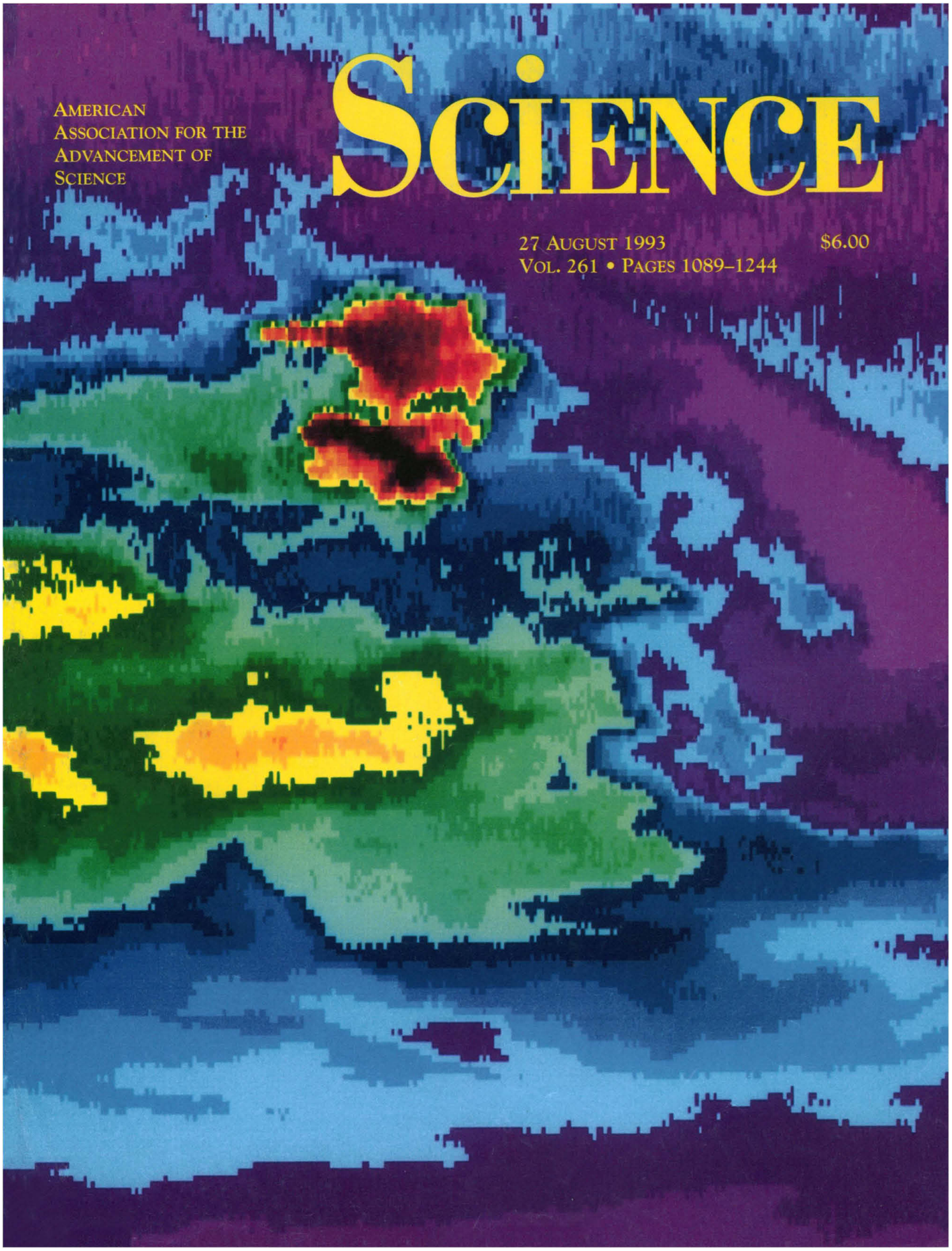

