



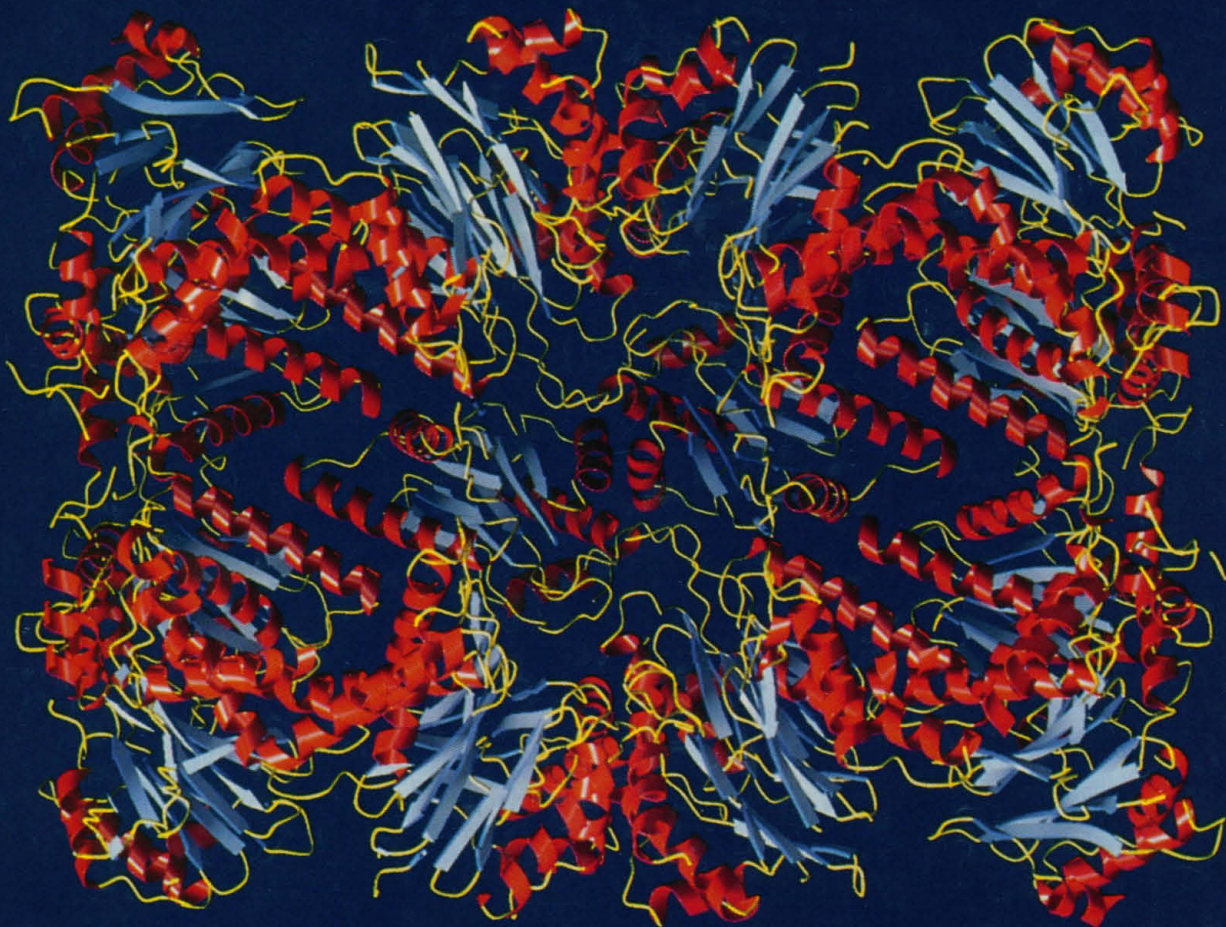
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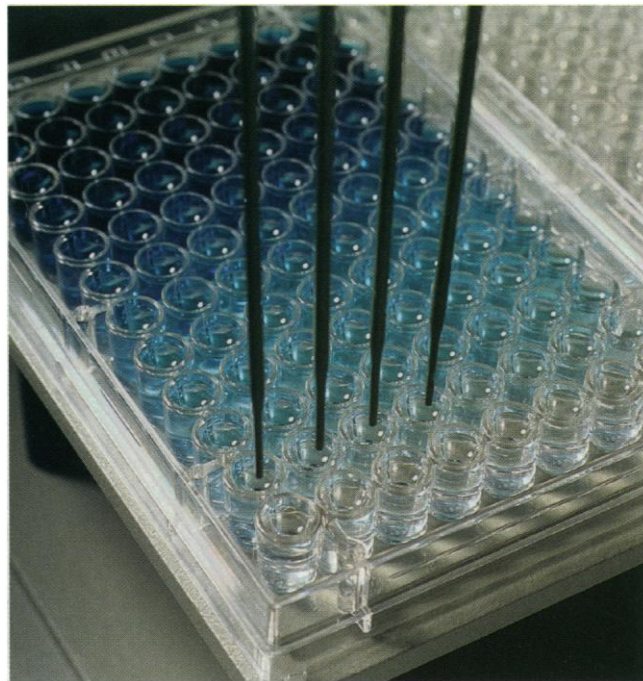
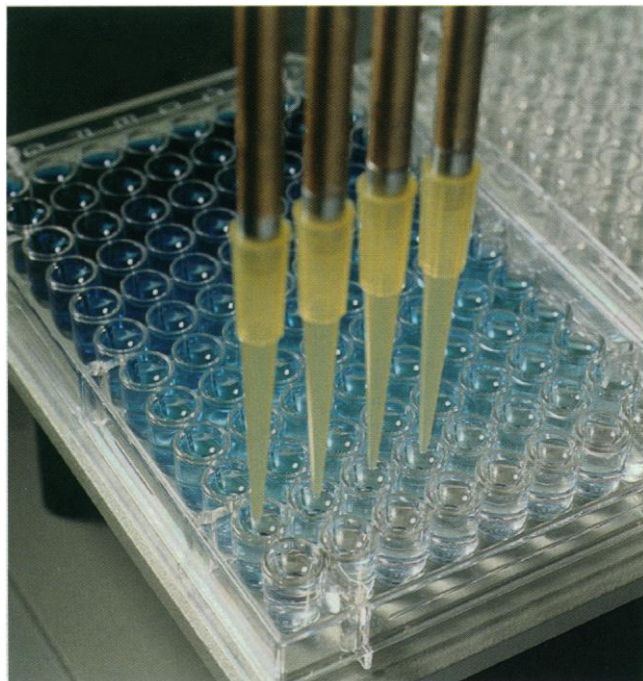
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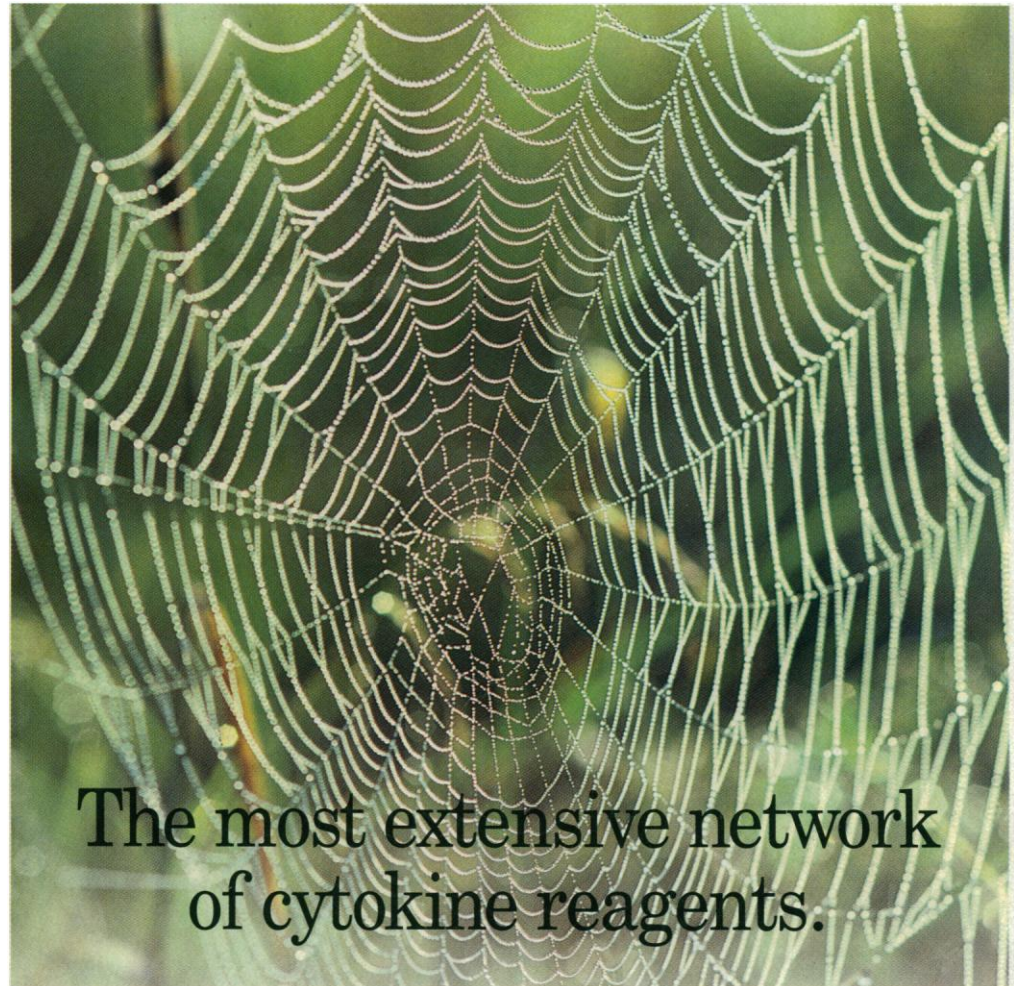
