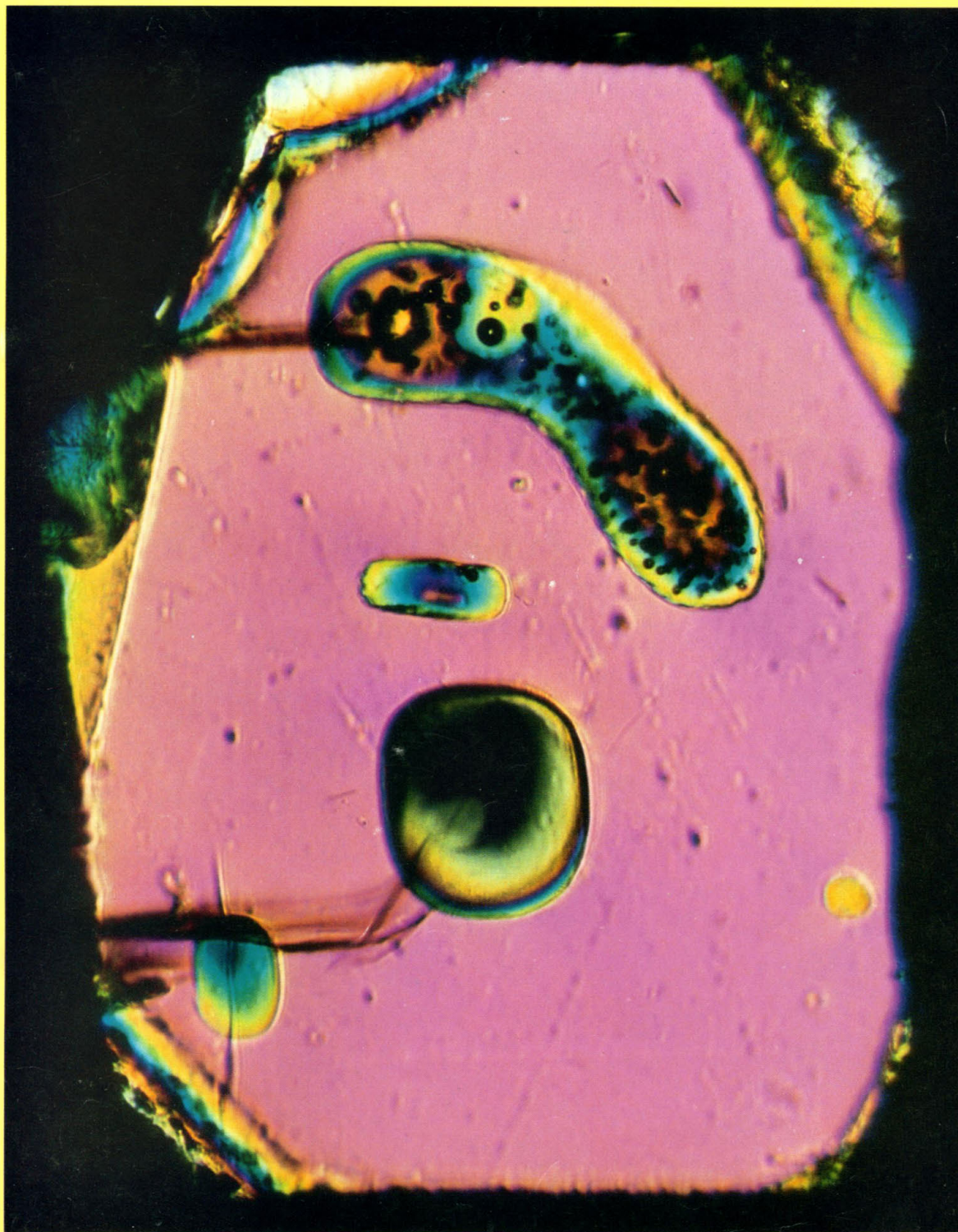


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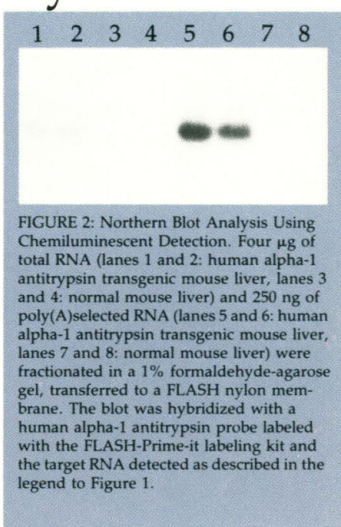
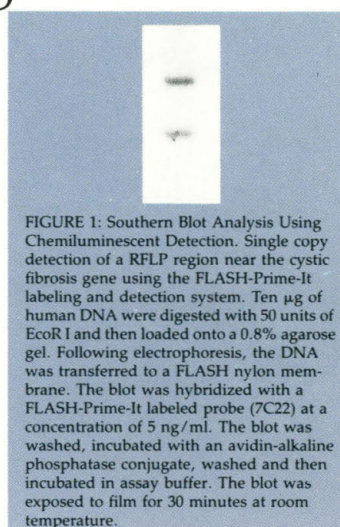
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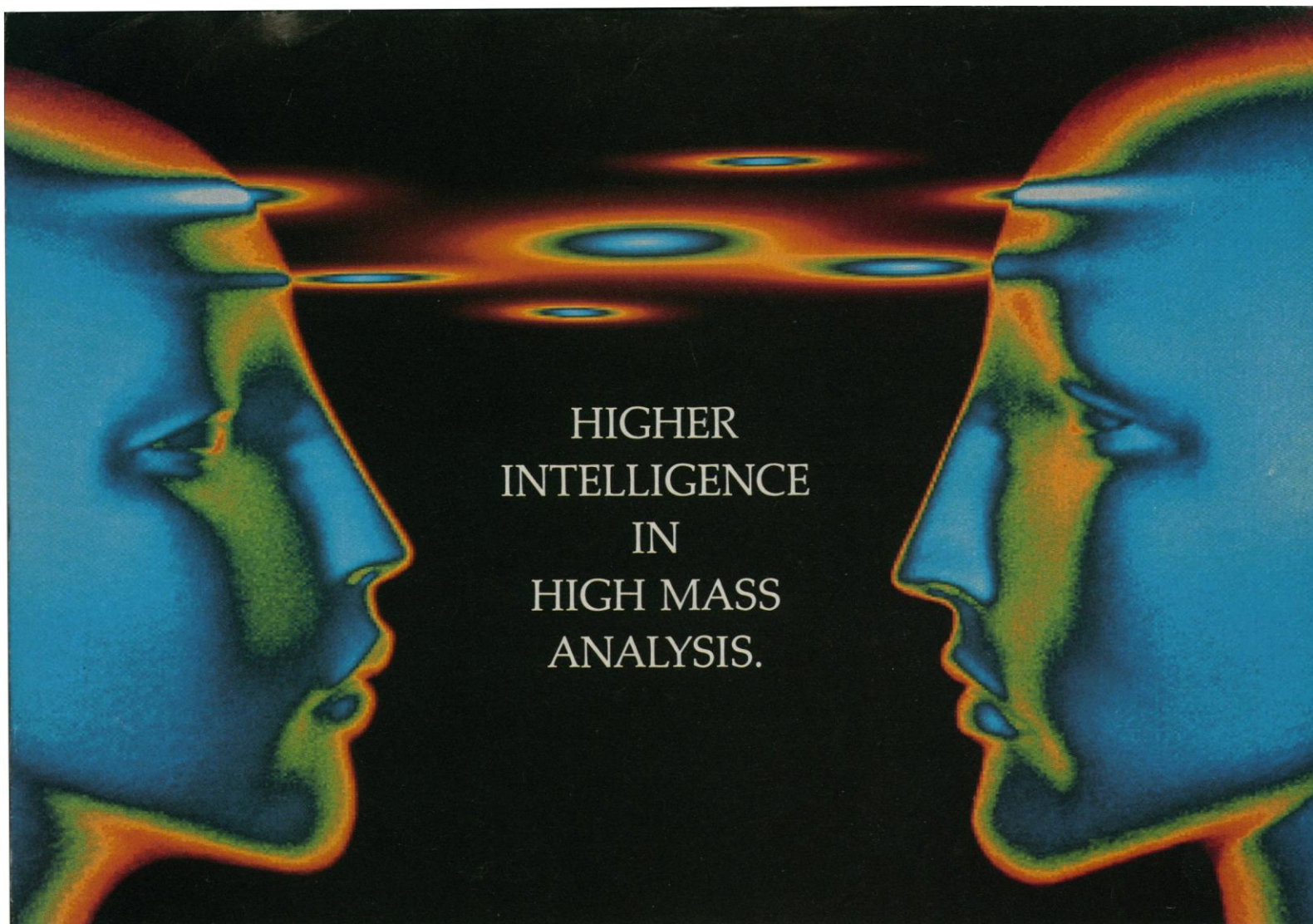
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COVER Quartz crystal (530 micrometers across) from a peralkaline rhyolite containing several inclusions of silicate melt (now glass). These inclusions were used to study the volatility of copper in magmas. Experimental heating caused the boomerang-shaped inclusion to leak and exsolve vapor bubbles, whereas the large black inclusion at the bottom did not leak. Other intact inclusions contained rare, copper-rich bubbles, which are interpreted as magmatic vapor. See page 1405. [Photograph taken under crossed polars by J. B. Lowenstern]

