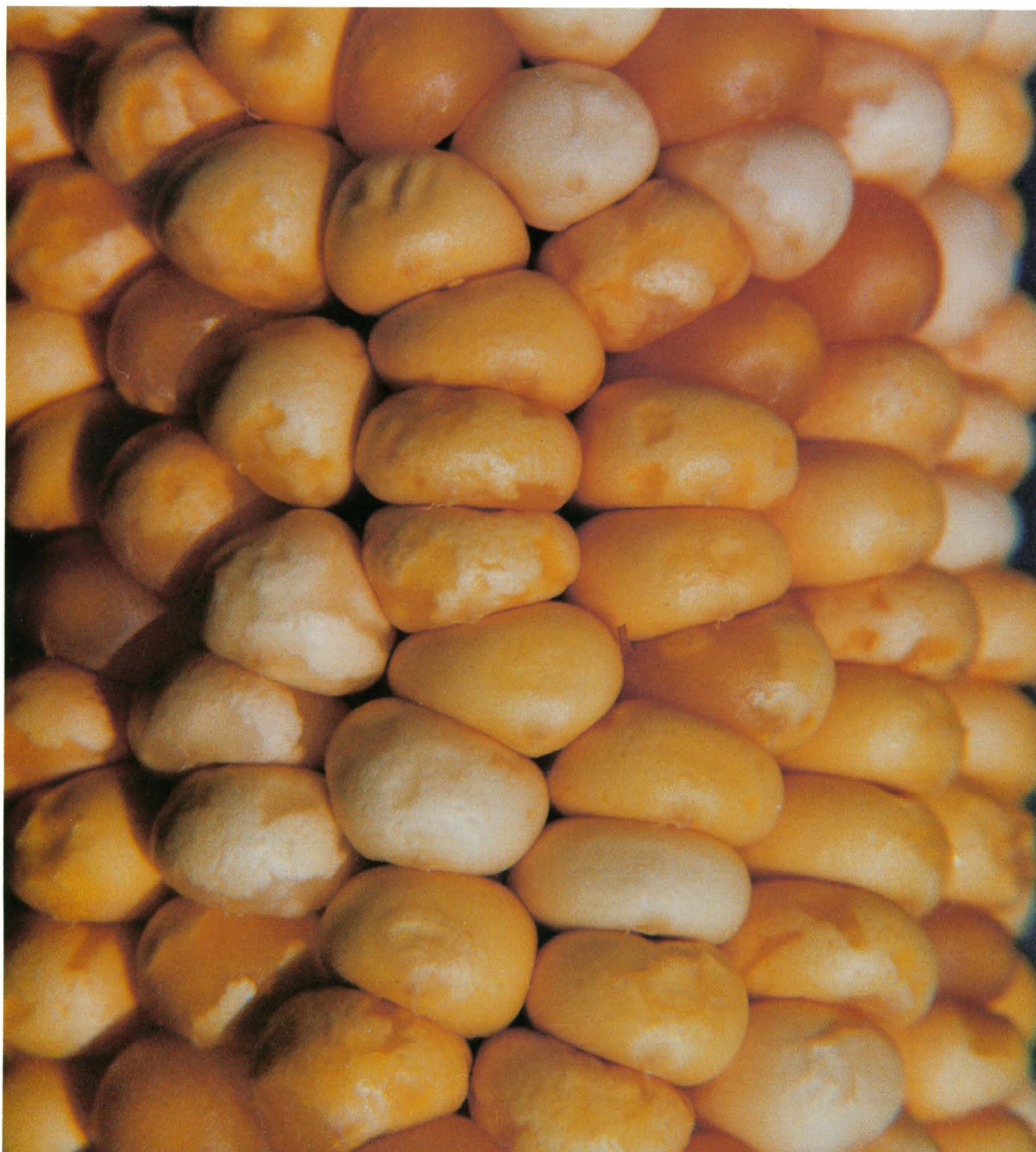


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873 This Week in *Science*

Editorial

- 875 Continuing Education for Blue-Collar Workers

Letters

- 877 NRC Report on the Space Station: L. H. MEREDITH; A. M. MOOD ■ Mass Bleachings on Atlantic Coral Reefs: E. H. WILLIAMS, JR., C. GOENAGA, V. VICENTE ■ Oil and Gas Discovery Rates: C. J. CLEVELAND; C. M. BLAIR, JR.; W. L. FISHER

News & Comment

- 880 Animal Regulations: So Far, So Good
882 Duke's Heart Center in Bureaucratic Jam
883 SDI Experts Clash on Nuclear Satellites
884 New Questions About AIDS Test Accuracy
886 DOD Sees Risks in Plutonium Trade
A Plea to Close Defense Reactors
887 Networks Nix Contraceptives Ad

Research News

- 888 Imaging Technique Passes Muster
890 Old and New Geology Meet in Phoenix ■ Ancient Air Analyzed in Dinosaur-Age Amber ■ Present at the Birth of an Ore Deposit ■ Seeing Bright Spots in the Middle Crust
892 NIH Celebrates 100 ■ Patterns and Processes Mark Brain Activity ■ Molecular Events Guide Embryonic Development
894 The Large-Scale Structure of the Universe Gets Larger—Maybe

Articles

- 915 The Recent Decline of Unionization in the United States: H. S. FARBER
921 Real-Time Landslide Warning During Heavy Rainfall: D. K. KEEFER, R. C. WILSON, R. K. MARK, E. E. BRABB, W. M. BROWN III, S. D. ELLEN, E. L. HARP, G. F. WIECZOREK, C. S. ALGER, R. S. ZATKIN
926 Exchange of Material Between Terrestrial Ecosystems and the Atmosphere: H. A. MOONEY, P. M. VITOUSEK, P. A. MATSON

Research Articles

- 933 Structurally Distinct, Stage-Specific Ribosomes Occur in *Plasmodium*: J. H. GUNDERSON, M. L. SOGIN, G. WOLLETT, M. HOLLINGDALE, V. F. DE LA CRUZ, A. P. WATERS, T. F. MCCUTCHAN

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Reports

- 938 When Will a Pulsar in Supernova 1987a Be Seen?: F. C. MICHEL, C. F. KENNEL, W. A. FOWLER
- 940 A Substantial Bias in Nonparametric Tests for Periodicity in Geophysical Data: S. M. STIGLER AND M. J. WAGNER
- 945 Atmospheric Trends in Methylchloroform and the Global Average for the Hydroxyl Radical: R. PRINN, D. CUNNOLD, R. RASMUSSEN, P. SIMMONDS, F. ALYEA, A. CRAWFORD, P. FRASER, R. ROSEN
- 950 A DNA Segment Encoding Two Genes Very Tightly Linked to Huntington's Disease: T. C. GILLIAM, M. BUCAN, M. E. MACDONALD, M. ZIMMER, J. L. HAINES, S. V. CHENG, T. M. POHL, R. H. MEYERS, W. L. WHALEY, *et al.*
- 952 Long-Term Neuropathological and Neurochemical Effects of Nucleus Basalis Lesions in the Rat: G. W. ARENDASH, W. J. MILLARD, A. J. DUNN, E. M. MEYER
- 956 Environmental Correlates of Food Chain Length: F. BRIAND AND J. E. COHEN
- 960 Transposon Tagging and Molecular Analysis of the Maize Regulatory Locus *opaque-2*: R. J. SCHMIDT, F. A. BURR, B. BURR
- 964 Unwinding of Duplex DNA from the SV40 Origin of Replication by T Antigen: M. DODSON, F. B. DEAN, P. BULLOCK, H. ECHOLS, J. HURWITZ

Book Reviews

- 969 Genetics in the Courts, *reviewed by* S. L. CARTER ■ Experimental Approaches to Mammalian Embryonic Development, J. J. EPPIG ■ High Energy Phenomena Around Collapsed Stars, F. MELIA ■ The Natural History of Badgers, M. HANCOX ■ Books Received