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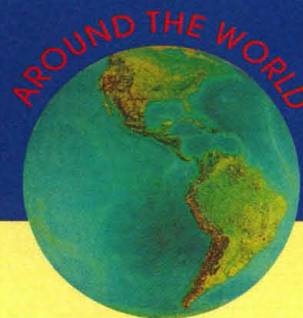
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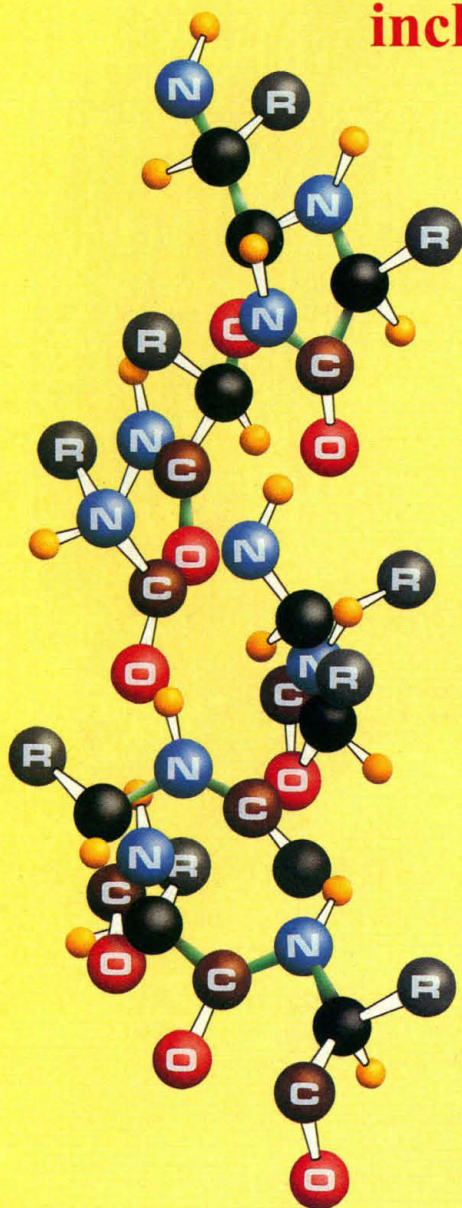
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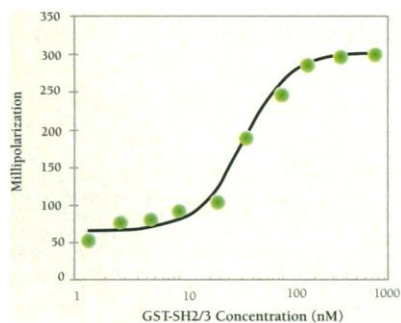