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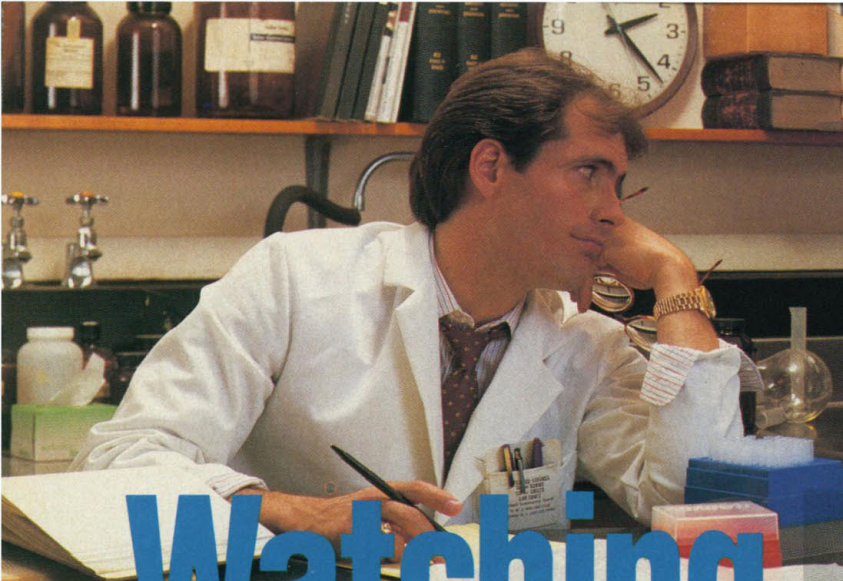
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## This Week in SCIENCE

### Children of divorce

**C**HILDREN whose parents are separated or divorced have been found to perform poorly in school compared with children in intact families and to have more behavioral problems. The children's dysfunctions typically have been attributed to the fact of the divorce. But an analysis by Cherlin *et al.* suggests that some of the emotional and the academic difficulties of the children become apparent well before the time of the actual breakup of the family (page 1386). Their conclusions are based on data collected in two longitudinal prospective studies of originally intact families—one, a survey of some 2,000 children carried out in the United States starting in 1976 and the other begun in Great Britain in 1958 that followed close to 15,000 children. The children's predivorce problems could be documented for reading and mathematics skills and for behavior, and the early onset was more apparent for boys than for girls. Children in intact but troubled families might thus be well served by social programs of the types that now are directed only at children whose parents are divorced. At current divorce rates, some 40% of children in the United States will experience the divorce of their parents by the time they are 18 years old.

### Big protein structures

**T**WO-DIMENSIONAL nuclear magnetic resonance (NMR) spectroscopy has been used for solving protein structure in three dimensions. It depends on the exchange of spin magnetization between pairs of protons and is an effective technique for resolving the structures of molecules in solution that contain up to 100 amino acids. Clore and Gronenborn describe the further expansion of NMR technology into three and four dimensions, which allows for the resolution of structure in larger molecules, those containing 150 to 300 amino acids (page 1390). Application of 3D and 4D NMR to structure determination was illustrated with the protein interleukin-

1 $\beta$ , which contains 153 residues; the expansion is achieved by straightforward and strategic combinations of 2D pulse sequences. The improvement in resolving power of the higher dimensionality spectroscopic determinations is likened to the growing clarity that would be realized if all the information in an encyclopedia were piled onto a single line (1D), spread onto one page (2D), dispersed in a single book (3D), and finally expanded into many volumes that are fully resolvable (4D).

### Cosmic cousins

**S**IMILARITIES and differences among comets, meteorites, and asteroids (mainbelt and near-Earth) are of considerable interest because of the insights they can provide into the astrophysical events that have occurred in the formation and evolution of the solar system. Radar observations of the near-Earth asteroid 1986 DA made from the Arecibo Observatory show that this M-type asteroid, which has an estimated diameter of about 2 kilometers, is much more reflective than other radar-detected asteroids; this suggests that 1986 DA has a strong metallic component (page 1399). Ostro *et al.* propose that iron meteorites (which because of their metallic composition are also extremely reflective at radar wavelengths) may be derived from asteroids like 1986 DA or that they might share a common parent object. The life history of their likely asteroid parent would have included episodes of melting, differentiation, cooling, and solidification, and, at a later time, a collisional disruption that would have resulted in the breakup of the parent object into these smaller metallic objects.