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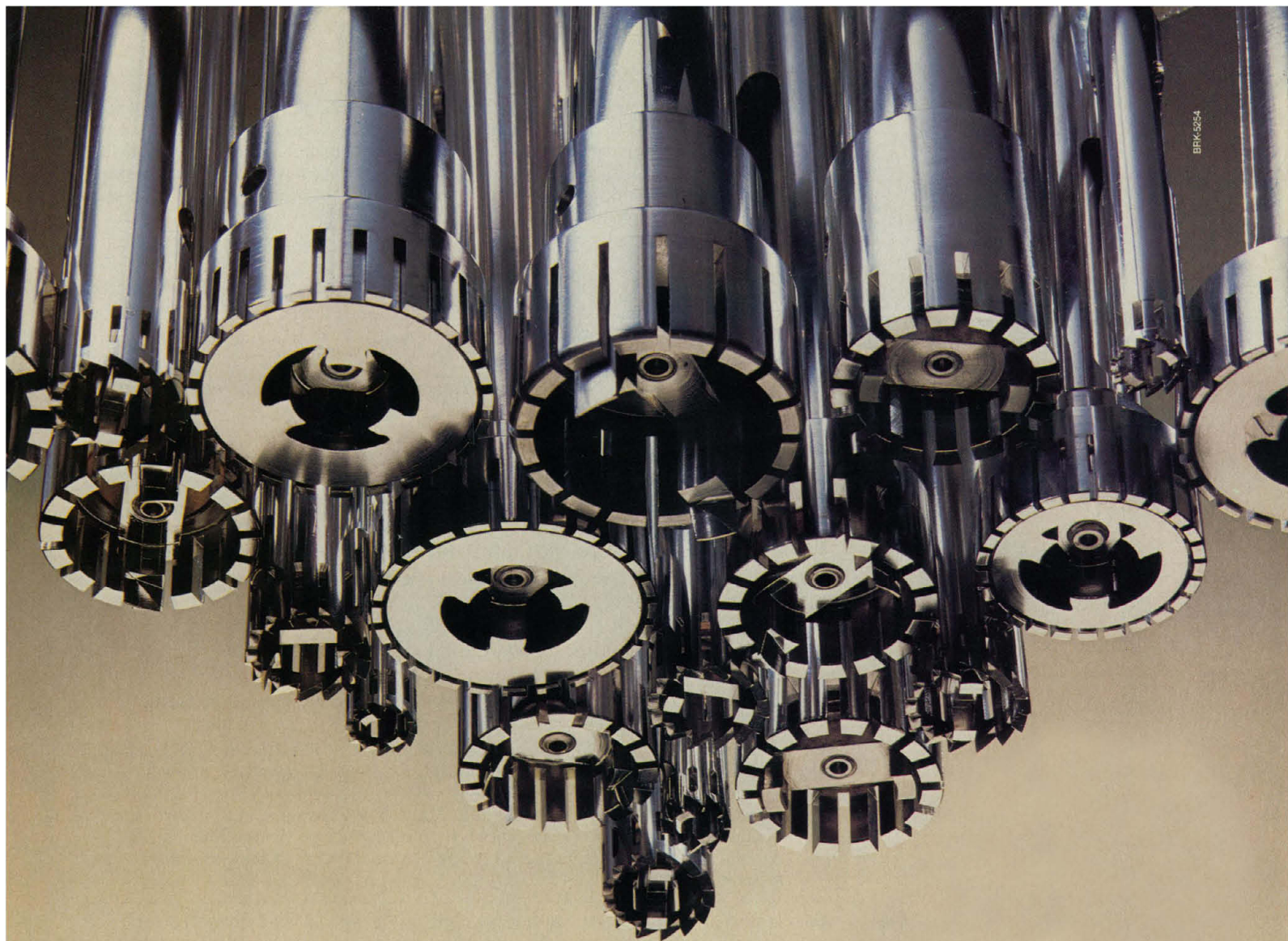
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This Week in SCIENCE

Landslide alert

LANDSLIDES in the San Francisco Bay region are initiated by heavy rains, earthquakes, and erosion (caused both by natural forces along the coast and by construction and development) (page 921). The region is hilly and receives most of its rain between November and April. Keefer *et al.* have developed a landslide warning system in which amounts of recent and predicted rainfall are monitored for a region and an alert issued on the basis of the region's prior landslide record and topographic, geologic, hydrologic, and vegetation features. The utility of the alert system was first demonstrated in February 1986 during a 10-day downpour. Radio broadcasts warned of possible landslides in certain places, many of which, according to eyewitness accounts, experienced landslides at the times predicted; these broadcasts are credited with helping to minimize deaths and property damage. That first use of the system focused on debris flow landslides, since they are considered the most threatening in the bay region. The system will be refined to take into account additional variables that affect slope stability and expanded to monitor other types of landslides; it is expected to grow in accuracy. Elsewhere around the world, similar principles should serve for making landslide predictions.

Ribosome diversity

AT different stages in the life cycle of the parasite *Plasmodium berghei* different ribosomes are active (page 933). During the insect stages when the parasite exists as an oocyte in the gut or as a sporozoite in the salivary gland of a mosquito, the C form of the ribosomal RNA gene is preferentially transcribed; during the mammalian stages when the parasite is in an asexual form in the host's bloodstream, the A form predominates. This pattern of gene transcription is described by Gunderson *et al.*, who analyzed, with probes specific for A and C, expression of these two "small subunit" ribosomal RNA genes. It may be that,

in *P. berghei*, A better assists in the synthesis of one group of proteins and C is better for others; the conditions for translating messages at each stage in the life cycle may thus be optimized by having two forms of ribosomes. Alternatively, each type of ribosome may meet the metabolic requirements of a different stage—one warm-blooded, the other cold-blooded—of the parasite's life cycle. Other *Plasmodia* and other organisms may be identified in which distinct ribosomes are part of the developmental machinery.

Supernova pulsar

ENERGETIC gamma rays from supernova 1987a observed in the Large Magellanic Cloud would be one signal that this is a nascent pulsar (page 938). Pulsars are rapidly spinning stars consisting almost entirely of neutrons; because of its enormous magnetic field, a pulsar generates powerful beams of electromagnetic radiation that sweep across the sky. The mechanism by which pulsars form has long been debated, and the nearby supernova offers a chance to resolve some fundamental questions. Although a neutron star was very likely created in the explosion (as revealed by an early burst of neutrinos), the expanding shell of ejected matter is still too dense to allow observation of the periodic radio-frequency and optical emissions that are characteristic of pulsars. Michel *et al.* calculate that the thinning shell should become transparent to high-energy gamma rays in about 1 year. Observation of this radiation would provide an early test of models of pulsar formation.

Troposphere chemistry

METHYLCHLOROFORM (CH_3CCl_3) is generated by human activities and is a source of substances that can catalytically destroy ozone; it is also one of the gases that may contribute to the greenhouse effect which is thought to be threatening the earth's climate (page 945). According to an extensive gas

chromatographic study that was conducted between 1978 and 1985 and is reported on by Prinn *et al.*, the abundance of CH_3CCl_3 in the troposphere is increasing. At several stations around the world, atmospheric samples were collected daily during the test years; 60,000 data points were available in all. When the sampling data were considered in conjunction with data of industrial emissions of CH_3CCl_3 , this substance was found to be a long-term (more than 6 years) tropospheric contaminant. The only sink for CH_3CCl_3 is its oxidation by the hydroxyl-free radical (the most important oxidizing species in the atmosphere), and tropospheric concentrations of the hydroxyl radical, which are difficult to measure directly, could be calculated from the CH_3CCl_3 data. Values obtained for CH_3CCl_3 and hydroxyl radical concentrations will figure into models that describe chemical reactions taking place in the troposphere.

Food chains

FOOD chains are longer in food webs in forest canopies, water columns of open oceans, and other "solid" environments than they are in webs in lake bottoms, grasslands, rocky intertidal zones, and other "flat" environments (page 956). Briand and Cohen evaluated 113 natural food webs that had previously been described; each web's average and maximum chain lengths were noted. Chain lengths correlated well with the dimensionality of the web and less well with environmental variability (whether temperature, water availability, salinity, and other variables remain constant or fluctuate) or with the chain's primary productivity (a measure of energy available at the beginning of the chain that might limit the amount of energy available for passing from organism to organism). One possible explanation for dimensionality's role in chain length is that there is a different chance for an encounter of prey and predator—and thus establishment of the next link in the food chain—in three-dimensional versus two-dimensional environments.

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Continuing Education for Blue-Collar Workers

The need for continuing education has been intensified for many groups, including blue-collar workers. In the production of manufactured goods, coming changes may prove to be as revolutionary as those that already have occurred in agriculture.

Education and training within corporations of the United States is an important and growing industry. The dollars spent and the numbers of company students trained are comparable to the totals experienced by all the country's 4-year colleges and universities. A substantial portion of the training efforts of corporations is devoted to upgrading the capabilities of their blue-collar workers. The circumstances under which teaching is conducted vary from company to company, and at different locations in any given company. For the most part, the curricula are dictated by the company to serve company objectives, and the courses are conducted during working hours.