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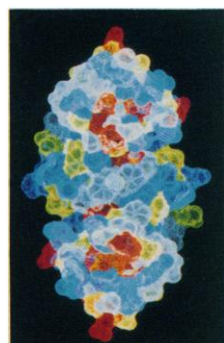
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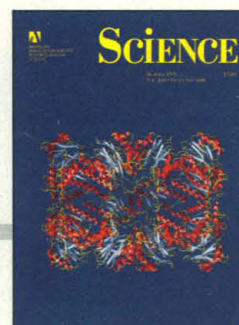
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Ribbon drawing of the 20S proteasome from the archaeobacterium *Thermoplasma acidophilum* as revealed by x-ray structure at 3.4 Å. The cross section of the protease complex (consisting of 28 subunits) shows a penetrating channel with three large cavities. Access to the inner cavity, which contains the 14 active sites, is

controlled by narrow constrictions that allow only unfolded proteins to be cleaved. See page 533, related Perspectives beginning on page 522, and the Report on page 579. [Graphic and photo: J. Löwe, D. Stock, and R. Huber at Max-Planck-Institut für Biochemie]



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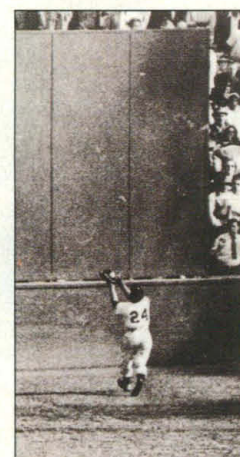
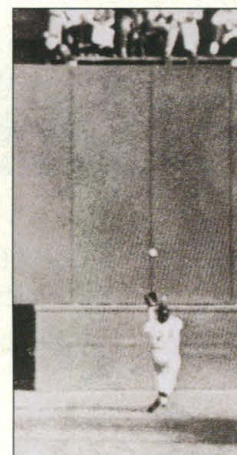
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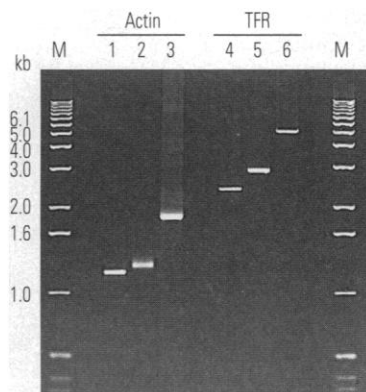
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(AD53021)

# THIS WEEK IN SCIENCE

edited by DAVID LINDLEY

## Green growth

In developed countries, some measures of pollution have fallen with rising affluence, perhaps suggesting that economic growth is the answer to the world's environmental problems. But continued economic growth, as Arrow *et al.* (p. 520) observe, will run up against global resource limitations, necessitating active environmental management.

## Industrial adaptation

As the U.S. defense budget has fallen, it has been suggested that companies that prospered in the defense industry will be ill-equipped to shift into the commercial world. Kelley and Watkins (p. 525) show, however, that the majority of companies active in defense manufacturing also have substantial commercial operations. Industries with a history of defense manufacturing seem moreover to be better prepared to take advantage of technological innovations.

## Buried evidence

Igneous meteorites are thought to have formed by the melting and differentiation of chondritic parent bodies, a connection bolstered by isotopic similarities between silicates in the IIE class of



iron meteorites and in H-chondrites. Casanova *et al.* (p. 540) provide direct evidence of this connection in the form of an unmelted chondritic inclusion of type H in the iron meteorite

## The flycatcher's strategy

Baseball players agree that a ball hit directly toward them in the outfield is harder to track and catch than a ball hit to one side or the other. McBeath *et al.* (p. 569; see also news by Cipra, p. 502) build on this empirical fact to propose that an outfielder catches a fly ball by running to it on an arc that gives the ball an apparently straight trajectory against the sky or the stands. Compared to an earlier model in which fielders were supposed to move so as to give the ball an apparently constant vertical acceleration, this strategy relies on the much simpler perceptual task of discriminating between straight and curved paths. The model explains why fielders do not guess where the ball will land and run there but move smoothly to arrive at the desired spot at the same time as the ball.

Techado. Collisions between partially melted chondritic parents, with subsequent mixing and burial of fragments, may explain this unusual inclusion.

## Software

Hard computational problems may be solvable by encoding the computation into sequences of DNA and letting biochemistry sort out the answer. The huge parallelism of reactions in solution might offer ways to attack problems for which no general algorithm is known. Lipton (p. 542) reports a theoretical extension of Adleman's original demonstration (*Science*, 11 Nov. 1994, p. 1021) to a wider class of problems, notably the classic satisfiability problem of Boolean logic. Several correspondents (p. 481) have commented on Adleman's work, while Baum (p. 583) suggests that DNA might be used to create a powerful content-addressable associative memory. See also news by Pool (p. 498).

## Early dinner

Although it is well established that modern humans originated in Africa around 100,000 years ago, and subsequently spread

elsewhere, the time and location of the appearance of tool use and social organization have been harder to pin down. Two studies of a site in the Upper Semliki Valley of Zaire (Brooks *et al.*, p. 548; Yellen *et al.*, p. 553; see also news by Gibbons, p. 495) reveal sophisticated tools in association with fish and animal remains. Dating of the remains and associated rock strata shows that this early society flourished about 90,000 years ago, indicating that modern human behavior can also be traced to an African origin.

## Insult to injury

Many studies have shown that neurotrophins can prevent or inhibit neuronal death induced by a variety of insults such as serum deprivation. An analysis of cultured mouse cortical neurons by Koh *et al.* (p. 573) indicates that the protective effect of neurotrophins may depend on the nature of the insult. When neurons were induced to die by means of oxygen-glucose deprivation, the addition of neurotrophins potentiated, rather than inhibited, cell death. These results sound a note of caution about the therapeutic use of neurotrophins for certain forms of brain injury.

## Sos: No help needed

Activation of the guanine nucleotide binding protein Ras is critical for signal transduction from receptor tyrosine kinases. Ras is activated by the protein Sos, a guanine nucleotide exchange factor. Karlovich *et al.* (p. 576) have dissected the function of various domains of Sos in the development of the *Drosophila* eye. Although Sos is known to interact with the receptor tyrosine kinase Sevenless through the linker protein Drk, it now appears that Sos can interact with Sevenless and localize to the plasma membrane without the help of Drk. Whereas the NH<sub>2</sub>-terminus of Sos is essential for the protein's function, the COOH-terminus of the molecule may inhibit the activity of the catalytic domain, and this inhibition may be relieved when Sos binds to Drk.

