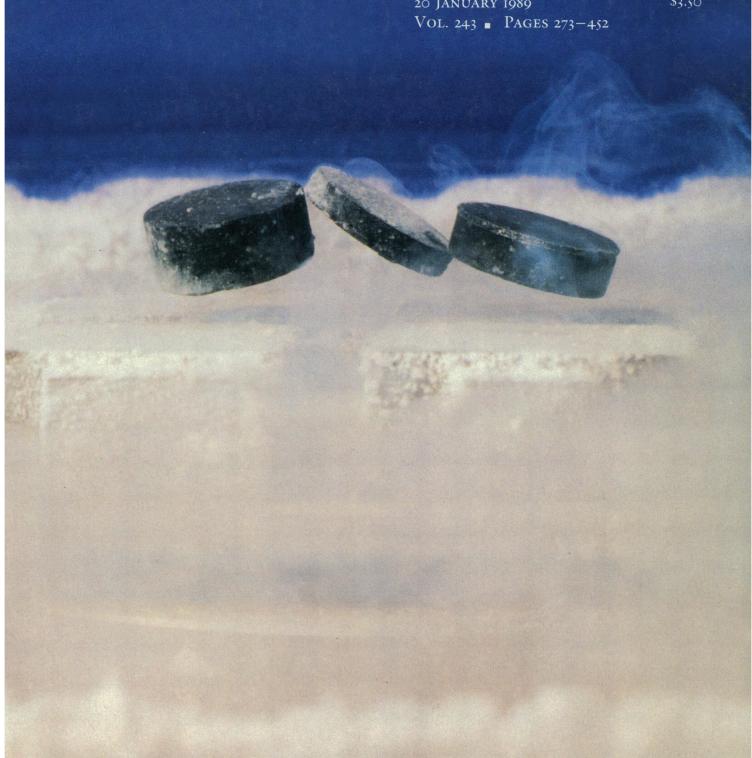
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# SCIENCE

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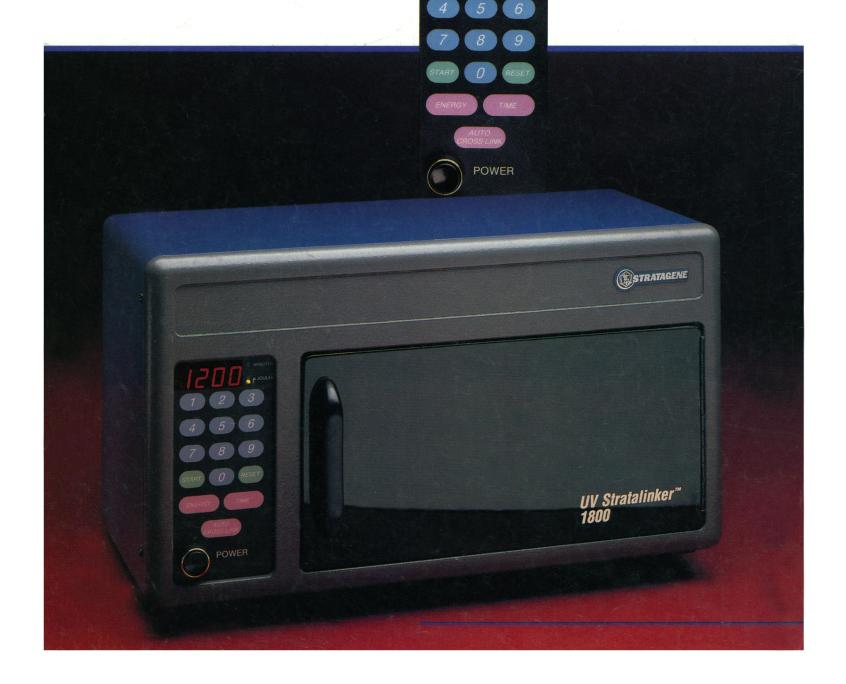
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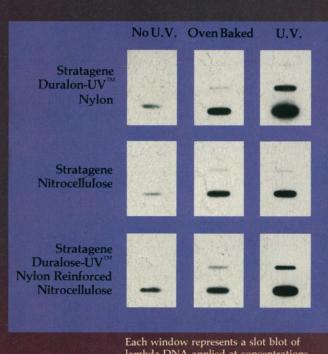
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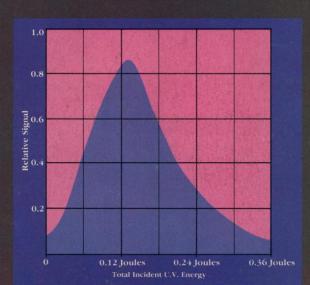
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The effects of altering the incident energy for crosslinking nucleic acids to nylon membranes. The peak signal intensity is at approximately 0.12 Joules. The significant drop in signal intensity at energies below and above 0.12 Joules demonstrates the limited optimal range for U.V. treatment.