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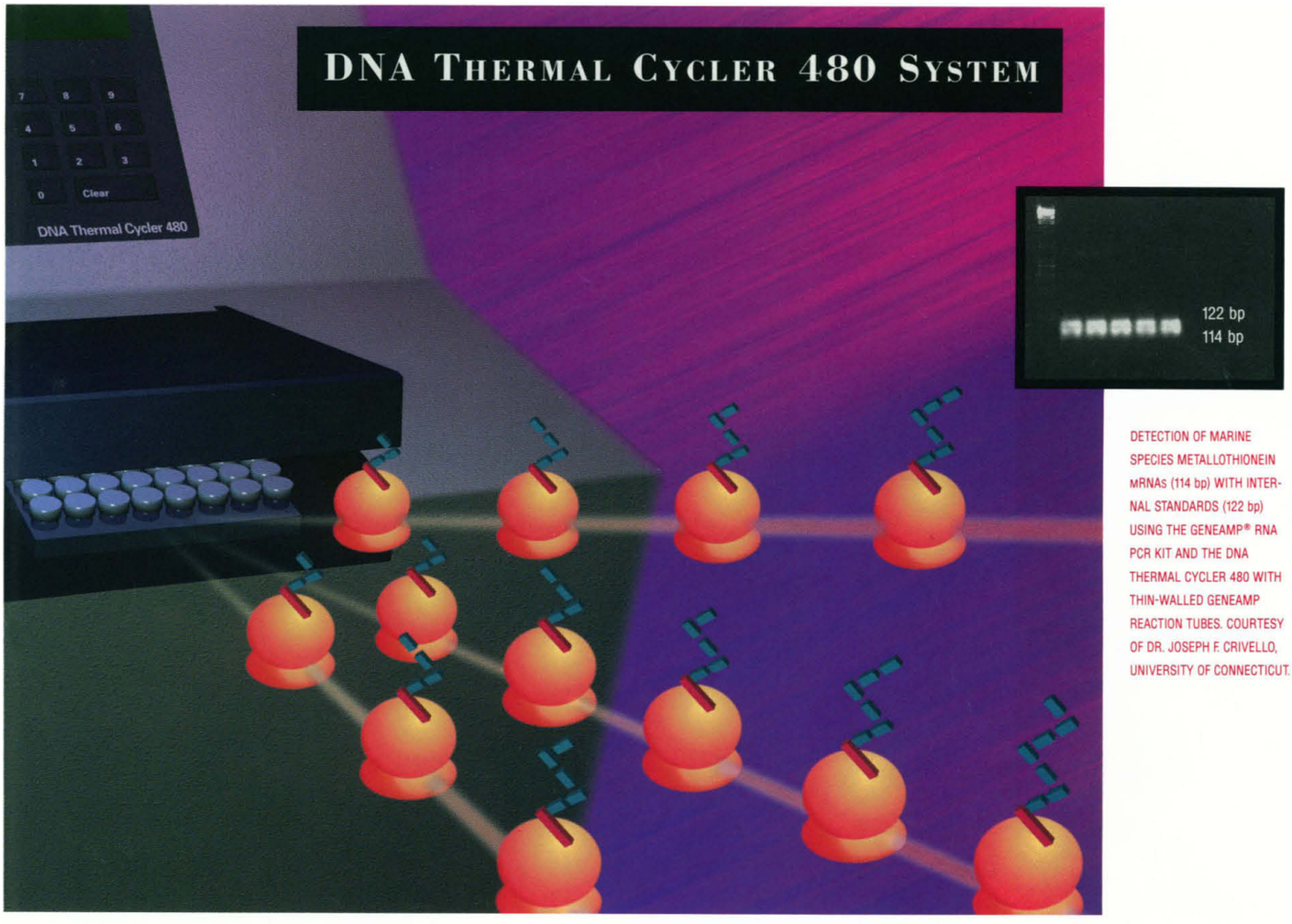