## Fragmentary vaccine

Strains of mice susceptible to the parasitic disease *Leishmania major* can be protected by some, but not all, parasite-specific CD4<sup>+</sup> helper T cells. A key question is how to induce the particular T cells that will provide protection. Mougneau *et al.* (p. 563) used a complementary DNA library to identify a 36-kilodalton protein as an antigen capable of eliciting a protective response. Similar proteins were found to be expressed in the course of infection by other *Leishmania* species, and a 24-kilodalton fragment of the antigen was effective as a vaccine when administered in conjunction with interleukin-12. A number of infectious diseases have similar CD4-dependent T cell responses, so that vaccines against them might also be made by the same strategy.

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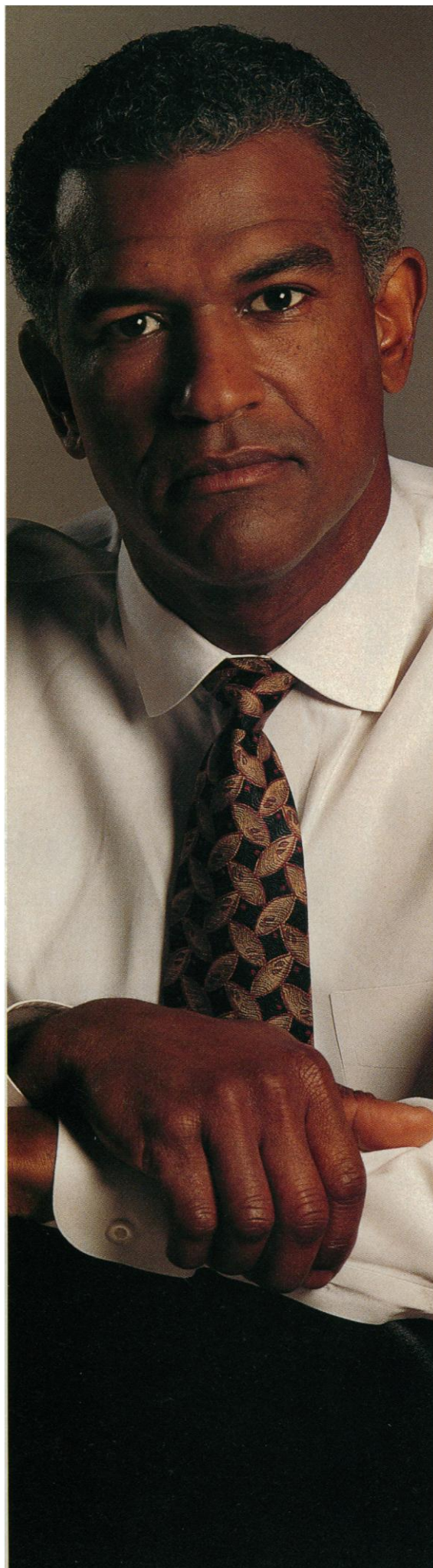
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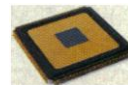
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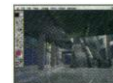
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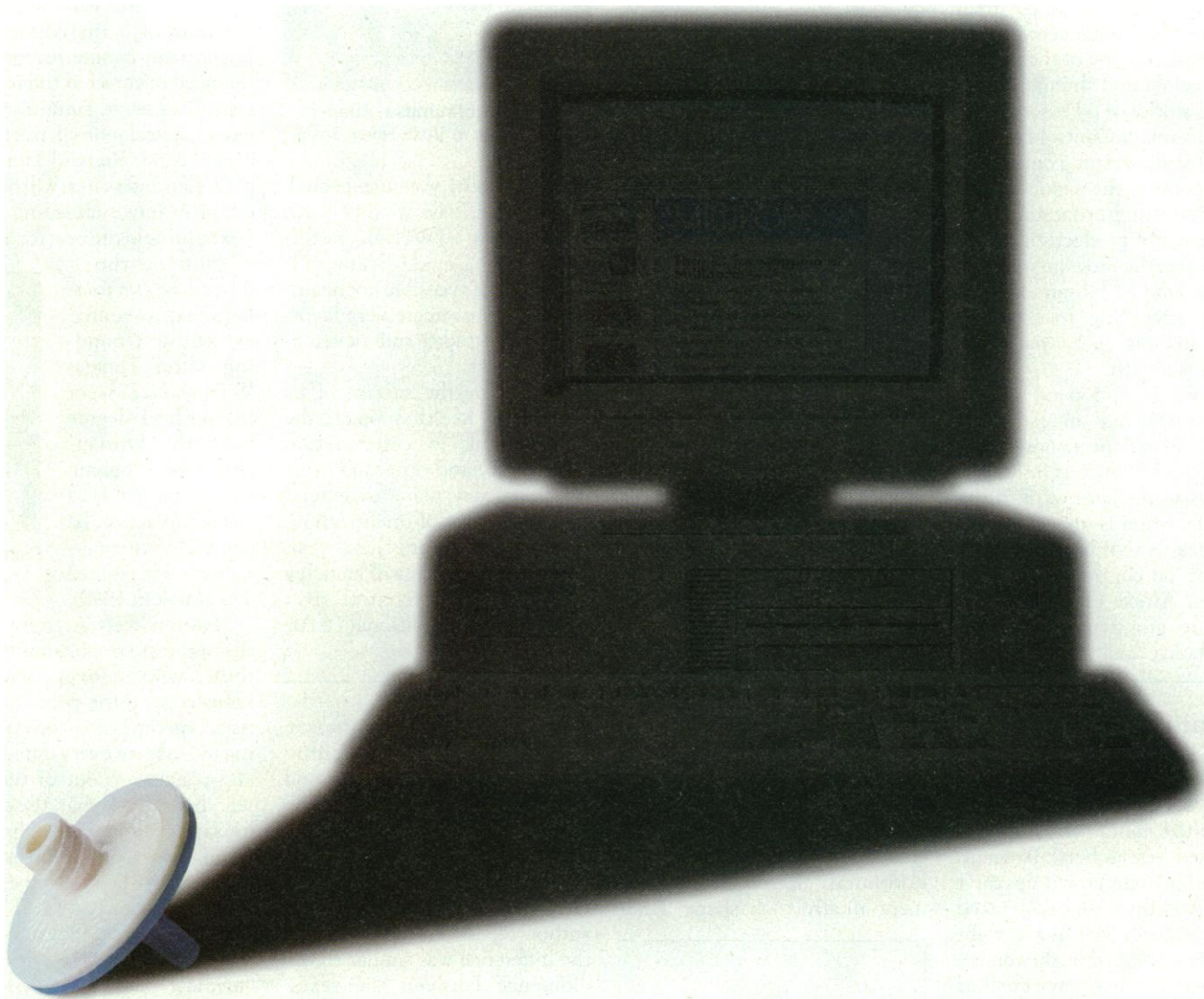