The United Auto Workers and Ford Motor Company have cooperated to create a novel and flexible UAW-Ford Employee Development and Training Program* that merits close attention and possible replication elsewhere. In part this program represents recognition of the need for labor to be more literate and computer-knowledgeable if this nation is to compete in the future. The program is also responsive to deeply felt needs for self-improvement on the part of many of the employees. It focuses on the individual interests and goals of the worker, uses customized individual and group guidance materials, and provides networking and partnership of local educational and training organizations.

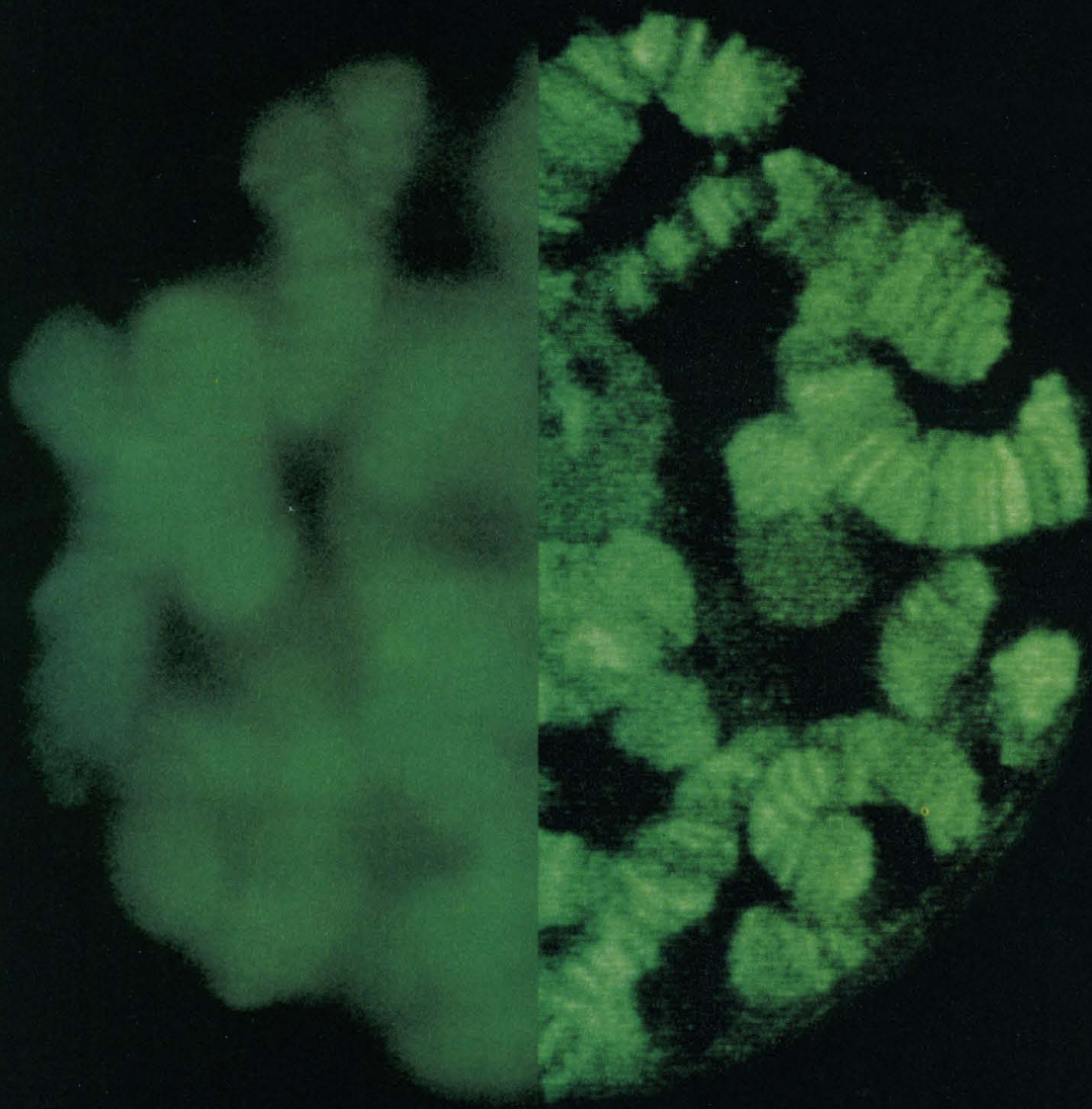
The two partners, labor and management, have sought the collaboration of the University of Michigan, which employs life-education advisers who have important roles in facilitating educational programs. The advisers are stationed at the various production plants and serve many functions, including friendly counseling. They help employees formulate and implement programs for self-improvement that are geared to the individual's talents and goals.

In the United States, Ford employs about 100,000 people who are represented by the UAW. They work at more than 70 locations where parts are made, subassemblies are produced, or vehicles are assembled. The previous educational attainments of the employees vary. About 25 percent have not completed high school. Another 60 percent stopped studies after completing high school. About 20 percent have had some college or university experience. Corresponding to this, a diversity of opportunities are available at each level. There are remedial programs for some. There is paid college tuition for others. More than 500 outside college-level institutions are involved. Nearly 100 of them conduct classes within the production plants. The union and the company jointly administer the program for which funds are available. An individual can obtain \$2000 in tuition support annually to attend an accredited college or university. Attendance in classes is on the individual's time, not the company's. When training is required to meet specific job needs, the instruction is conducted during working hours. The fact that many employees are willing to spend their limited free time on classes and studies is impressive.

Many of the courses chosen by employees add to their literacy, communication skills, or mathematical competence. Courses on computers leading to and including programming are popular, as are courses in robotics. Some of the students choose subjects not directly related to their work, such as public speaking.

In the initial phases of the program, the workers were slow to respond to the educational opportunities. But with the passage of time, favorable testimony by co-worker participants led to increasing numbers of workers joining the program. One said that the program was the best thing that had happened in all his years at Ford. Two other comments of the students follow: "An active and learning mind seldom faces the problem of senility. Our minds need 'exercise,' not just our muscles." A second comment: "I feel that the better our work force is trained, the better vans we build. When a person starts thinking and learning in the classroom, it doesn't stop there. It becomes a habit, and you carry it not only to the job but everywhere else."—PHILIP H. ABELSON

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- Technol.* **34**, 2757 (1982); —, J. E. Frederiksen, *Oil Gas J.* **82**, 90 (8 October 1984); C. M. Blair, Jr., in *SPE/DOE Fifth Symposium on Enhanced Oil Recovery* (Society of Petroleum Engineers, Dallas, TX, 1986), pp. 345–352.
3. C. M. Blair, Jr., and C. A. Stout, *Oil Gas J.* **83**, 55 (20 May 1985).

Response: Cleveland is correct in pointing out the two different data series—that of the API and the AGA through 1979 and the DOE series from 1977 to the present. I used Nehring's linked data set, one of the two approaches indicated in Cleveland's reference 4 for the period 1970–1980, and the DOE data subsequently, applying standard appreciation values. The linkages, in my judgment reduce, if not eliminate, much of the inconsistencies inherent in different data sets.

Also, there are separate lines of evidence suggesting that discovery data I have used are consistent and that the conclusions drawn from the data are appropriate. It is worth noting that conclusions similar to my own can be drawn from Nehring's data (my reference 2) on the basis of his Significant Oil and Gas Fields of the U.S. Data Base and from Wood's paper (my reference 3) utilizing the Gas Research Institute's hydrocarbon model. Data from both sources indicate stability in the finding of oil and gas.

Blair cites the role of enhanced secondary recovery, which I gather he distinguishes on a cost basis from tertiary or enhanced oil recovery. I indicated that enhanced recovery, as generally defined, is more expensive than mobile, or standard, secondary oil recovery, which is not quite the same as relegating immobile oil recovery to high cost. The kinds of techniques Blair mentions will be critical, and may, in fact, eventually be low cost as he states. My expressed goal of keeping U.S. production stable over the next 45 years involves recovery of the mobile oil target (about 40 billion barrels) and one-fourth the immobile oil target (60 billion barrels). This implies, over the longer term, the importance of recovery strategies such as those mentioned by Blair.

