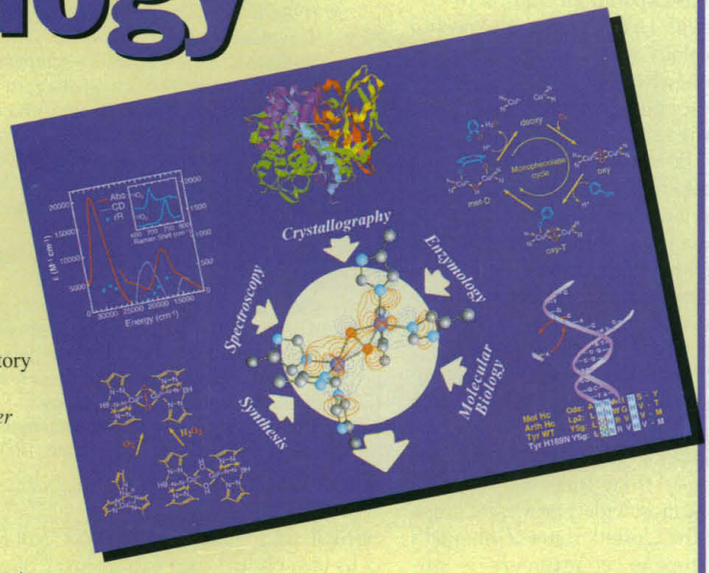

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