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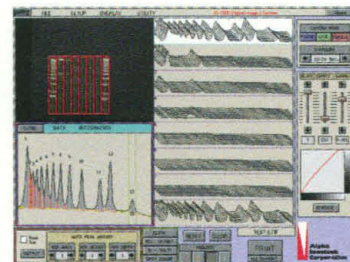
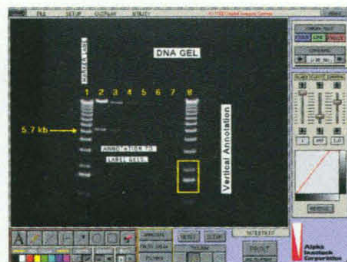
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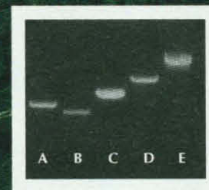
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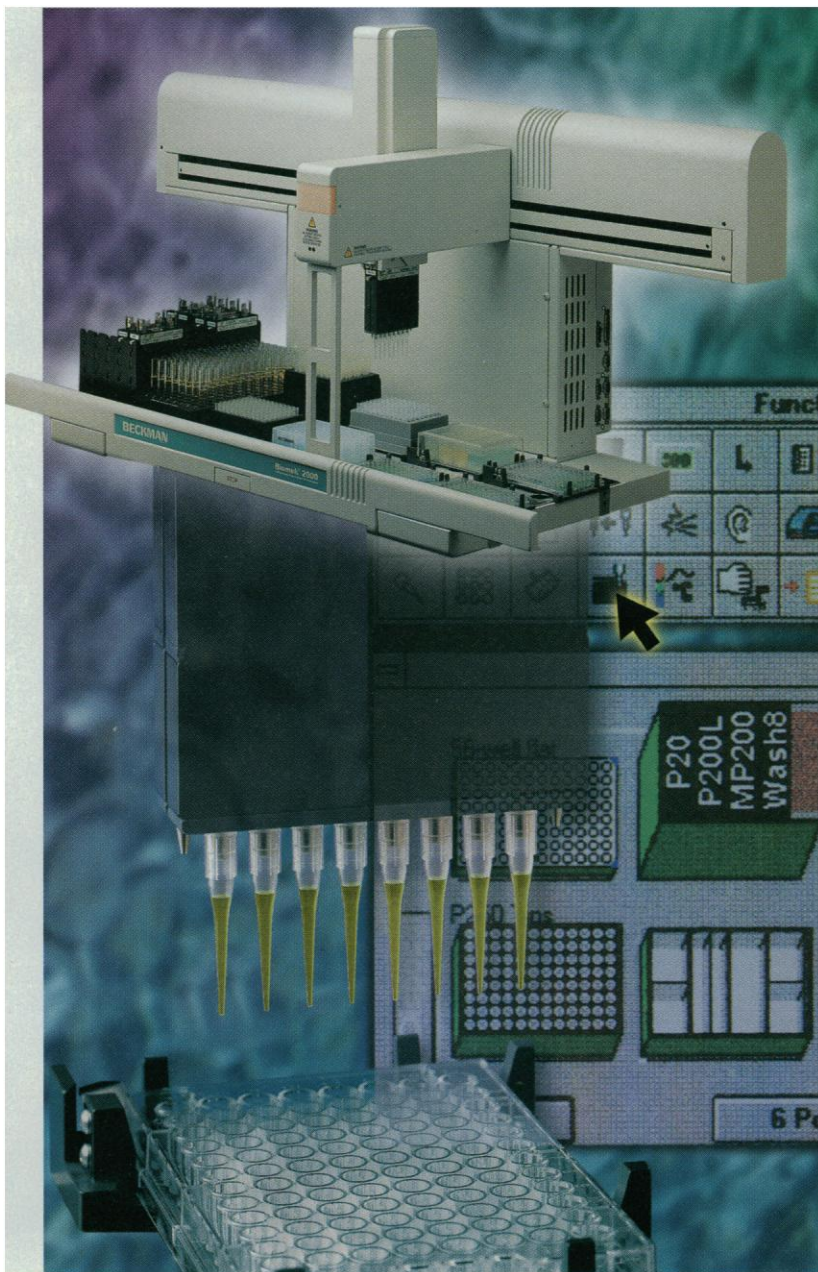
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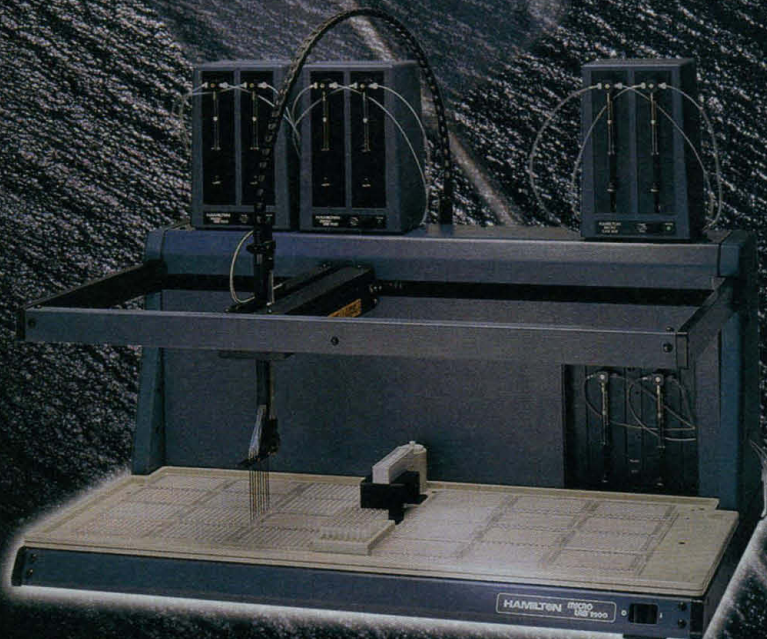
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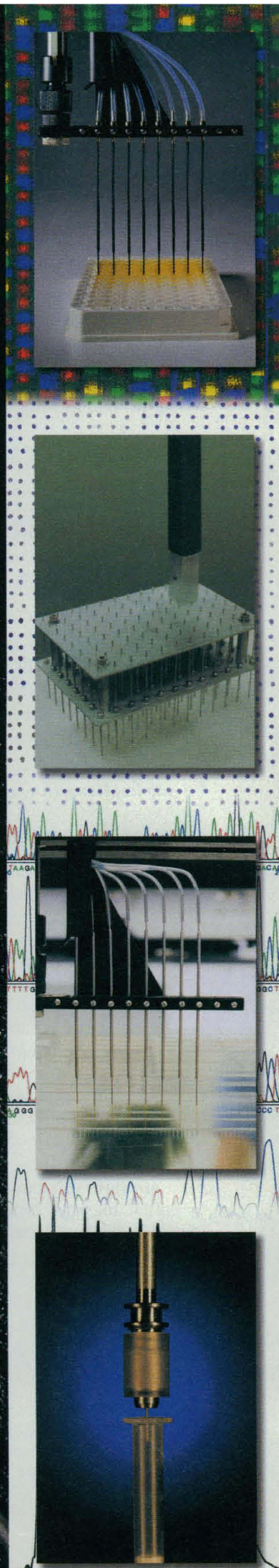