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## Science

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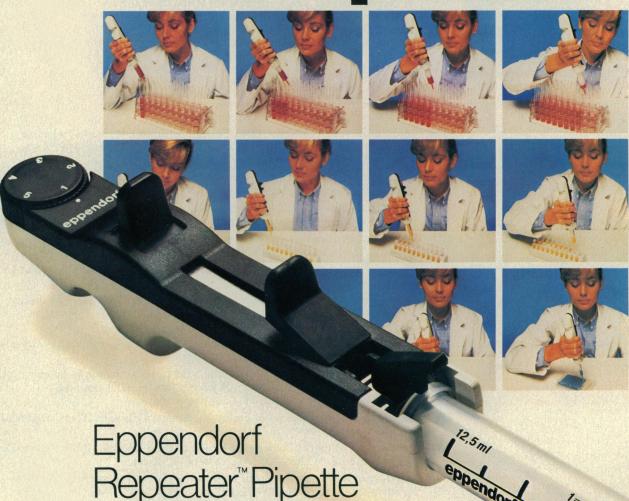
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#### This Week in

### Science

#### Sexual contacts between males

'N 1970, a sample survey on sexual practices and social relations was conducted in the United States; 1450 of the participants were men who were 21 years old or older. This was almost a decade before the first cases of AIDS were to be identified, and many questions that today would be included in a comparable survey in light of the AIDS epidemic were not then asked. Nonetheless, the 1970 survey reveals patterns of sexual contacts between males at and before that time and the prevalence of male-male contacts; these data may contribute to a better understanding of how the AIDS virus and the disease it causes have spread. Fay et al. describe how the survey was conducted and the methodologic and sociologic factors that may have contributed to the willingness of participants to respond and to the thoroughness and forthrightness of their answers (page 338). The survey results are discussed and compared with results of a 1988 survey and with data collected in the original Kinsey study on sexual practices that was begun a half century ago. Booth discusses plans by the U.S. government for a national probability survey on human sexual behavior (page 304).

#### Sun sheds light on the earth's mantle

**▼** HE earth and the other terrestrial planets may be richer in iron and perhaps calcium and titanium than was previously assumed (page 367). For the most part, the elemental compositions of the planets and the sun have been inferred from analyses of chondritic meteorites; the abundances of elements in chondrites were thought to be representative of those in the primitive nebula from which the entire solar system formed. However, spectroscopic analyses of the sun's corona and photosphere indicate that the sun may have more iron and possibly more calcium than do the chondrites; perhaps, with regard to those elements, chondritic meteorites are not accurate proxies of the early nebula. Calculations by Anderson, based on the solar data and supported by certain geophysical and chemical data, point to an enrichment of iron (FeO) in the lower mantle of the earth compared with the iron abundance in the upper mantle and to a possible overall enrichment of calcium. Exact knowledge of the earth's composition is crucial for explaining the earth's origin and evolution.

#### Scanning and tunneling along DNA

UST a few years after its invention, the promise of the scanning tunneling microscope for biologic applications is being realized: this instrument has become a valuable tool with which the topographic features of native molecules can be observed at high resolution. In the studies of Beebe et al., calf thymus DNA molecules were put on graphite substrates that served as the conductive surfaces for electron tunneling (page 370). Many informative highresolution images were obtained. Some of the double-stranded DNA molecules had the appearance of twisted ladders. Both the major and the minor grooves of the DNA molecules were resolved, and it was possible to measure the distances between these grooves. In one sample, there was a bump in the structure every 27 to 50 angstroms that corresponded to the pitch of the helix; the unevenness noted in the inter-bump distances in all samples may have resulted from forces at the surfaces of the molecules, dehydration of the molecules under study, or intercalation with ionic

#### Tin foils hypertension

Injections of tin have prevented the development of hypertension in a group of rats that would otherwise have experienced a rapid rise in blood pressure between 5 and 13 weeks of age (page 388). In earlier studies of these spontaneously hypertensive rats (SHR), Sacerdoti et al. had observed that, during the developmental phase of

hypertension, there was an increase in arachidonic acid metabolites that are generated by cytochrome P-450-dependent monooxygenases; when the hypertension was established, metabolite levels returned to those observed in normal rats. Tin induces a kidney enzyme (heme oxygenase) that affects the availability of heme for heme-containing enzymes such as cytochrome P-450-dependent monooxygenases; thus tin (in the form of SnCl<sub>2</sub>) was injected into rats, and levels of cytochrome P-450 and arachidonic acid metabolites were monitored. In young SHR rats, these were depressed and blood pressures were normalized. Tin kept the young rats' blood pressures under control for the duration of the study (14 weeks) but had no effect on the hypertension of adult SHR rats.