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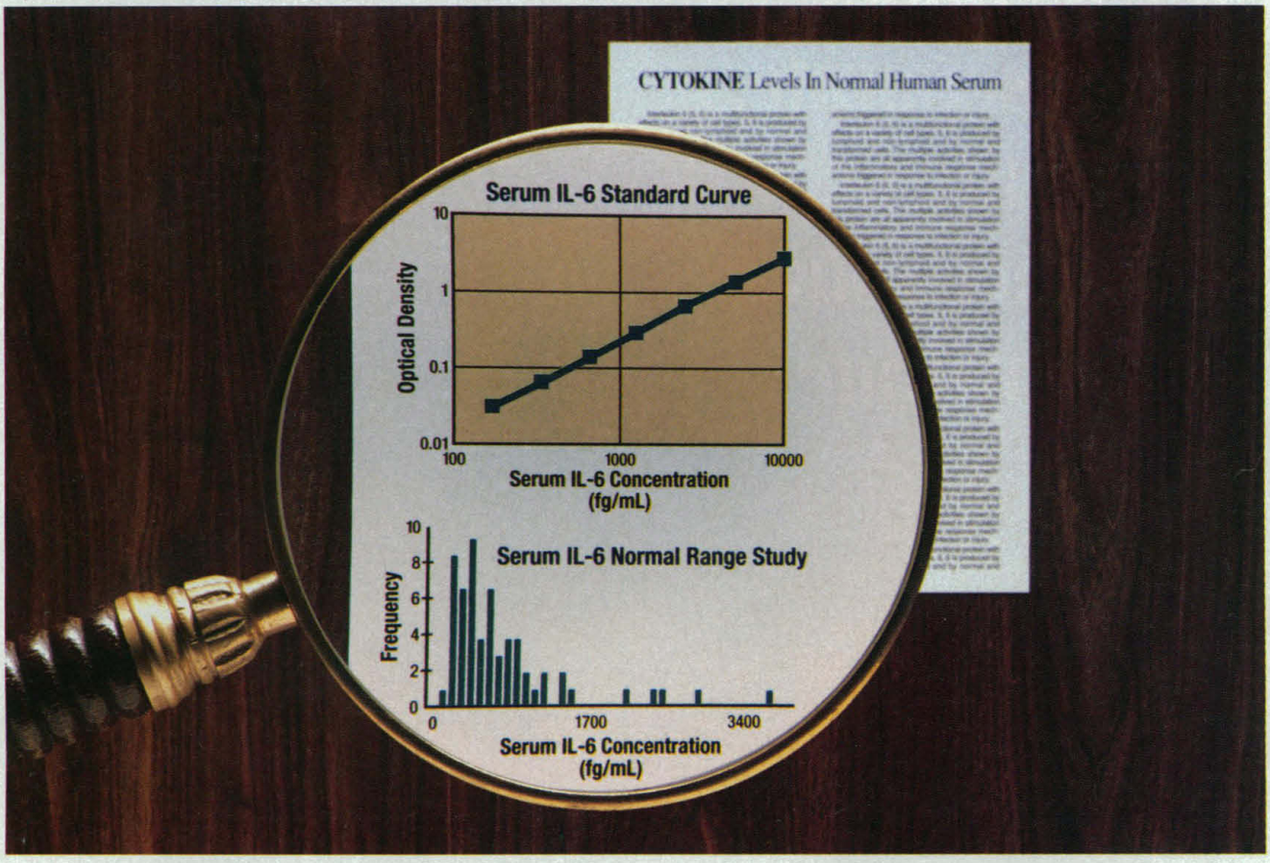