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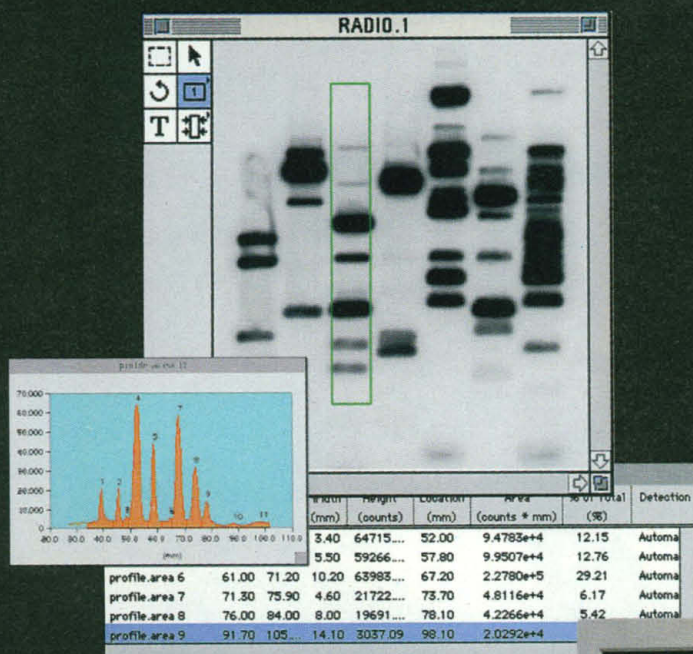
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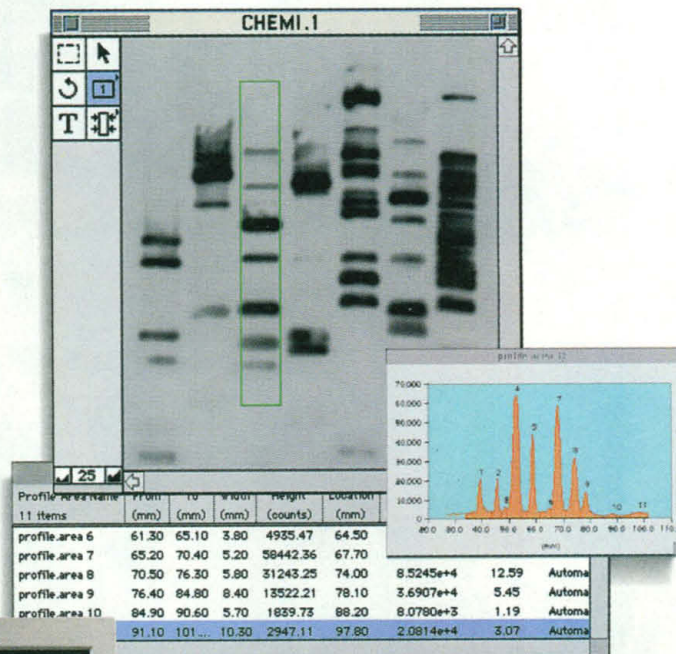
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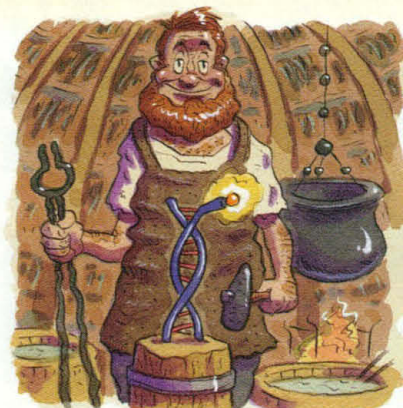
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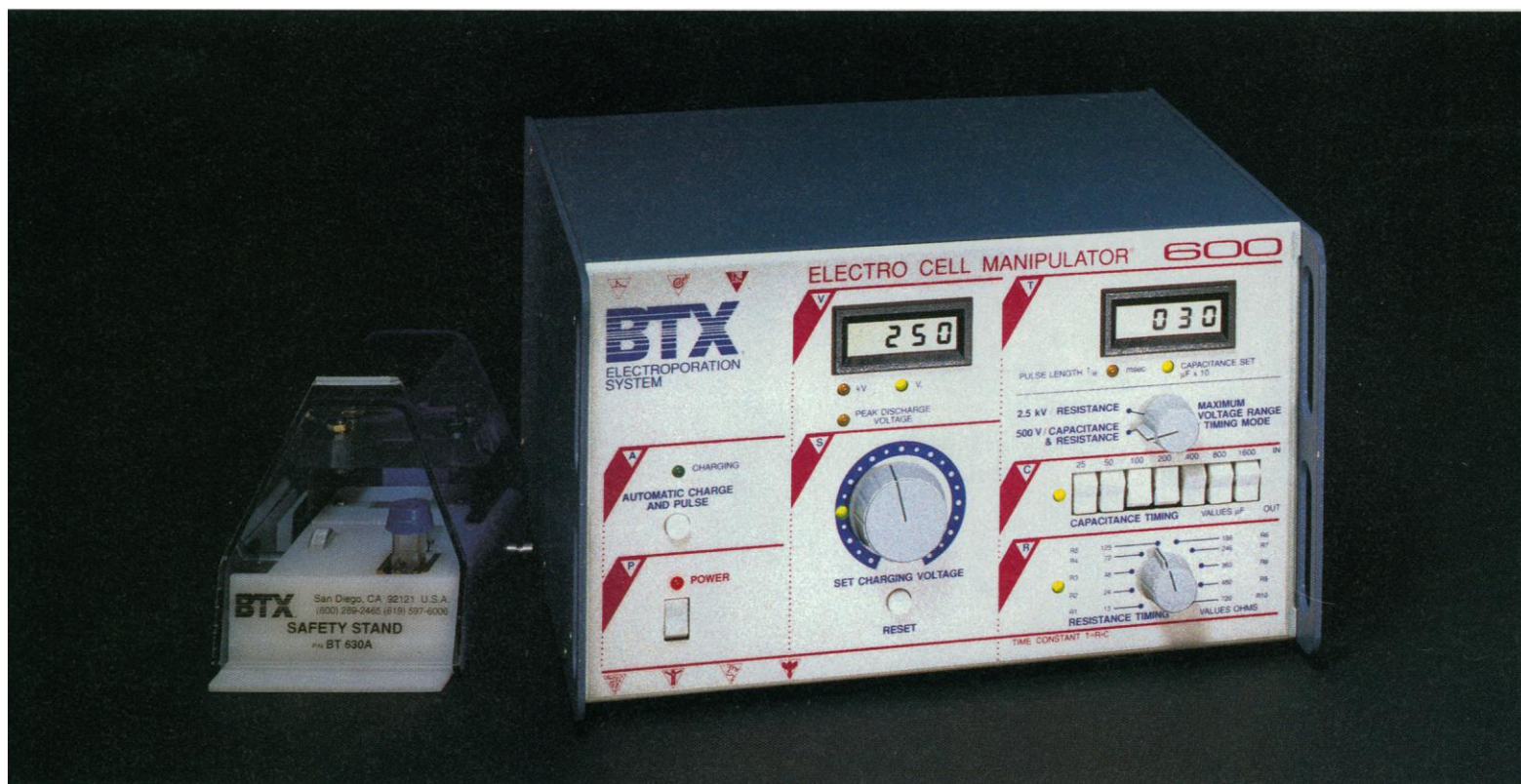