#### **Retinal cell fates**

■ VEN after they have stopped dividing, cells in the retina of a "plastic": those cells that remain attached to the outer limiting membrane of the retina will develop into photoreceptors, but those that migrate to the inner retina will be exposed to new microenvironmental signals that will induce their differentiation to neurons. This scenario for cellular commitment in the developing retina, proposed by Adler and Hatlee, is consistent with the results of studies in which cells from chick embryo retinas were placed in culture and evaluated between the sixth and tenth day of embryonic development; during this period mitosis has ended but cell migration in the retina and cell differentiation are still going on (page 391). At day 6, about 70% of the cells differentiated into photoreceptors, whereas at day 10 about 80% of the cells became neurons; yet, in the egg, the differentiation of neurons has been observed to precede the differentiation of photoreceptors. Thus, differentiation to a photoreceptor is proposed to be the "default" pathway that embryonic retinal cells will take in the absence of neuron-inducing signals in the egg or in the culture system.

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#### A Tax on Sin: The Six-Cylinder Car

f taxes are inevitable we might as well have those that serve the national need and are popular at the same time. For this purpose, taxes on sin seem to be the only sensible choice. There are two types of sin: those committed by other people and those committed by oneself. Taxes on the sins of others will of course have wide approval; taxing the wicked is exactly what the Internal Revenue Service should be expected to do. On the other hand, taxing one's own sin is a violation of civil liberties and an outrageous intrusion on the inalienable right to the pursuit of happiness. Such taxes, however, have some positive aspects. It is somewhat like going to a charity ball at which conspicuous consumption can be rationalized on the basis that the money spent is not for one's personal pleasure, but rather a contribution to the helpless and the homeless who are the recipients of the charity. It allows one to indulge and expiate one's sins at the same time, while also acquiring something of a reputation as a bon vivant. Nothing is as deadly to one's reputation as being considered totally virtuous. Because most people like to be classed as charming scalawags, the federal government might as well benefit from the urge to sin.

Once the decision to tax has been made, the next step is to identify those sins that can be taxed to serve the national interest. One that seems obvious is owning a car that gets less than 30 miles per gallon of gasoline. Science and technology are steadily improving the efficiency of automobiles so that cars averaging 30 miles per gallon can be readily obtained with a slight sacrifice of comfort, and those giving 40 miles per gallon with a little more discomfort. To a large extent the improvement in efficiency and conservation resulting from small cars has helped break the OPEC cartel and avert another energy crisis. Has the United States proceeded intelligently to improve and expand this conservation program? Of course not. Energy efficiency and low gasoline prices have resulted in a return to heavier cars together with government encouragement of this sin by backsliding on the mileage-pergallon goals given to the automobile industry. Because most driving occurs with a single passenger in the car, a big car is energy-inefficient and adds to the CO<sub>2</sub> problem, the acid rain problem, and the NO<sub>x</sub> pollution problem. Today about a third of the U.S. trade deficit results from the importation of foreign oil. Thus, a tax that would maintain an appropriate cost of gasoline and one on cars of high horsepower would decrease fuel consumption, make a contribution to environmental problems, provide added revenue for child care, care of the chronically ill and other worthy enterprises, and improve our balance of payments.

Such a tax could be designed to be neither regressive nor coercive. If cleverly designed, and introduced over a period of years, it would not increase the cost of transportation for the average person because efficiency would be balanced against cost. It would not be coercive because the laws could specify that any individual would have the right to buy a heavy, mileage-inefficient car, but such a car would have an appropriately heavy "sin tax," so that the buyer would pay for the luxury. Any individual purchasing such a large and extravagant car would, of course, be considered sinful, but a sort of Robin Hood type of sinner, of whom the gossips could say, "There goes old Joe, can't resist the temptation of a gas guzzler, but on the other hand, he's supporting one widow, two orphans, and three toxic waste dumps." Since this type of sin would be expensive, only those who were excessively virtuous in other areas would feel the necessity of establishing themselves as sinners in this new category. If phased in properly, the main sacrifice would be in comfort, and it is widely understood that loss of comfort is almost synonymous with virtue. Once this kinder, gentler approach to sin and taxes became widely accepted, the sin tax could be extended to other areas in a similar approach to produce a national policy.

In the past, sin has been almost universally identified with personal preference. Sanctimonious and humorless attacks on smokers, drinkers, philanderers, and other offenders have had a polarizing effect, either making the one attacked look like a criminal or the attacker look like an inquisitor. A system of pay-as-you-go sin, in which sin is defined on the basis of national policy rather than personal peccadillo, could put self-indulgence in the service of the national good.—Daniel E. Koshland, Jr.