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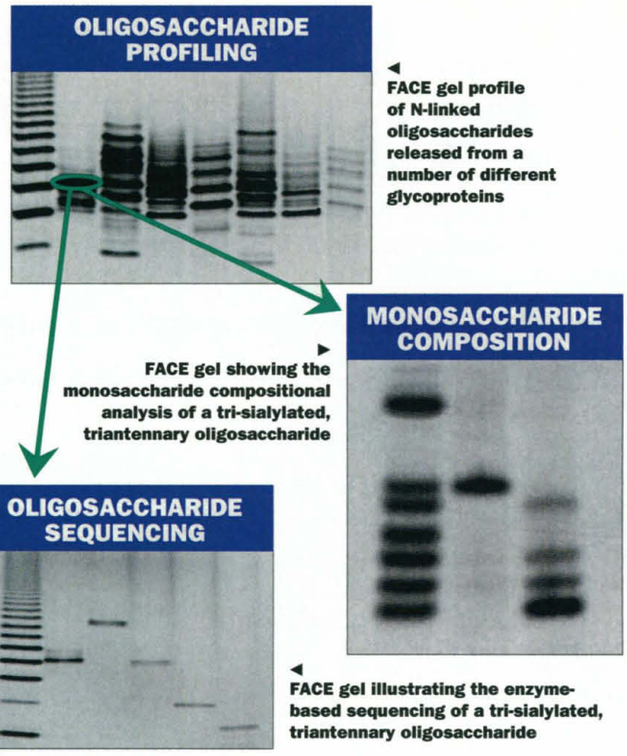

FACE gel profile of N-linked oligosaccharides released from a number of different glycoproteins

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FACE gel illustrating the enzyme-based sequencing of a tri-sialylated, triantennary oligosaccharide

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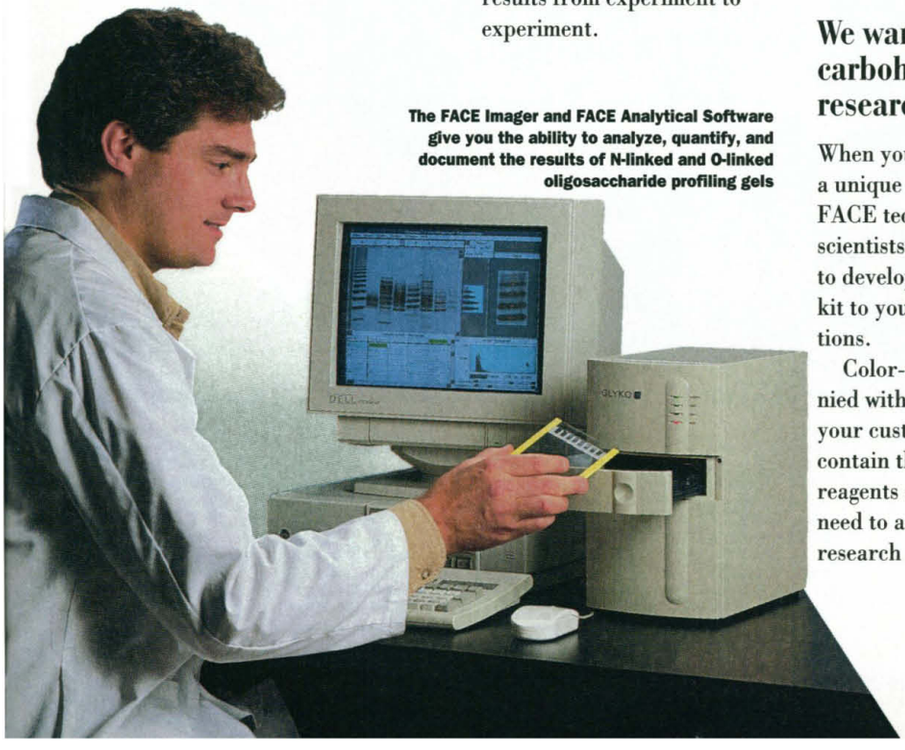

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1117
A leap for pharmacology