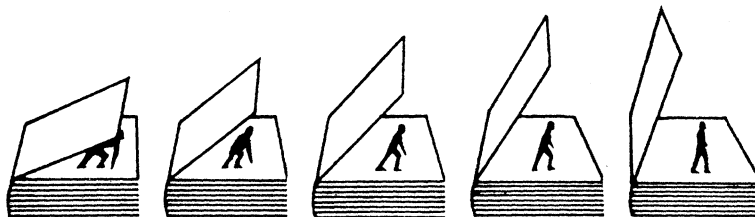
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Erratum: In the caption for the figures (p. 480) accompanying Richard A. Kerr's Research News article "Sunspot-weather correlation found" (23 Oct., p. 479), the key was inadvertently omitted. The solid lines in the figures represent solar flux and the broken lines represent stratospheric temperature.

Erratum: In Eliot Marshall's article "Reinventing the space truck" (News & Comment, 16 Oct., p. 266), the photo identification was reversed. The Martin Marietta rocket design was on the right, and the Hughes Aircraft design was on the left. Also, the Air Force's Space Division is in Los Angeles, not Denver.

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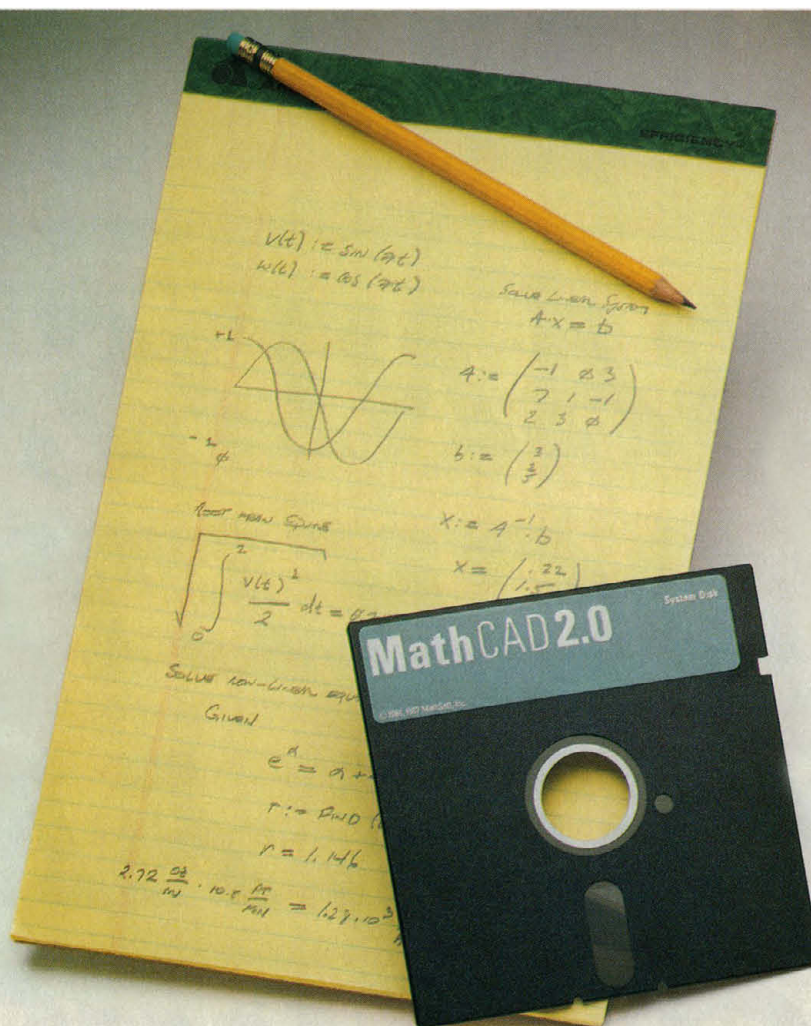
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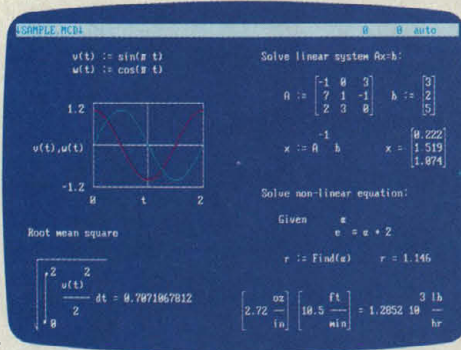
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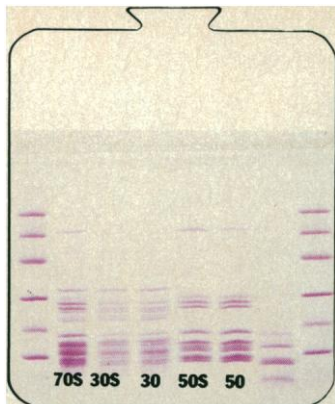
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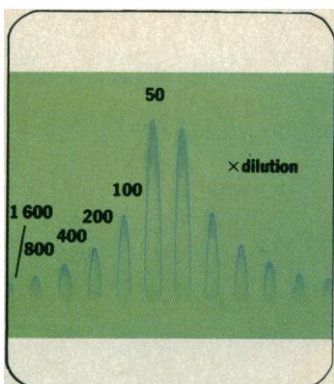
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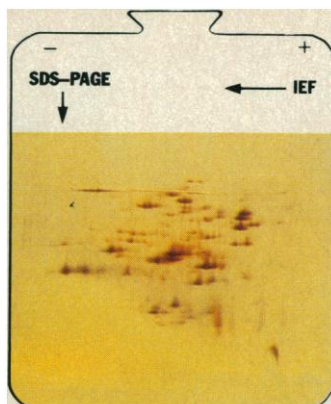




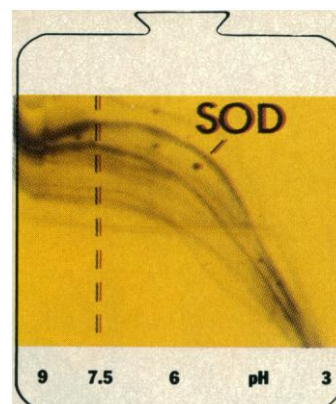
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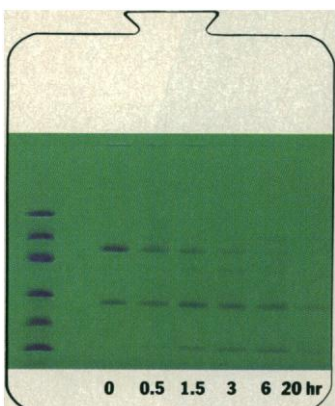
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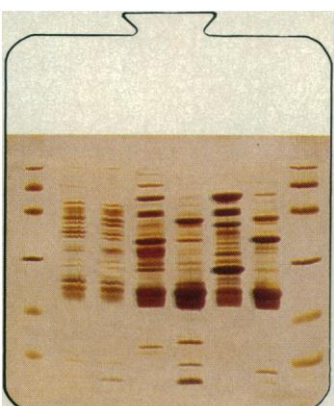
Analysis of *E. coli* proteins by 2D PAGE with subsequent silverstaining. Sample to result: 2.5 hr.



Characterization of a clarified cell homogenate by electrophoretic titration prior to purification. Sample to result: 90 min.



Optimizing a pepsin digest of Murine IgG Mab with SDS-PAGE. From sample to result: 60 min.



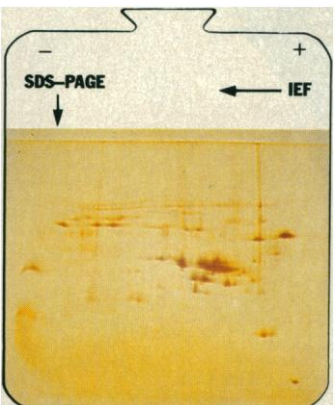
Analysis of peptides from an early step in the production of rh-growth hormones by SDS-PAGE. Sample to result: 90 min.