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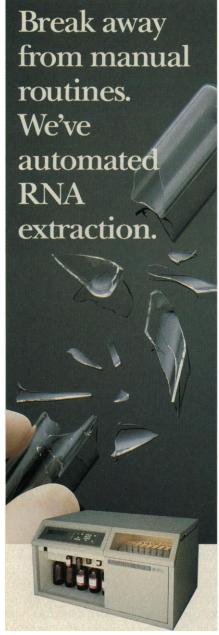
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ing proper statistical methodology will go a long way toward relieving the apprehensions of those who fear that it is an unreliable scientific method.

THOMAS C. CHALMERS\*

Technology Assessment Group, Department of Health Policy and Management,

Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115

\*Distinguished Physician, Boston Veterans Administration Medical Center, Boston, MA 02130 and President and Dean Emeritus, Mount Sinai Medical Center, New York, NY 10029.

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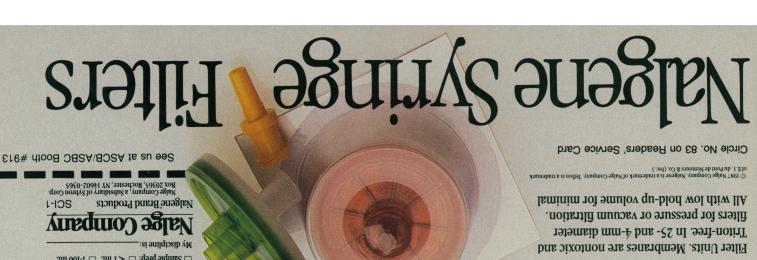
#### Dues Increase Announced

The AAAS Board of Directors has approved an increase in Regular member dues and in nonmember subscription rates for 1989. Rising costs associated with publishing and mailing Science every week led to the Board action. Effective 1 April 1989, the Regular member dues rate will be \$75 and the nonmember subscription rate will be \$120. Student, Emeritus, and Spouse memberships will remain the same. Student and Emeritus members receiving Science currently pay dues of \$40, while Spouse and Emeritus members who do not receive Science pay a \$17 dues rate.

Postal rates for delivery outside the United States will remain the same.

Member dues and voluntary contributions furnish the critical base upon which AAAS activities stand or fall. Those activities include internationally recognized publications; leadership in science and mathematics education; scientific freedom and human rights; opportunities in science and engineering for minorities, women, and the disabled; public understanding of science and science policy; fellowship programs with the Congress and the media; and cooperative projects with other scientific, engineering, and educational organizations.

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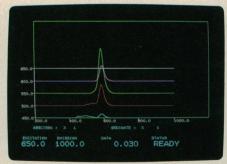
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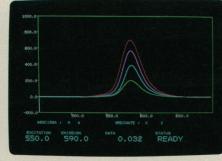
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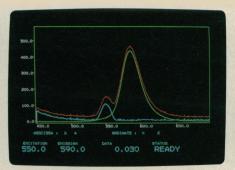
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**8:00 AM** Automatic 3D Search for Optimal Excitation and Emission Wavelengths



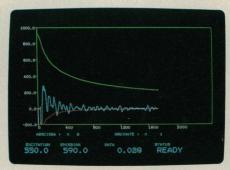
**8:09 AM** Determination of an Optimal Band Pass from 1.5 to 30nm



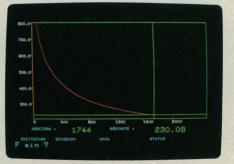
**8:17 AM** Spectral Manipulation Showing Subtraction of the Background with Zooming



8:26 AM Quantitation Analysis Using a Higher Order Calibration Curve



**8:37 AM** Kinetic Studies Showing 1st and 2nd Derivatives



**8:51 AM** Automatic Fura-2 Ca ++ Determination

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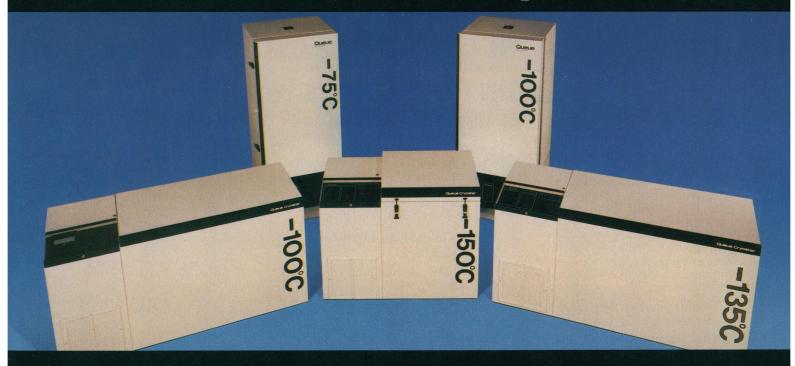