NEWS

SPECIAL NEWS REPORT

NIH AT A CROSSROADS

PERSPECTIVE

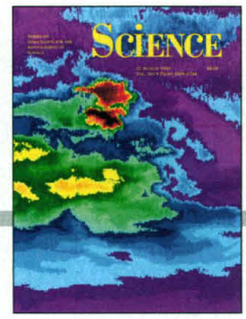
REPORTS

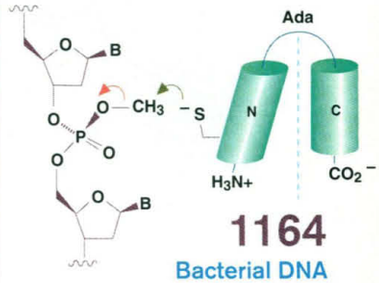
ARCTIC OZONE: AASE II OBSERVATIONS

DEPARTMENTS

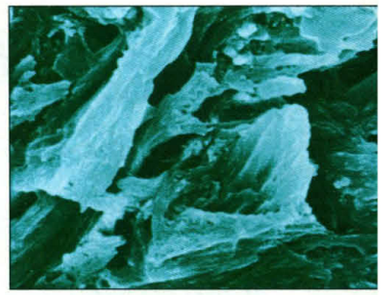
COVER

Stratospheric aerosol scattering (red, high; violet, low) from 11 to 25 kilometers across the Arctic vortex edge, measured on 16 January 1992 by AASE II. Aerosols from the Mount Pinatubo eruption were blocked from moving deep into the vortex. Isolation of air in the vortex resulted in a 23 percent ozone loss at 18 kilometers between January and March 1992. See page 1155 and related Reports beginning on page 1130; see also the Perspective on page 1128. [Image: E. V. Browell, NASA Langley Research Center]





1164
Bacterial DNA demethylation



1162
A dental record of diet

Indicates accompanying feature

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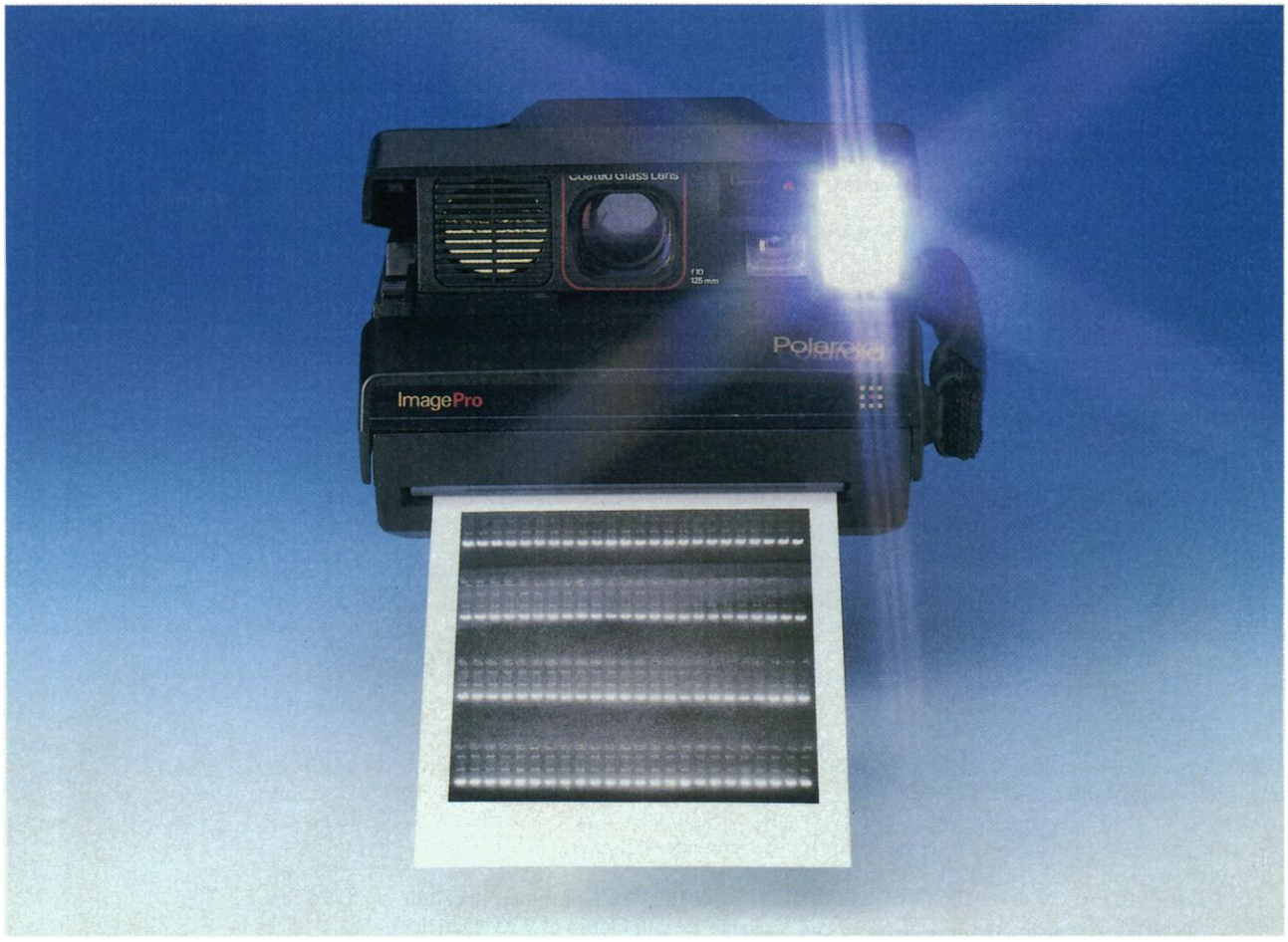