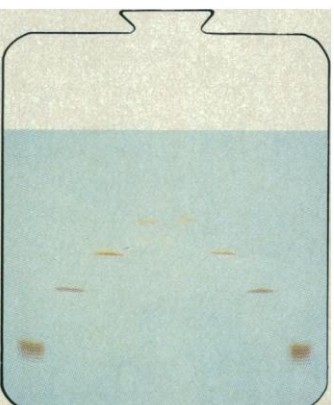
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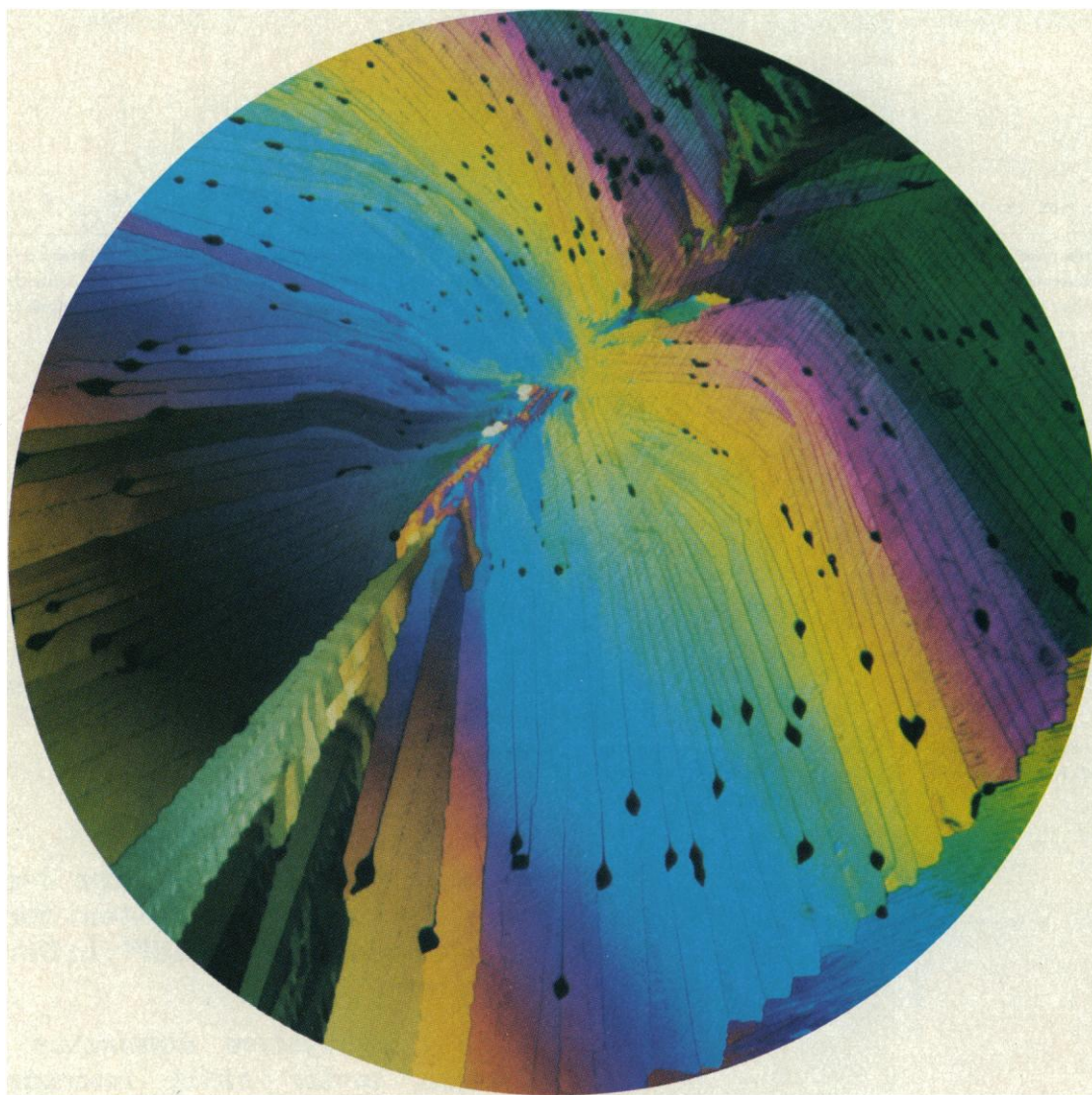
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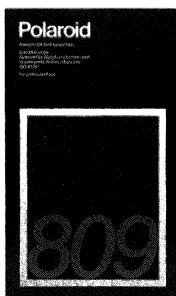
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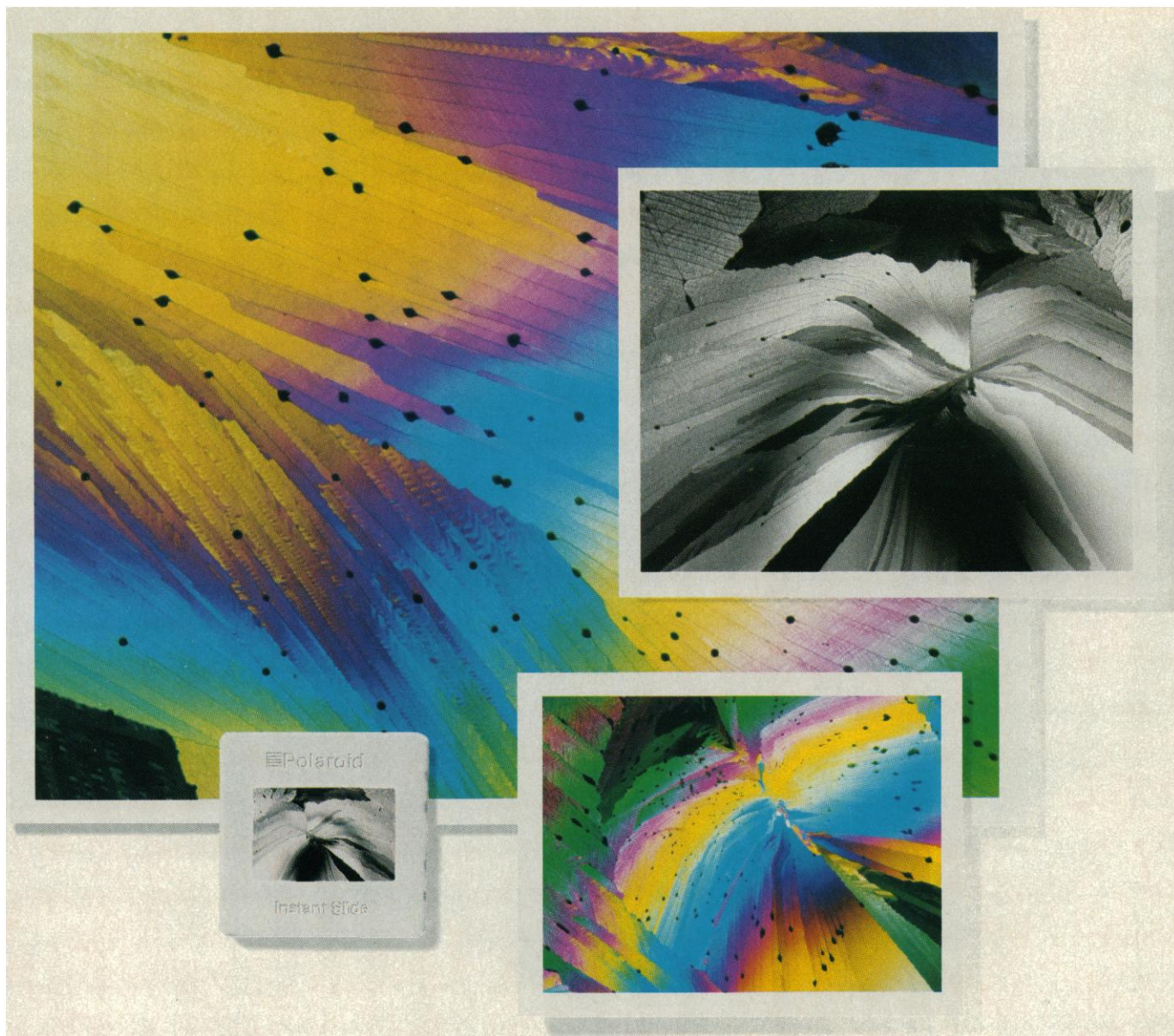
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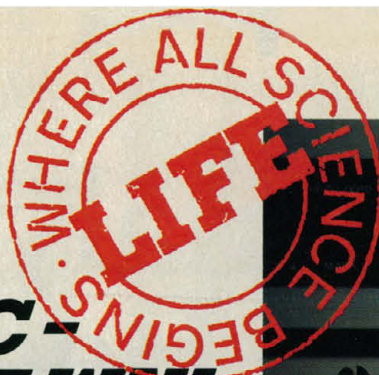