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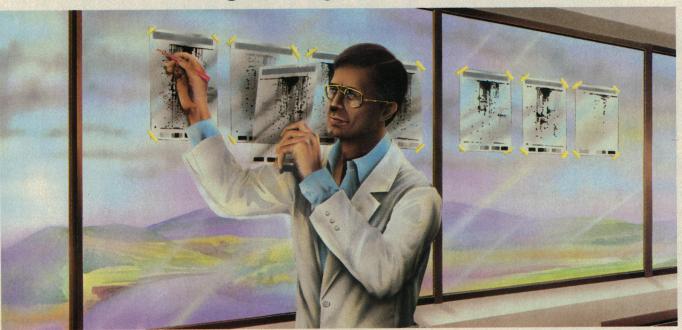
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7230	-100°	13.0 cu. ft., upright	-75° to -100°
7180	-120°	12.85 cu. ft., chest	-100° to -120°
7160	-135°	4.3 cu. ft., chest	-100° to -135°
7140	-135°	9.4 cu. ft., chest	-100° to -135°
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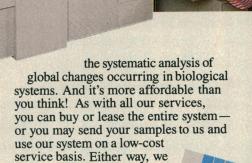
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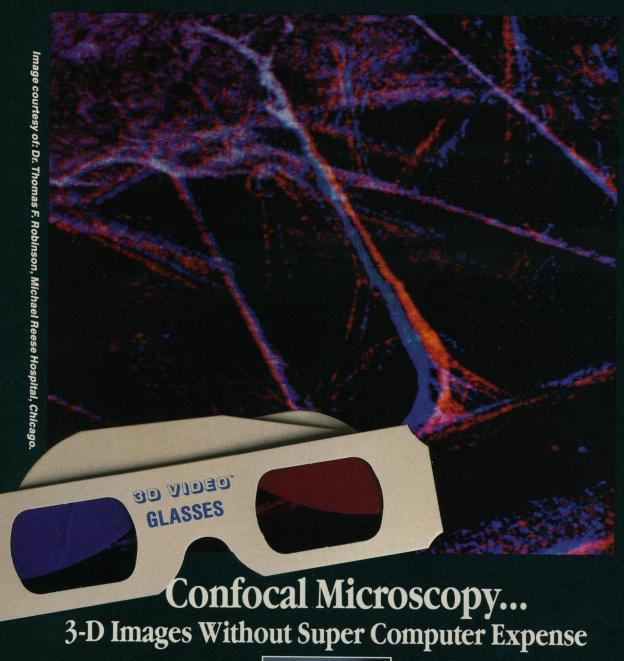
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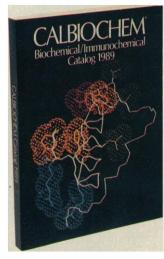
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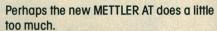


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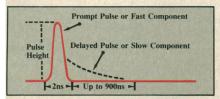
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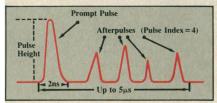
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Traditional counters are based on twodimensional pulse analysis: pulse height and pulse counts. They provide a level of sensitivity that's merely adequate for most applications.

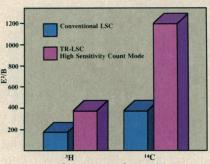
Patented TR-LSC adds a third dimension to pulse analysis: a pulse index that measures over time the afterpulses associated with background. In doing so, TR-LSC clearly distinguishes between beta pulses and background pulses. By identifying, and reducing, background noise, TR-LSC provides a great level of sensitivity (see chart comparing E<sup>2</sup>/B values) and more accurate counts.





The typical beta scintillation pulse (top) is very fast and may be followed by a delayed component. The typical background pulse is followed by a series of afterpulses. Patented TR-LSC distinguishes between the two.





Typical E<sup>2</sup>/B values for <sup>3</sup>H and <sup>14</sup>C using traditional and TR-LSC counting.

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Traditional technology limits sensitivity. The improved sensitivity of TR-LSC, however, allows you to achieve accurate DPM results for single and dual label samples in volumes as small as 25  $\mu$ L. That can add up to substantial savings in sample and cocktail costs.

#### Slash radioactive waste disposal costs

Counting smaller samples will also reduce radioactive liquid disposal costs, which can be \$500 per drum, or higher. While you may not pay this cost directly, your operating budget could be affected. With TR-LSC you can cut operating costs while reducing environmental hazards.