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THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Mantle anisotropy

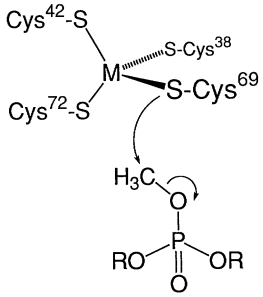
Deformation in the shallow mantle associated with the flow from ridges to trenches should induce an anisotropic fabric in its constituent minerals. Older fabrics would be preserved after a change in plate motions. Anisotropic fabrics should produce a variation in the propagation of seismic waves in different directions, but obtaining sufficient resolution has been difficult. Park and Yu (p. 1159) show that evidence can be obtained using long-period seismic waves (quasi-Love waves). Data for selected paths in the shallow mantle beneath the Pacific Ocean suggest that the anisotropy is horizontal and that fabrics rotate by 90° in a region east of the Tonga-Kermadec trench.

Dental records

Cementum bands in teeth, which are commonly preserved as fossils, have been used to infer age, but their origin has been obscure. Liebermann (p. 1162) demonstrates in a series of experiments that the bands can be produced by variations in collagen orientation or collagen mineralization. The teeth of goats that were fed either hard or soft diets were examined by scanning electron microscopy, which revealed that orientation reflects the magnitude and frequency or forces involved in chewing. Bands were also produced when growth of teeth slowed in response to a diet low in protein and minerals. Thus, the bands can be used to infer life history as well as age.

Zinc to the rescue

In *Escherichia coli*, the Ada enzyme repairs certain types of DNA damage caused by inadvertent methylation, including methylation of phosphates. Myers *et al.* (p. 1164) studied a cadmium variant by nuclear magnetic resonance spectroscopy and show that zinc activates nucleophilic attack by the



Cys^{69} residue of Ada. This reaction irreversibly transfers the phosphate methyl group to Ada; a His^{69} variant was inactive. The zinc atom may also participate in the subsequent conformation change that converts Ada into a DNA binding protein.

Collagen genes and tumorigenesis

About half of the patients with X-linked Alport syndrome, a disorder marked by defects in basement membrane components, carry deletions in the α5 type IV collagen gene. A subset of these patients also inherit benign smooth muscle tumors. Zhou *et al.* (p. 1167) found that patients affected with both disorders carry deletions that straddle the α5 type IV collagen gene and a second, previously unidentified, type IV collagen gene located nearby. This finding suggests that collagen may help regulate the differentiation of smooth muscle cells.