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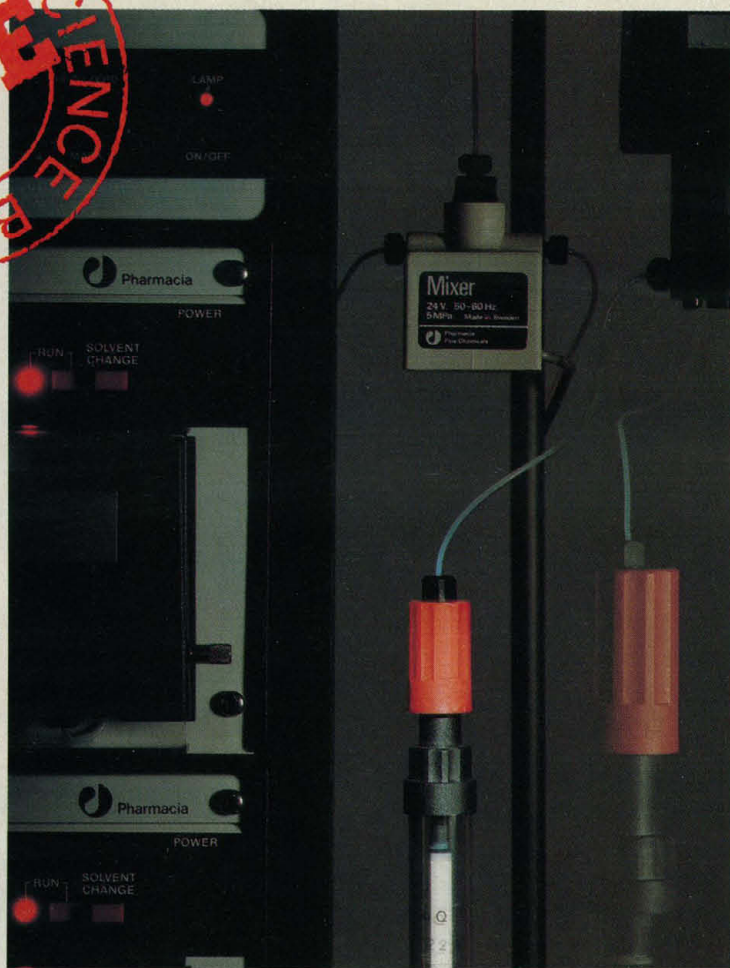
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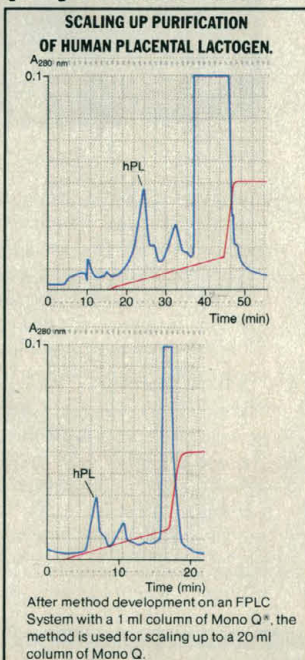
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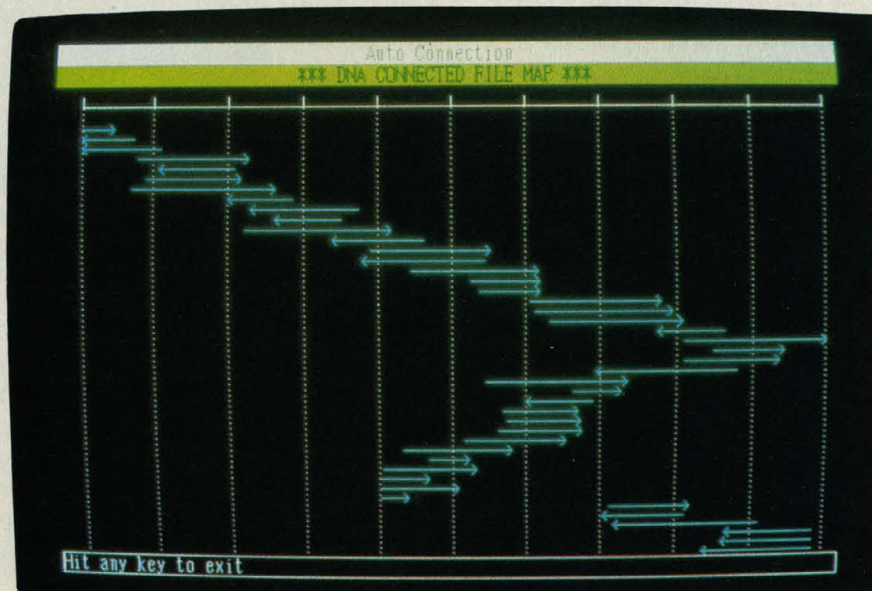
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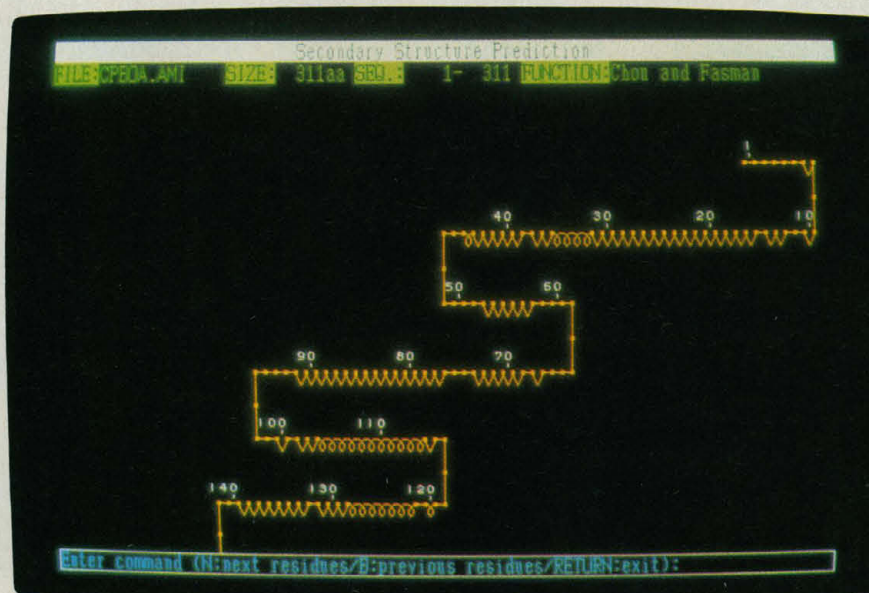
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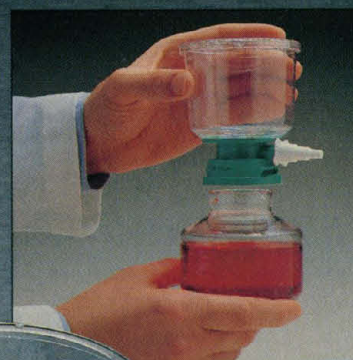
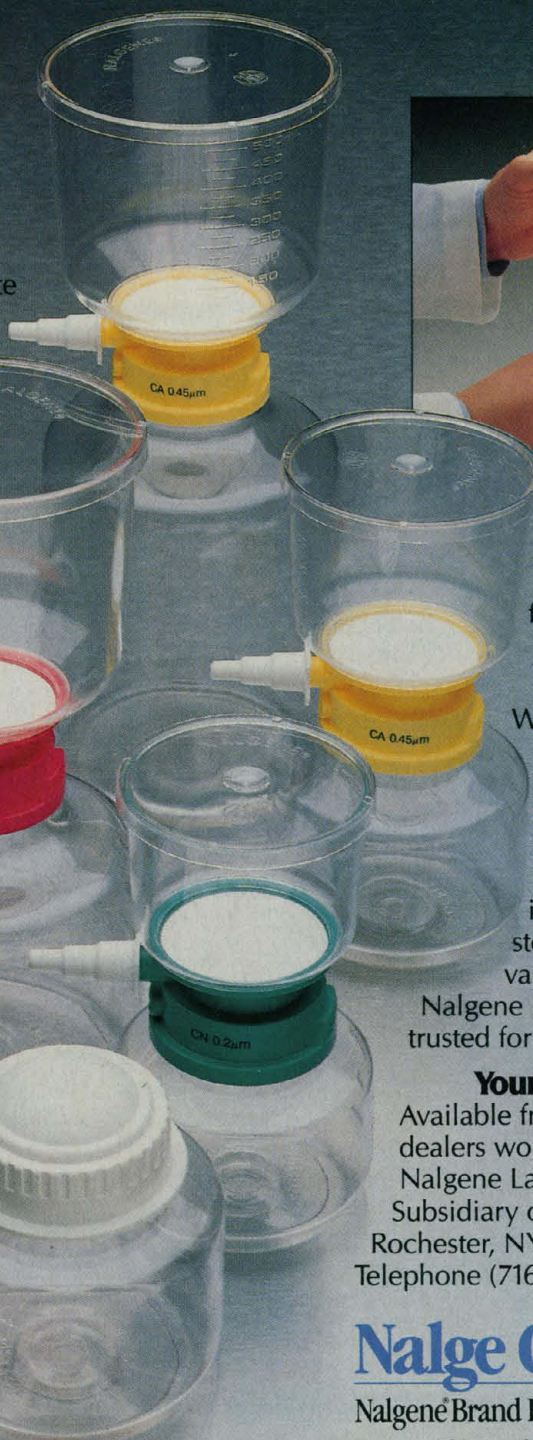