### Gas separations on polymers

**T**HERE are many industrial applications and laboratory experiments for which it is desirable to separate, recover, and recycle gases. Anderson *et al.* have developed a highly selective polymer-membrane system that

effectively separates a number of stubborn gas pairs, including mixtures of hydrogen and nitrogen, oxygen and nitrogen, and carbon dioxide and methane (page 1412). Conducting polymers of polyaniline (the type used in electronic devices) were used as the matrix materials; these polymers were doped (impurities are added to them, a process that alters their conductance properties) with halide counterions to induce permanent morphologic changes in the polymers. The polymers could then be undoped (but the morphologic changes remained) and later redoped. Gas permeability in these polymers depends on the kinetic diameters of the gases and is largely the result of diffusion; doping and redoping with various halide counterions results in fine-tuning of the porosity of the polymer, the outcome of which is enhancement or decrease in individual gas permeabilities.

### Properties of $K_xC_{60}$

**R**ECENT experiments have shown that when buckminsterfullerene ( $C_{60}$ ) and other fullerenes are doped in interstitial spaces with alkali metal ions such as potassium they become superconductors. For example,  $K_xC_{60}$  is a superconductor at 18 K. What changes in electronic structure occur as potassium is added to  $C_{60}$  that could account for the shift from insulator ( $C_{60}$ ) to superconductor ( $K_xC_{60}$ ) and eventually back to insulator ( $K_6C_{60}$ )? Two papers this week report on the use of photoemission spectra to monitor the progressive occupation of electron bands as  $C_{60}$  is doped with potassium (Benning *et al.* on page 1417 and Wertheim *et al.* on page 1419); both studies find that the lowest unoccupied orbital of  $C_{60}$  acquires the outer electron of the potassium atom. From their results, Benning *et al.* go on to suggest that, in contrast to a related class of compounds—graphite intercalated with alkali ions—the fullerene superconductors exhibit strong electron-phonon coupling. Electron-phonon coupling is the known mechanism of conventional superconductivity.