Chemistry and dynamics of Arctic ozone

The second Arctic Airborne Stratospheric Experiment (AASE II) involved a series of aircraft flights into the Arctic vortex from fall 1991 to spring 1992 to study the dynamics and chemistry of ozone destruction in situ. The timing of the mission was particularly interesting because the effect of sulfate aerosols from the Mount Pinatubo volcanic eruption could be studied. The major results of AASE II are reported in a series of eight papers (pp. 1130 to 1158). One highlight is that the in situ measurements allow the history of reactions in air packets to be reconstructed as air descended in the Arctic vortex and ice particles formed and melted. Rodriguez, in a Perspective (p. 1128), summarizes the results in light of other recent missions to both the Arctic and larger Antarctic ozone holes and discusses the implications for our understanding of ozone chemistry at midlatitudes.

RNA virus ribonuclease

Viral genomes not only encode structural coat proteins but also encode enzymes, such as proteases, which can serve as targets for drug therapies. Surprisingly, a viral coat glycoprotein has been found that also acts as an enzyme. Schneider *et al.* (p. 1169) studied the protein products of an RNA virus from the *Pestivirus* genus, classical swine fever virus, and showed that the secreted form of one of the three structural glycoproteins, E0, is a ribonuclease (RNase). The primary sequence of E0 is similar to that of certain fungal and plant RNases, and its RNase activity is highly specific for uridine and could be inhibited by zinc ions. The apparent role of E0 is not to act on its own RNA; instead, the target of this secreted RNase is probably cells of the host immune system.

Promoting diversity

Assembly of variable region genes in V(D)J recombination is frequently accompanied in adults by the addition of N regions, nucleotides that are added at segment junctions. In prenatal and newborn animals, N regions are rarely seen. Reports by Komori *et al.* (p. 1171) and by Gilfillan *et al.* (p. 1175) show that adult mice whose stem cells lack the gene for terminal deoxynucleotidyl transferase (TdT) have few N regions in their T cell receptors or immunoglobulin molecules. However, extensive homology-directed recombination occurs, suggesting that TdT also inhibits this process.

Selective HIV transmission

Although an individual infected with the human immunodeficiency virus–type 1 (HIV-1) may harbor several viral phenotypes, a selection mechanism apparently operates during viral transmission. Zhu *et al.* (p. 1179) found that viral phenotypes of five seroconverted individuals were of the type that replicated in macrophages rather than in T cells and that did not induce syncytium formation. For two patients for which the phenotypes of their sexual partners could be identified, the gp120 sequences matched best with minor variants found in the transmitters. These results may refocus vaccine development strategies, which mainly focus on syncytium-inducing and T cell–trophic HIV-1 strains.

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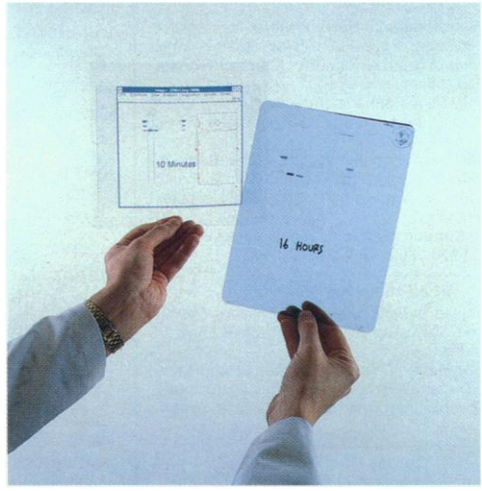

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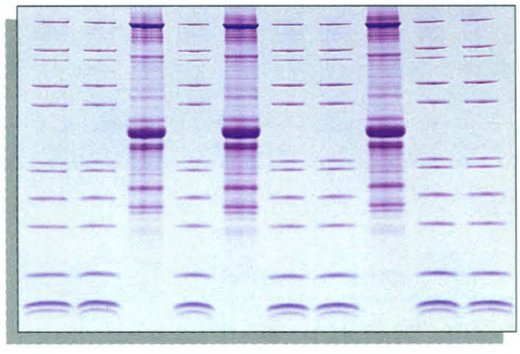