#### Increase sample throughput by over 80%

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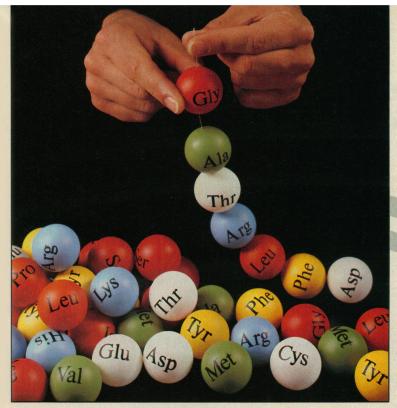
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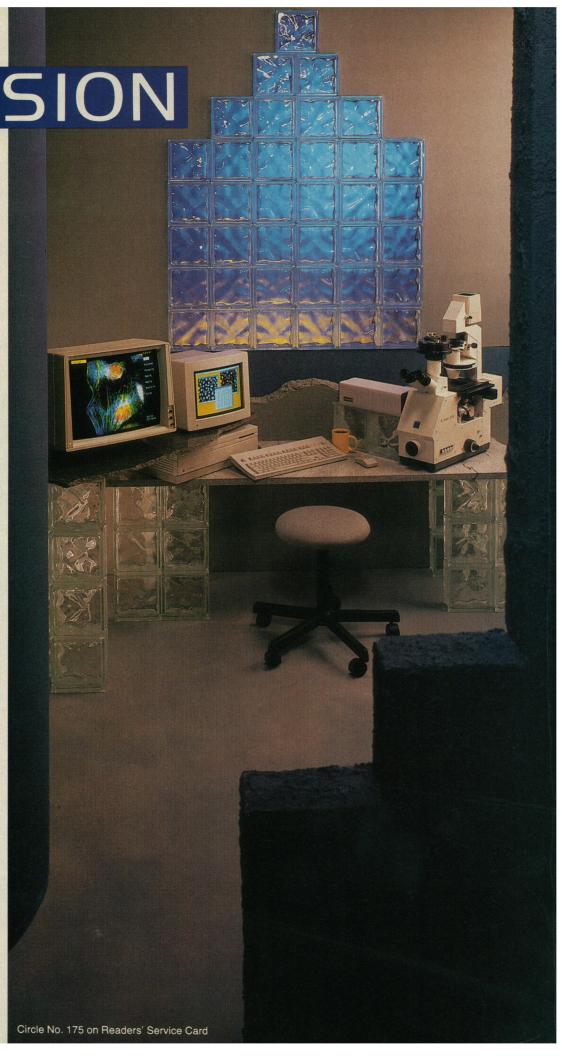
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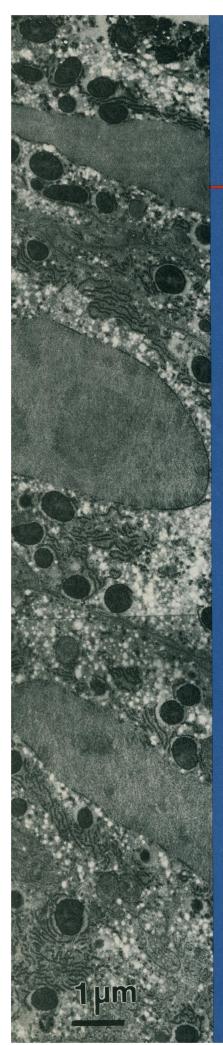
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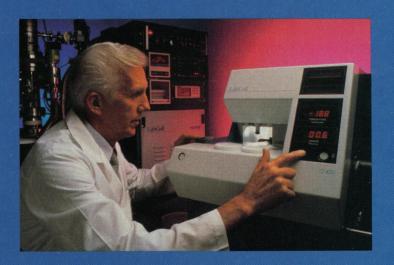
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and amino acid composition

Sp. activity: >14,000 U/mg by radioreceptor

assay using placenta membranes

Quantity:  $10 \,\mu \text{g}$ ,  $50 \,\mu \text{g}$ ,  $100 \,\mu \text{g}$ , 1 mg, 10 mg

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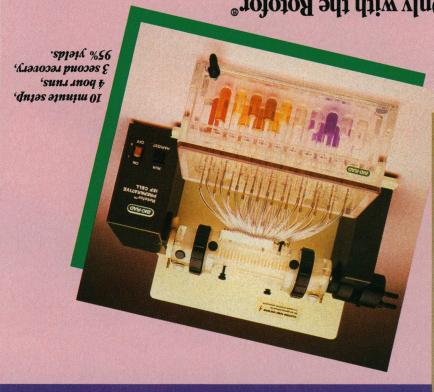
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- L. Egen, N.B., Thormann, W., Twitty, G.E. and Bier, M., Electropbonests '83, H. Idrai, ed., Walter de Gruyter, Berlin 1984, pg. 547-550.
   Z. Egen, N.B., Bliss, M., Mayersohn, M., Owens, S.M., Anniyited Biochemistry, Arnold, L. and Bier, M., Anniyited Biochemistry, Arnold, L. and Bier, M., Anniyited Biochemistry,
- 172, in press (1988). 3. Petrash, M.J., Delucas, L.D. and Egen, N.B., Biochemistry, in press (1988).