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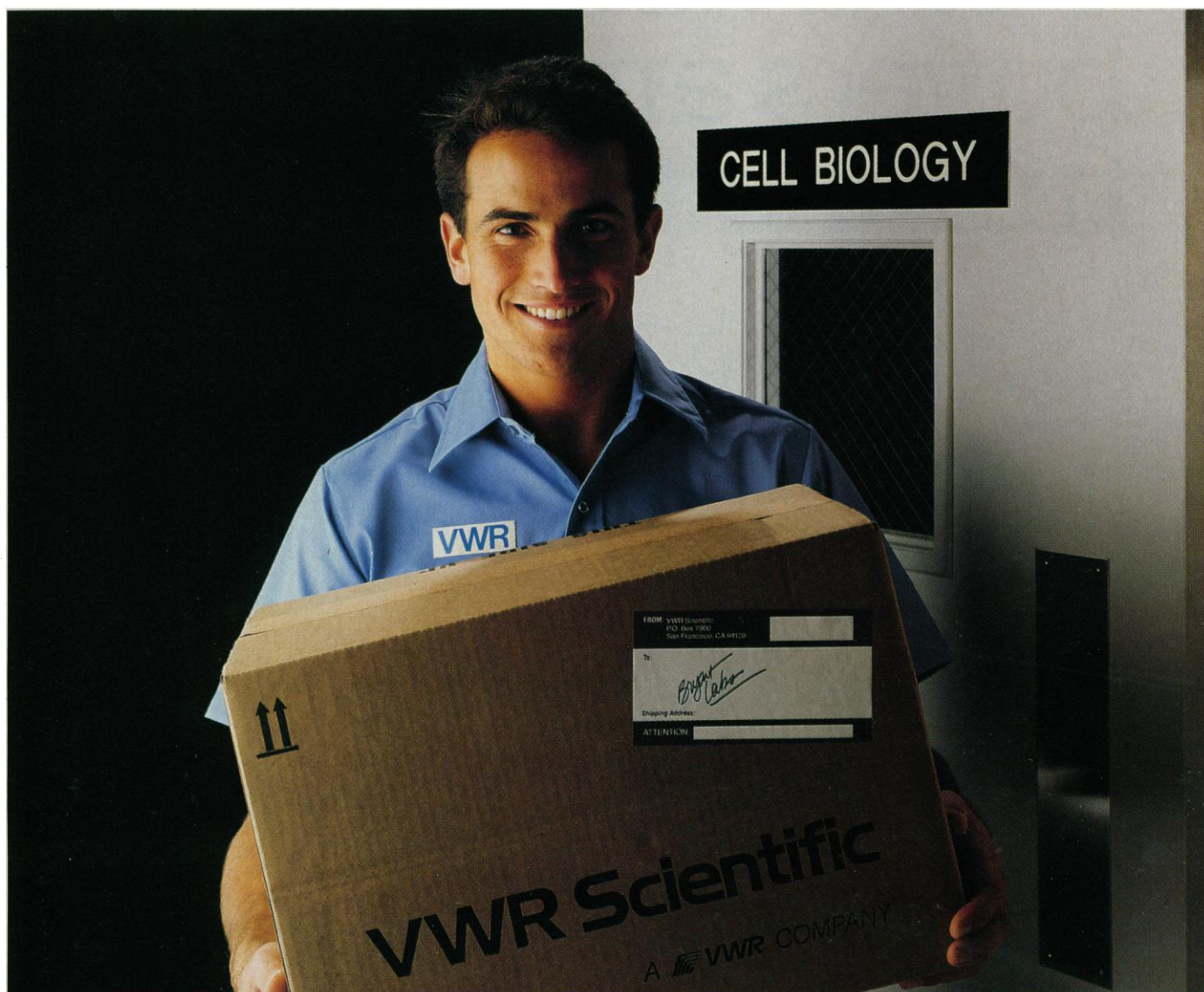
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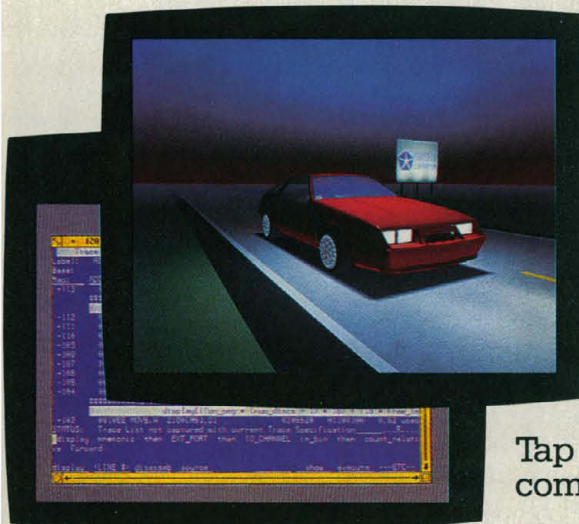
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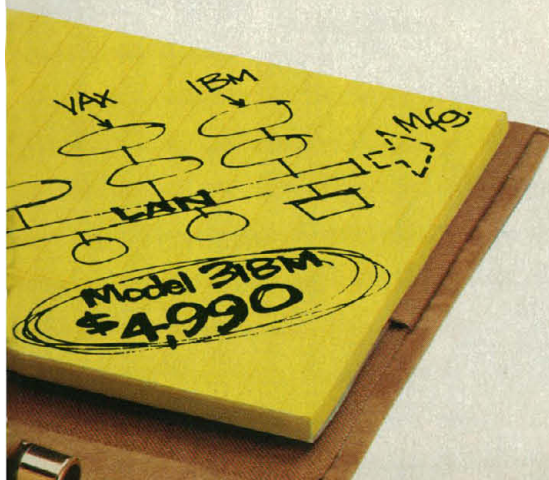
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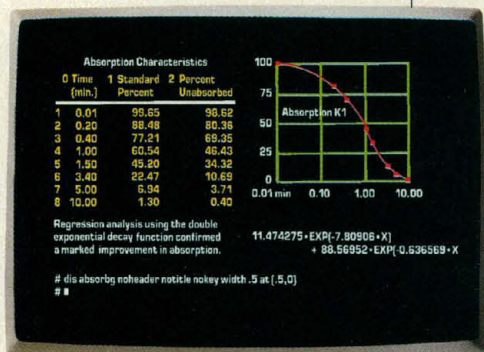
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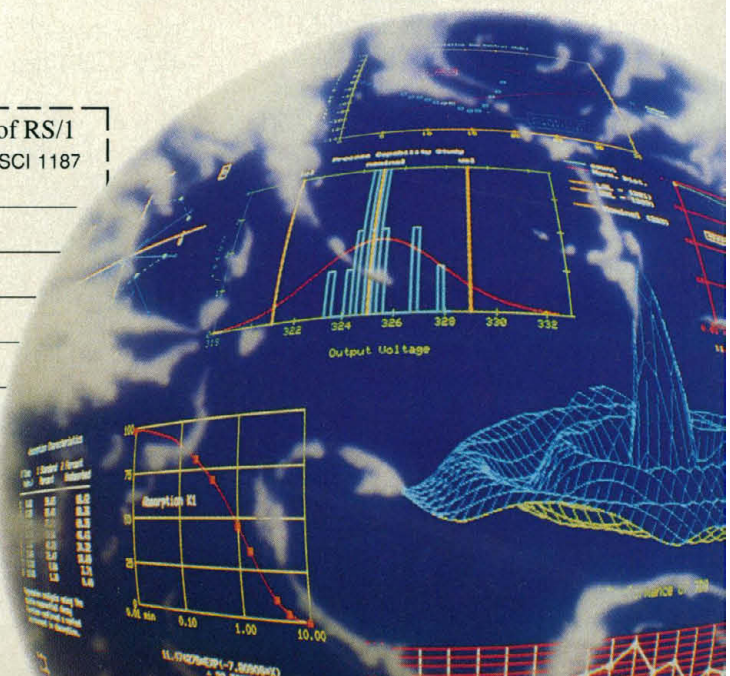