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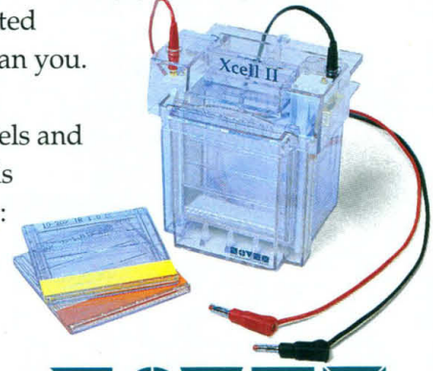

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Actual image: 10-20% Tricine Gel, lanes 1,2,4,6,7,9,10: Mark12™ standard (2.5kDa-200kDa), lanes 3,5,8: Turkey Muscle Extract

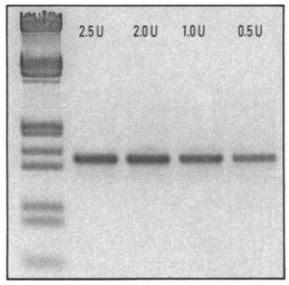
Circle No. 21 on Readers' Service Card

Specific purpose

The sharply curved bill of the white-tipped sickle-billed hummingbird is specifically adapted to probe the delicate tubular flowers of heliconia plants for the nectar on which the creature survives.

High-performance Boehringer Mannheim *Taq* DNA polymerase is designed and tested with an equally specific goal in mind: to produce absolutely specific amplification products in your polymerase chain reactions.

Each lot of *Taq* polymerase undergoes a unique self-priming assay to assure that the enzyme is essentially free of endogenous DNA fragments. Additional testing makes sure that contaminating exonucleases and endonucleases are also not present.



Specific amplification of a single-copy β-globin gene (1.5 kb) from 100 ng of human genomic DNA using various unit (U) quantities of Boehringer Mannheim *Taq* polymerase.

The highest levels of product purity are provided so that you achieve specific, high-yield amplification with no background and no false priming.

Licensed to perform

Choose Boehringer Mannheim *Taq* polymerase with confidence because Boehringer Mannheim is now a fully licensed supplier of PCR products, and your purchase conveys to you a license to perform PCR for research purposes.

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AAAS 1993 Mentor Awards Call for Nominations

The American Association for the Advancement of Science (AAAS) invites nominations for the 1993 Mentor Awards. The two categories are *Lifetime Mentor Award* and *Mentor Award.* These annual awards honor individuals who, during their careers, demonstrate extraordinary leadership to increase the participation of women of all racial/ethnic groups; African American, American Indian, and Hispanic men; and/or people with disabilities in science and engineering fields and careers.

A prize of $5000 and a commemorative plaque for the *Lifetime Mentor Award* will recognize an individual who has mentored and guided significant numbers of students from these underrepresented groups to the completion of doctoral studies and/or who has impacted the climate of a department, college, or institution to significantly increase the ethnic diversity of students pursuing and completing doctoral studies. This individual will have served in such a role for 10 years or longer.

The *Mentor Award*, a prize of $2,500 and a commemorative plaque, will recognize an individual who has mentored a significant number of students over a period of less than 10 years.

Such commitment and extraordinary effort may be demonstrated by:

- the number and diversity of students mentored.
- assisting students to present and publish their work, to find financial aid, and to provide career guidance.
- providing psychological support, encouragement, and essential strategies for life in the scholarly community.
- continued interest in the individual's professional advancement.

The 1992 AAAS Mentor Award recipient was Dr. Abdulalim A. Shabazz, Professor and Chair of the Mathematical Sciences Department of Clark Atlanta University.

For more information or an application, please contact Yolanda S. George at AAAS, telephone (202) 326-6670.

The Awards will be presented during the Association's Annual Meeting in San Francisco in February 1994.