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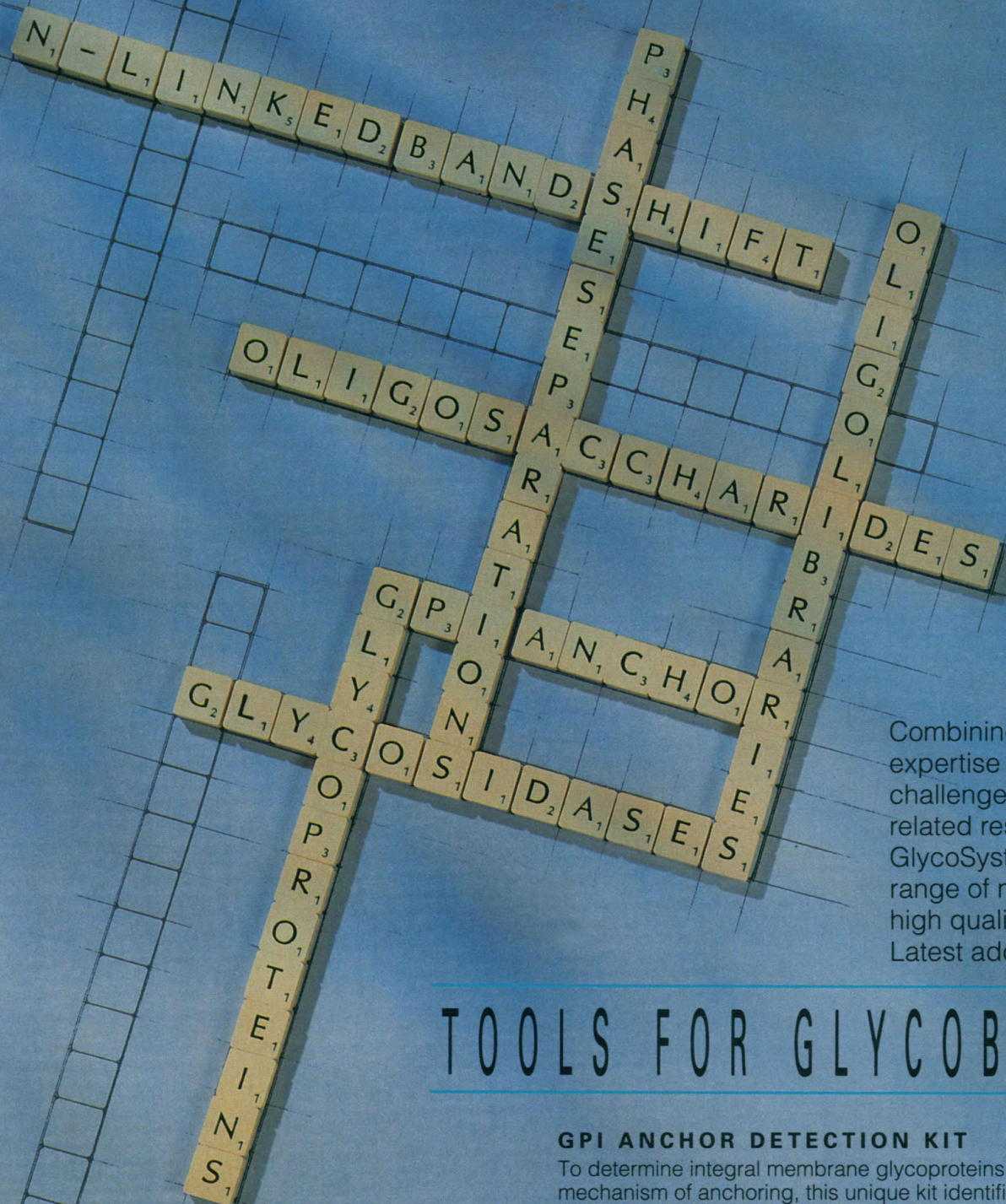
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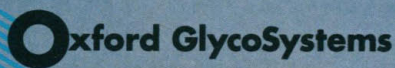
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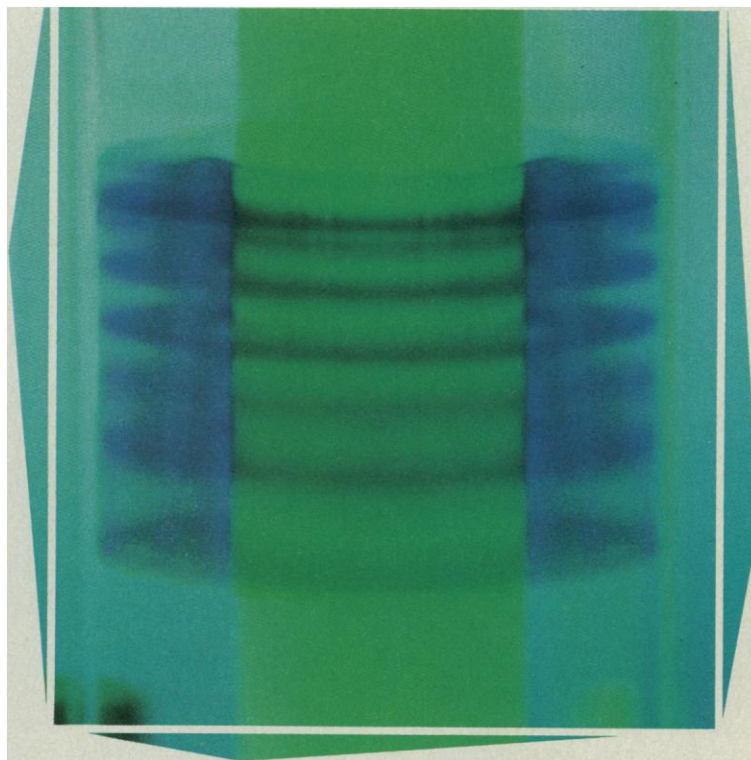