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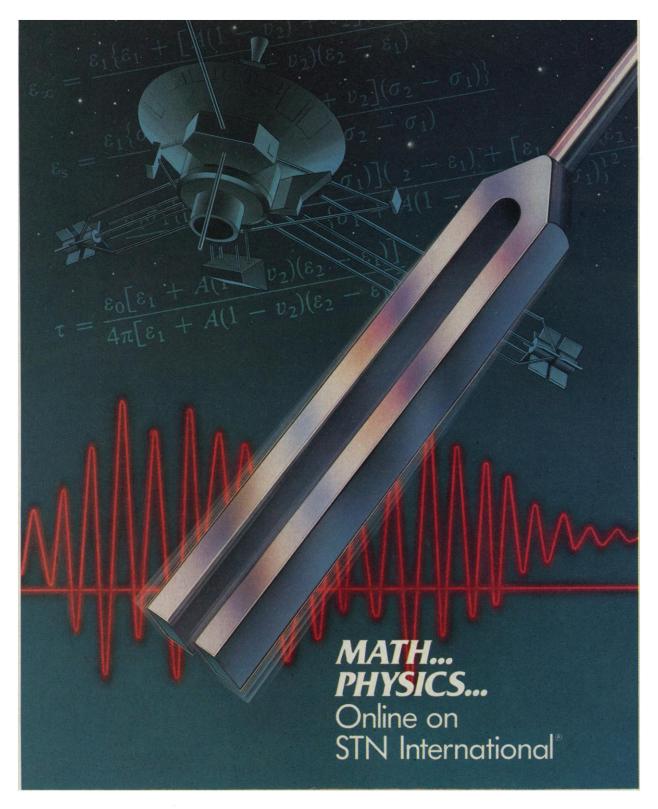
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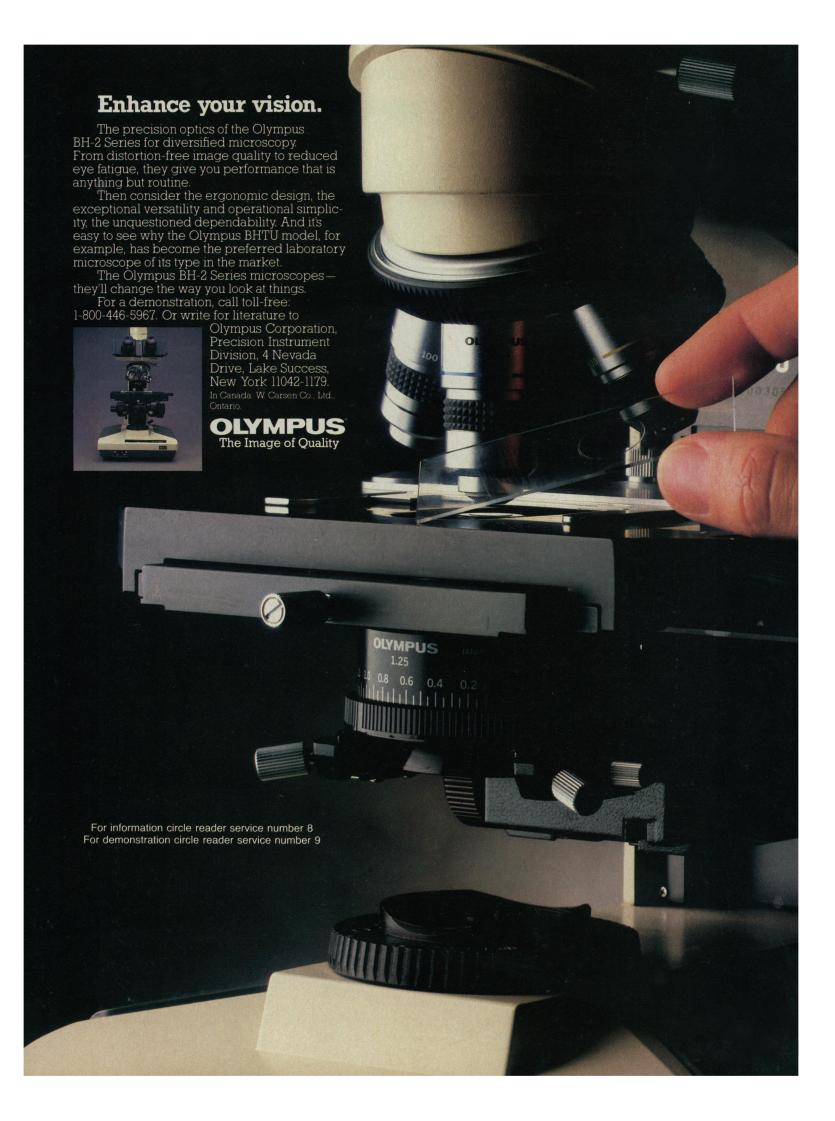
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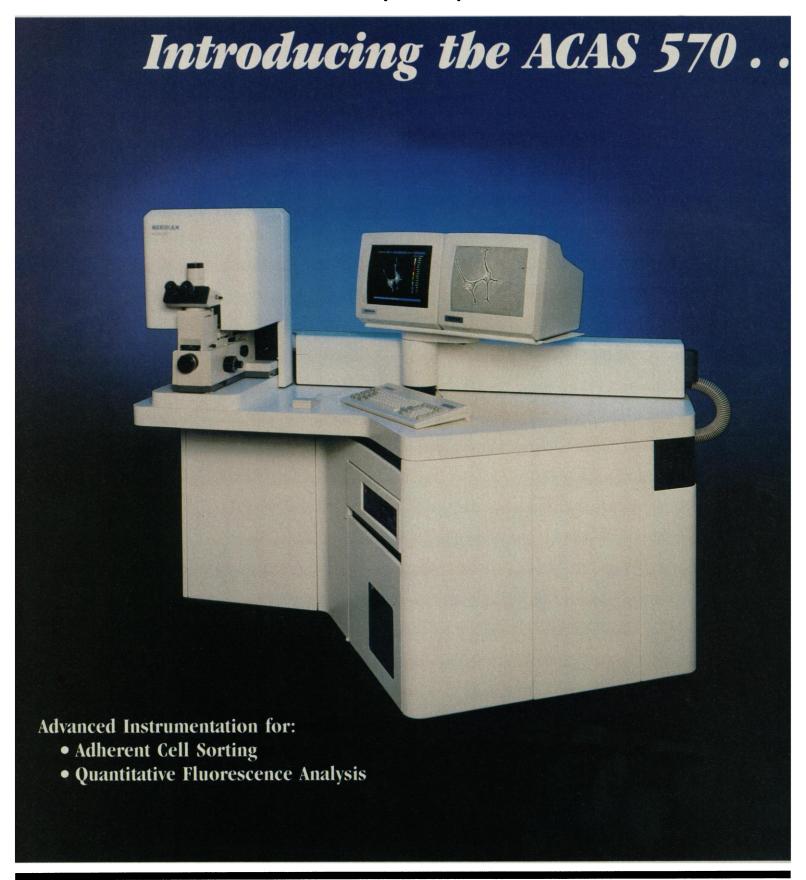