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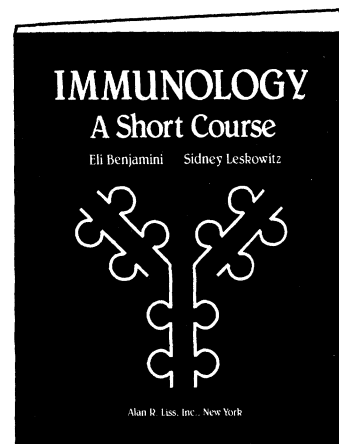
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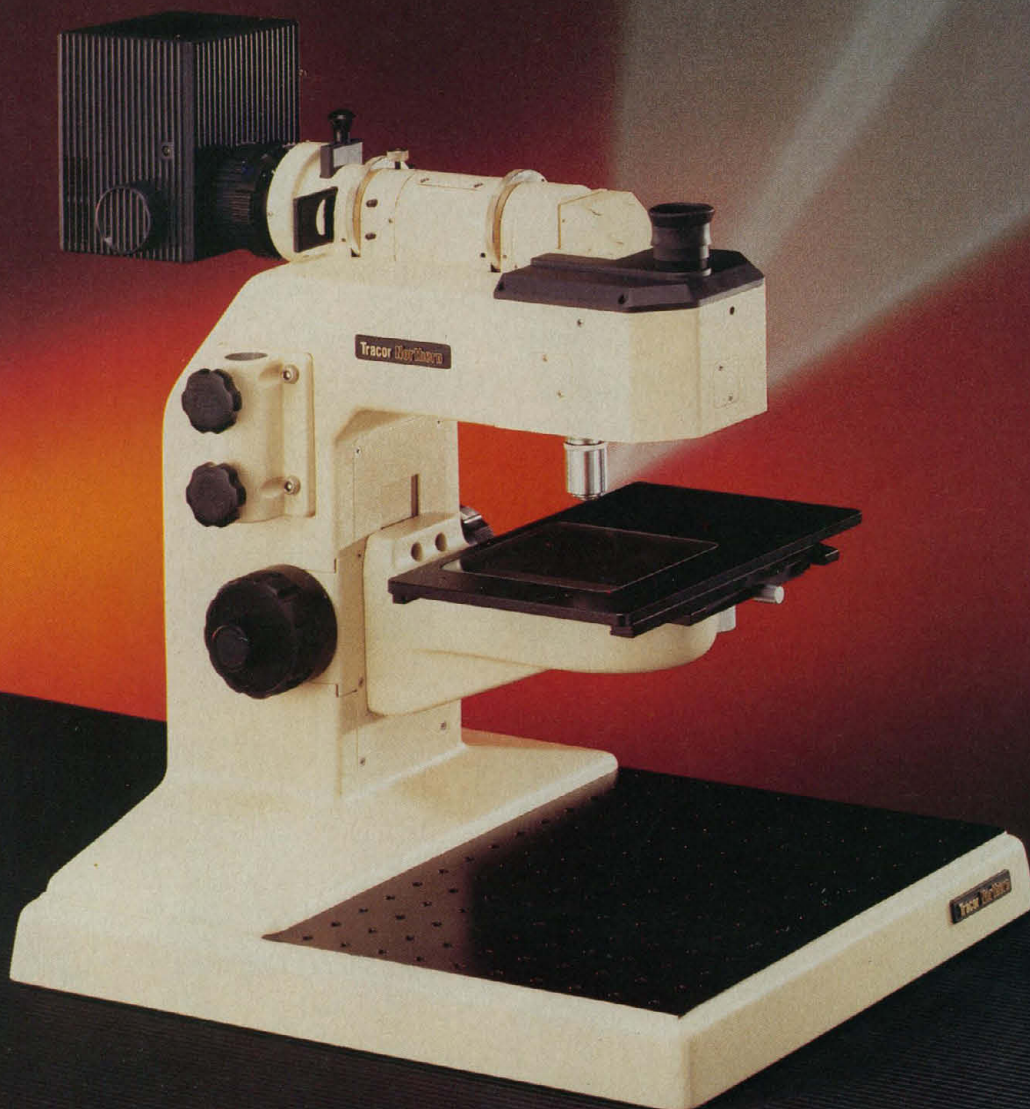
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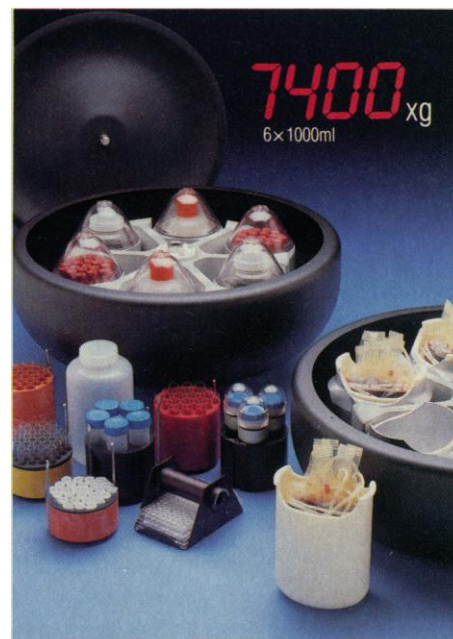
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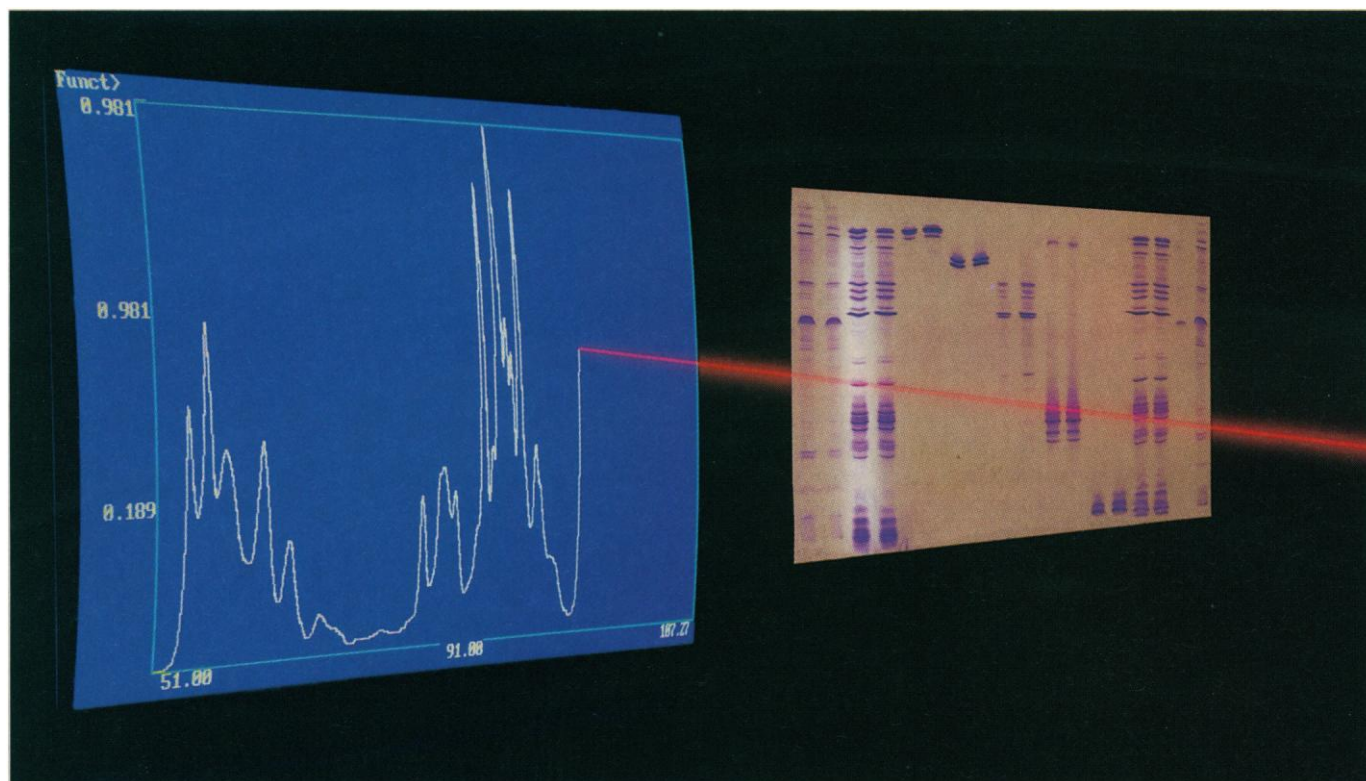
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