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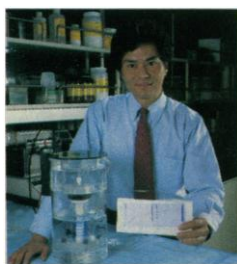
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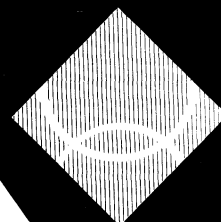
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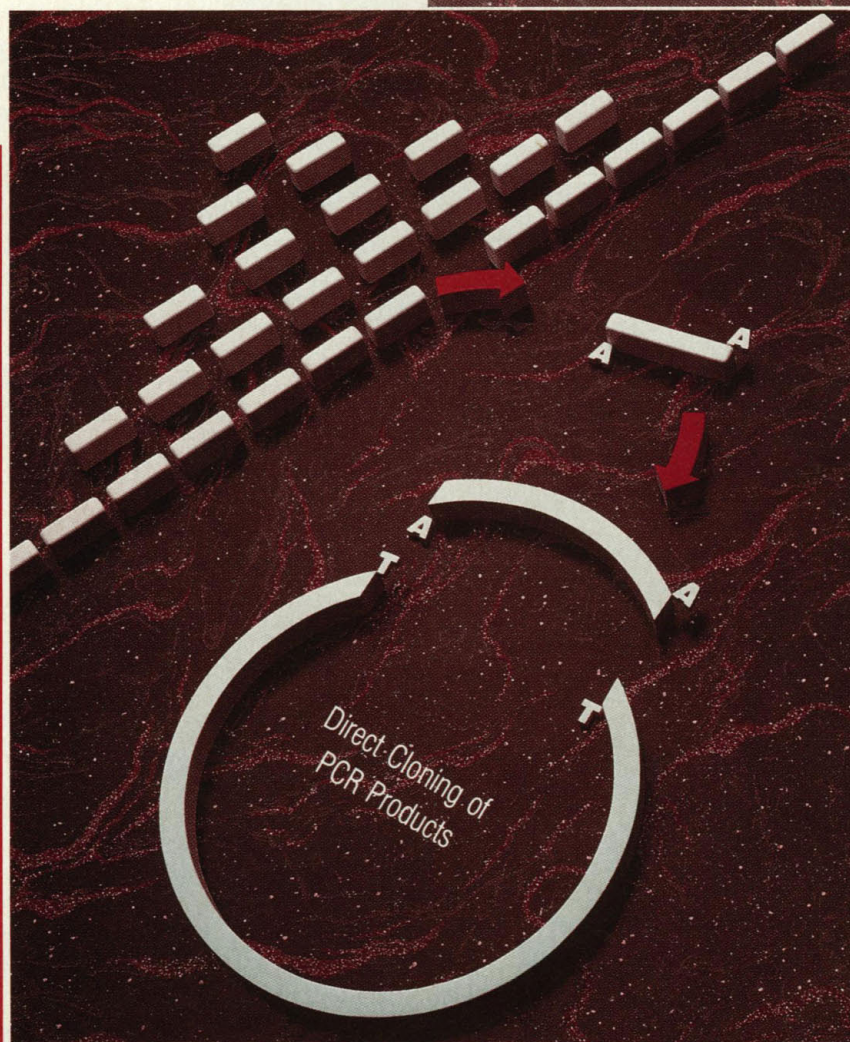