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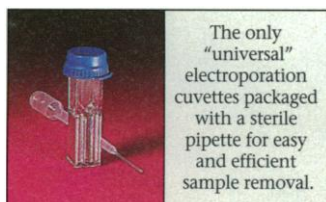
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# Separate, quantify, or sequence carbohydrates in one day with Glyko FACE® technology

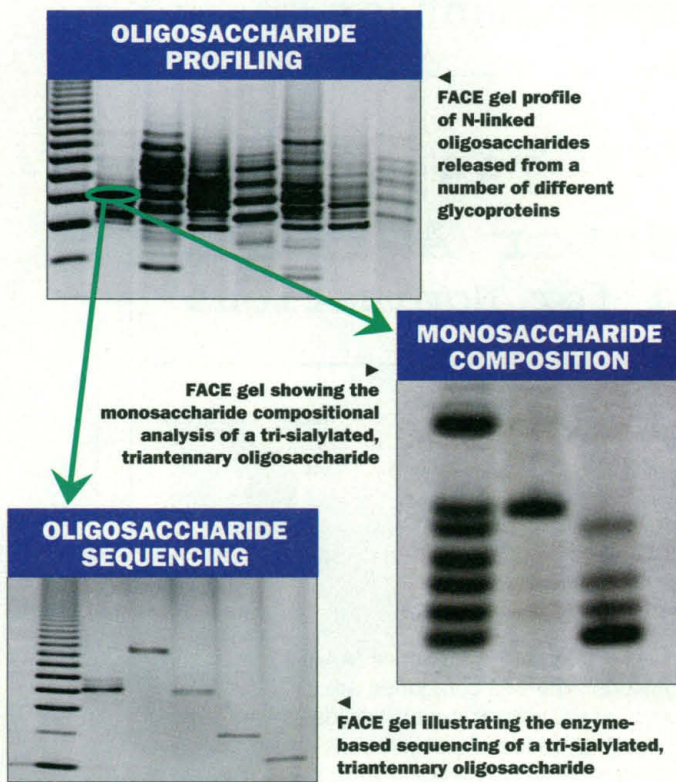
If you're working with DNA or protein, you're ready to work with carbohydrates

Glyko's FACE (*Fluorophore Assisted Carbohydrate Electrophoresis*) technology, makes it possible for you to work with and analyze complex carbohydrates using the same technique you already use every day in your laboratory: polyacrylamide gel electrophoresis.

Now, in less than one day, you can perform profiling, composition, or sequencing experiments such as the ones shown here, using FACE chemistry kits.

## Color-coded FACE kits make carbohydrate analysis easy and reliable

FACE kits are color-coded and are designed to provide a complete approach to carbohydrate analysis...starting



with the enzymatic or chemical release from the glycoconjugate to the separation, isolation, or sequencing of oligosaccharides.

Everything you need is included: enzymes or release chemicals, fluorescent-labeling reagents, electrophoresis

standards, controls, running buffers, precast polyacrylamide gels, and complete protocols.