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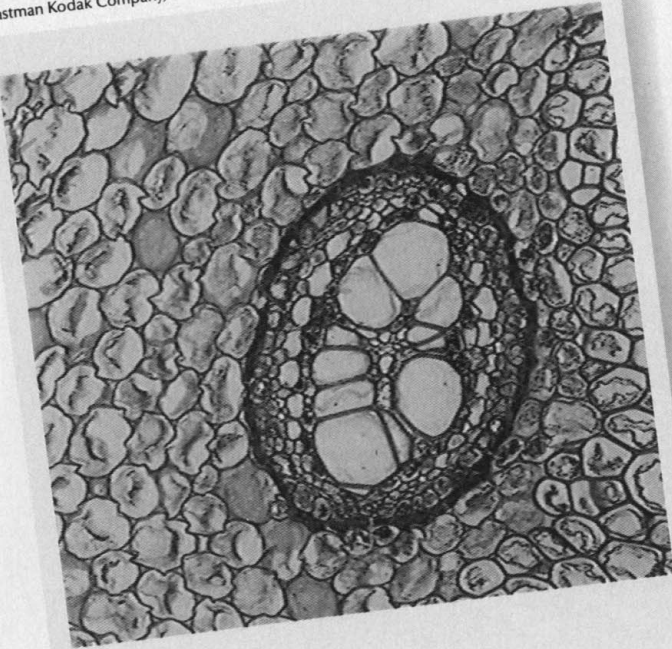
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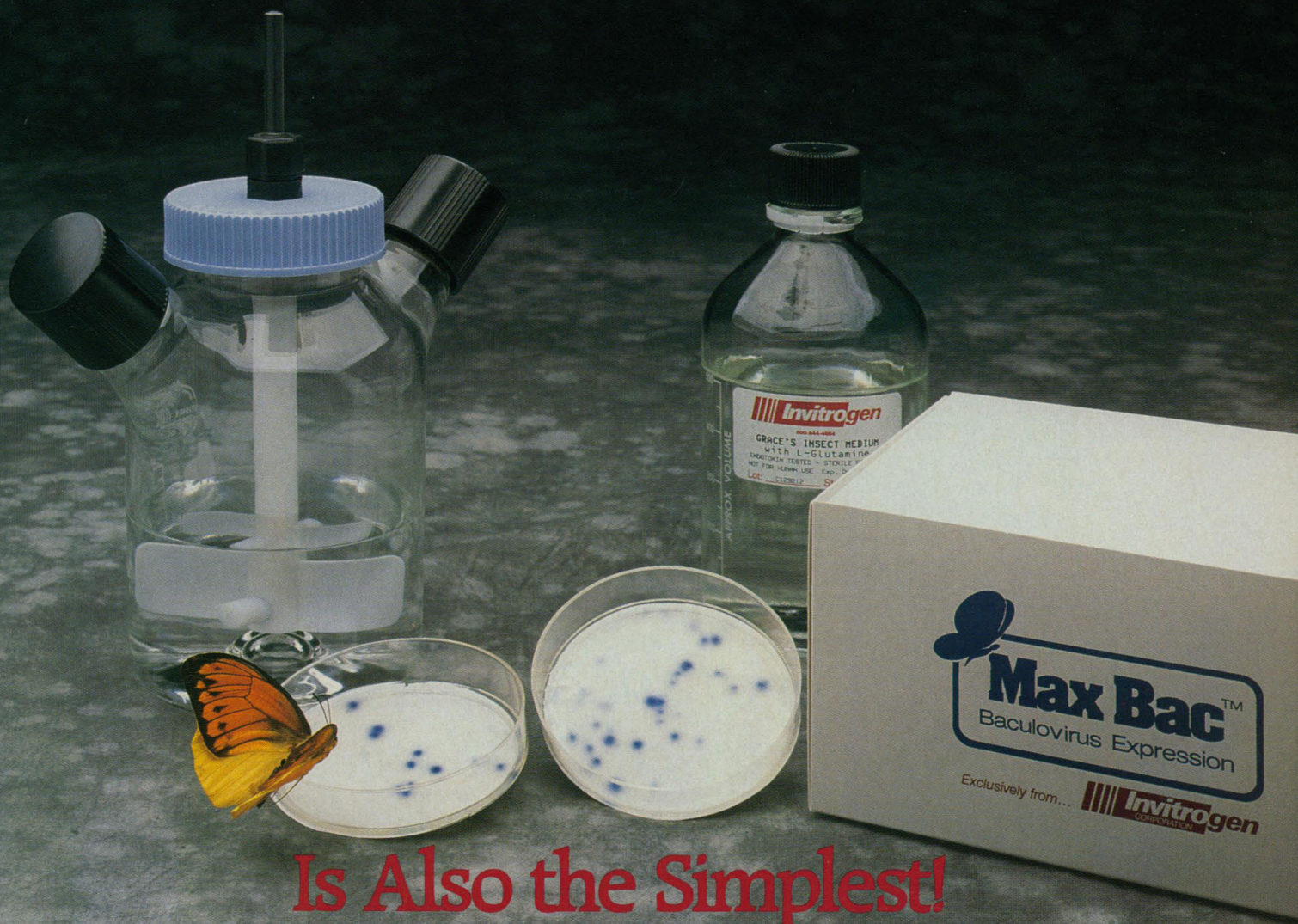
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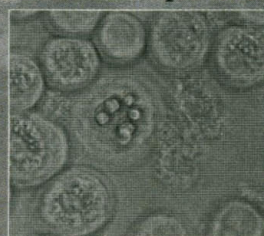


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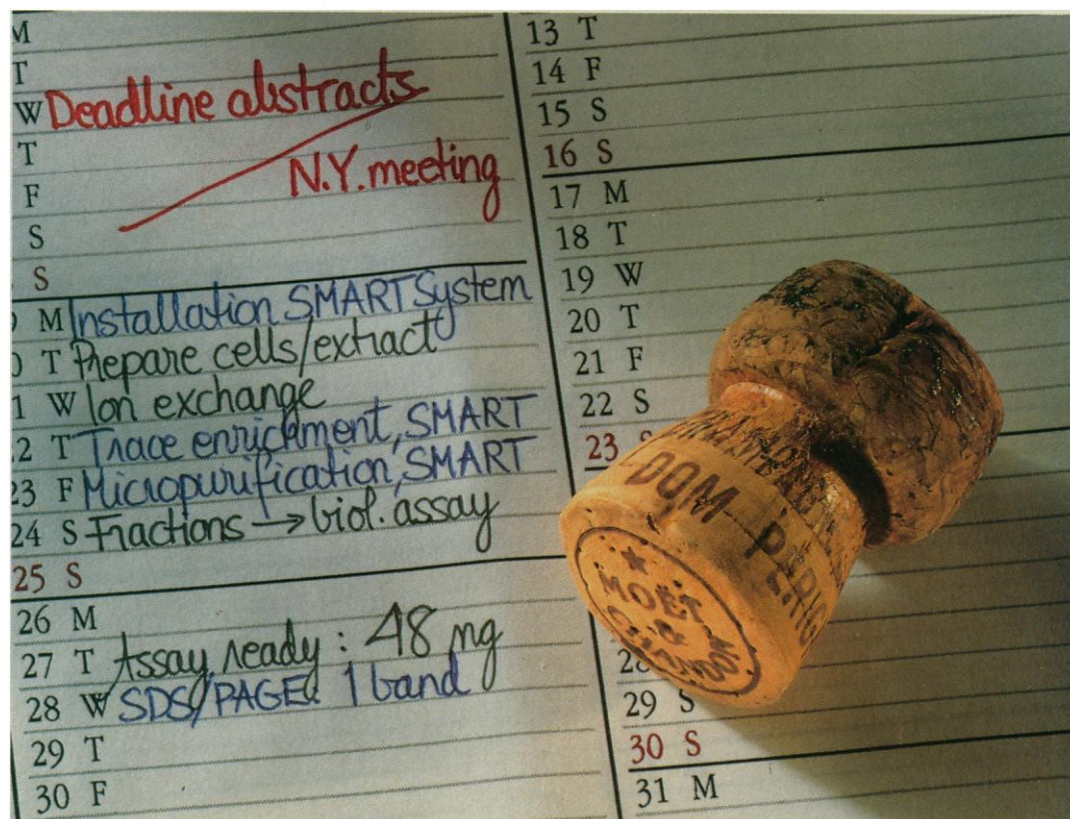
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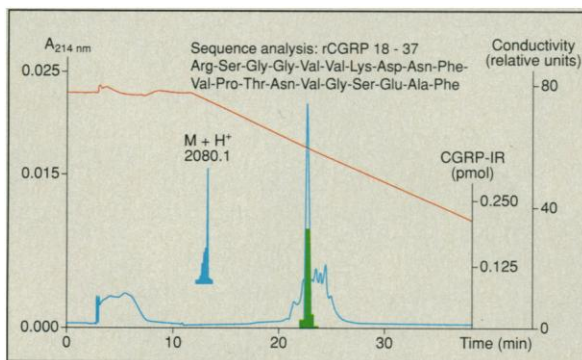
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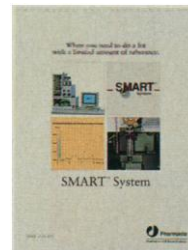
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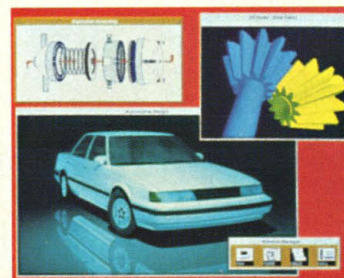
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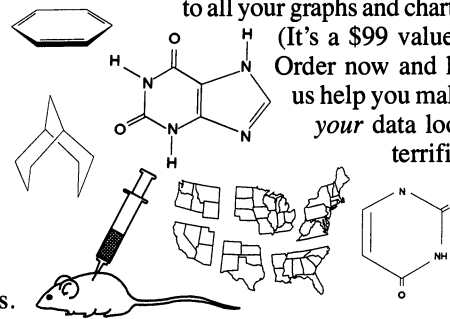
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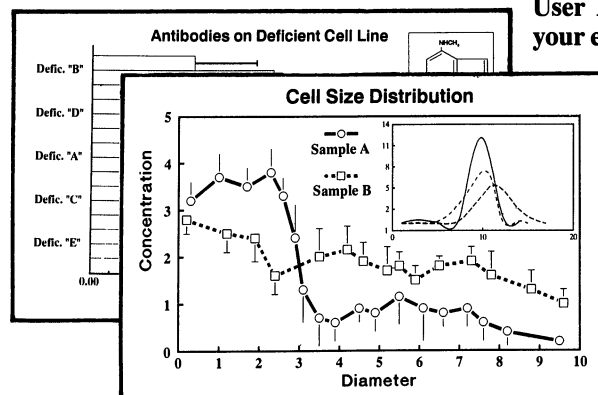
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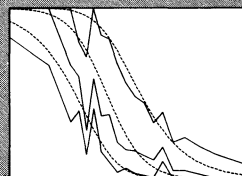
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## Model Organisms

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**Kunio Isono**, *Tohoku University*, "Neurogenetics of Taste in *Drosophila*"

**Fotis C. Kafatos**, *Harvard University/IMBB, Crete*, "Integrated Maps of the *Drosophila* Genome"

**Eugene Rinchik**, *Oak Ridge National Laboratory*, "Fine-structure Functional and Physical Mapping of Germline Deletions in the Mouse"

## Politics

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**Anthony Carrano**, *Lawrence Livermore National Laboratory*, "A Chromosome 19 Physical Map"

**Robert Moyzis**, *Los Alamos National Laboratory*, "Physical and Functional Mapping of the Human Genome"

## Method Development

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**Ronald W. Davis**, *Stanford University*, "Sequencing the Yeast Genome"

**Waclaw Szybalski**, *McArdle Laboratory, University of Wisconsin*, "Sequencing of Eukaryotic Genomes Without Cloning"

**Pieter J. De Jong**, *Lawrence Livermore National Laboratory*, "A New Approach for Completing Contig Maps Using Alu-PCR"

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## Human Landmarks

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