The FACE Imager and FACE Analytical Software give you the ability to analyze, quantify, and document the results of N-linked and O-linked oligosaccharide profiling, monosaccharide composition, and sequencing gels



Glyko FACE kits are available for:

- N-linked Oligosaccharide Profiling Kit
- N-linked Capillary Electrophoresis Profiling Kit
- O-linked Oligosaccharide Profiling Kit
- O-linked Capillary Electrophoresis Profiling Kit
- N-linked Oligosaccharide Sequencing Kit
- Monosaccharide Composition Kit
- Glycosphingolipid Analysis Kit
- Glycosaminoglycan Identification Kit

## Sequence your oligosaccharides with Glyko recombinant glycosidases

Glyko offers the most complete line of recombinant glycosidases available, each cloned to be free of other glycosidases, protease activity, and carbohydrates:

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- **Endo H:** releases Asn-linked high mannose and hybrid-type oligosaccharides
- **O-Glycosidase I:** releases Ser/Thr linked Gal-GalNAc
- **Enzymatic Deglycosylation Kit:** releases oligosaccharides from glycoproteins
- **NANase I:** releases  $\alpha$ 2-3 N-acetylneuraminic acid
- **NANase II:** releases  $\alpha$ 2-3,6 N-acetylneuraminic acid
- **NANase III:** releases  $\alpha$ 2-3,6,8 N-acetylneuraminic acid
- **Neuraminic Acid Linkage Analysis Kit:** NANase I, II, and III
- **HEXase I:** releases  $\beta$ 1-2,4,6 N-acetylglucosamine
- **MANase I:** releases  $\alpha$ 1-2,3,6 mannose
- **FUCase I:** releases  $\alpha$ 1-6 fucose
- **HEPase I:** recombinant heparinase I

## We want to be your carbohydrate research partner

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**American**  
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**1995**  
***Mentor Awards***  
**Call for Nominations**

*Lifetime Mentor Award (10 or more years)*  
*Mentor Award (less than 10 years)*

The American Association for the Advancement of Science (AAAS) invites nominations for the 1995 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 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.

The AAAS Mentor Awards are administered by the Committee on Opportunities in Science (COOS).

*Deadline for the 1995 Mentor Awards  
nominations is 1 August 1995*

The 1995 Awards will be presented during the Association's Annual Meeting in Baltimore, MD in February 1995.

For more information on the AAAS Mentor Awards please contact Yolanda S. George or Paula Lee at (202) 326-6670.

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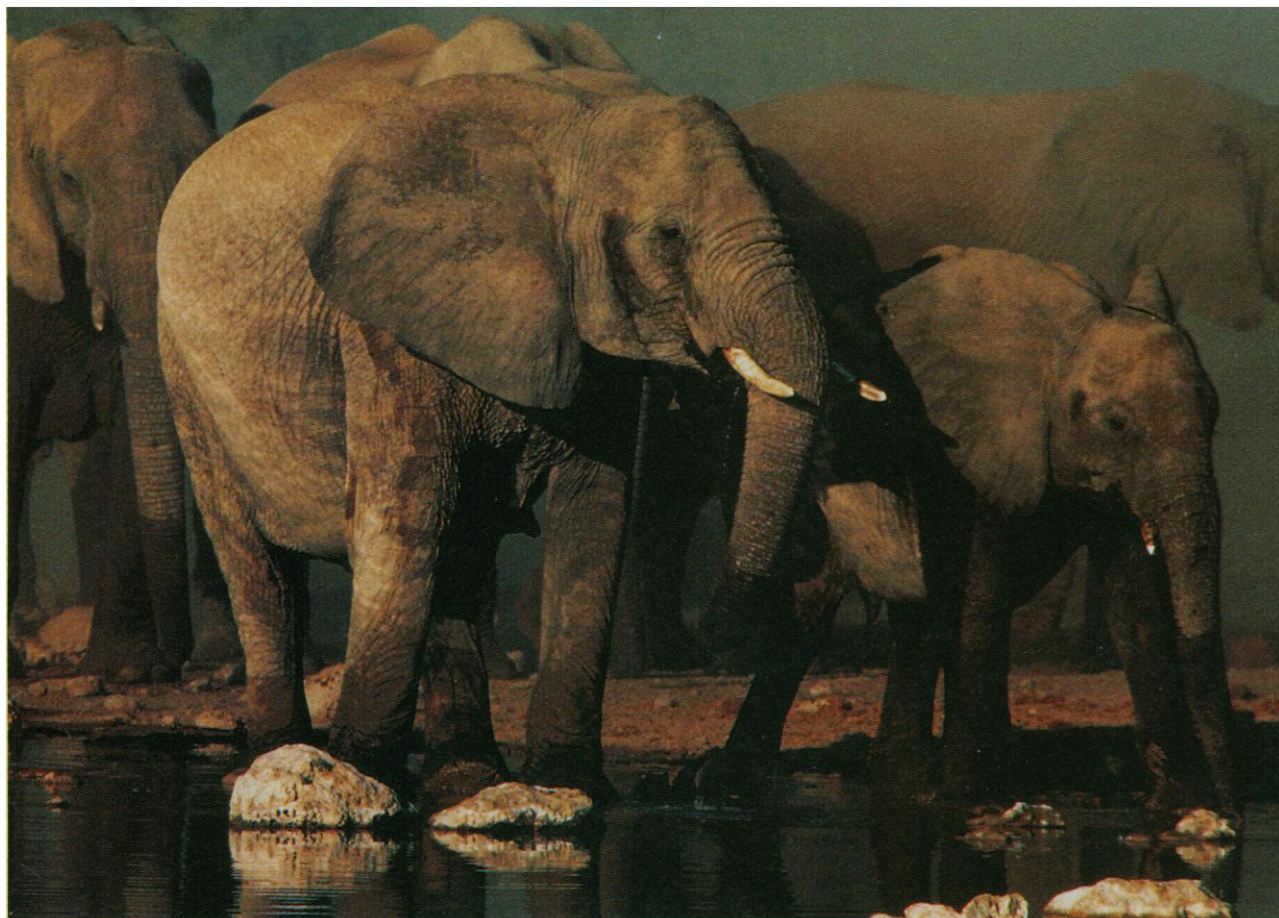
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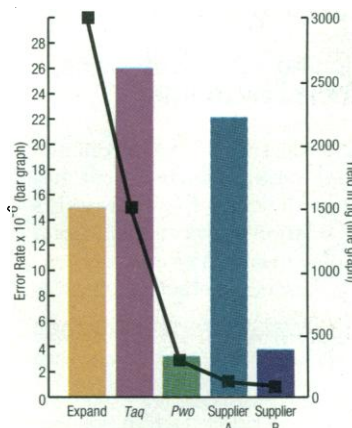
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