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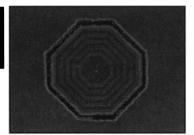
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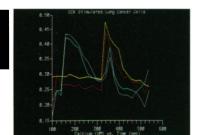
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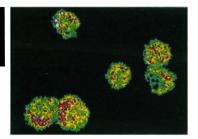
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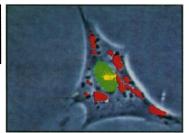
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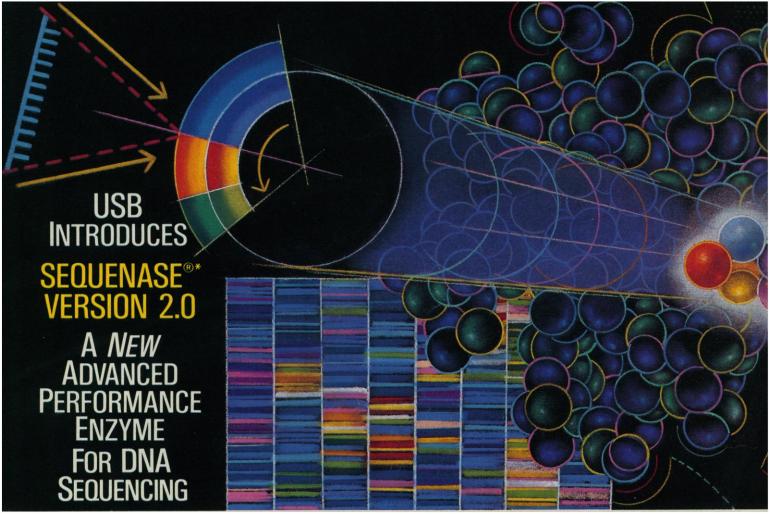
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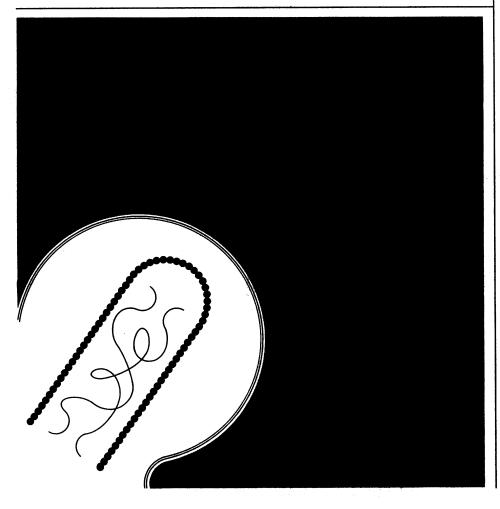
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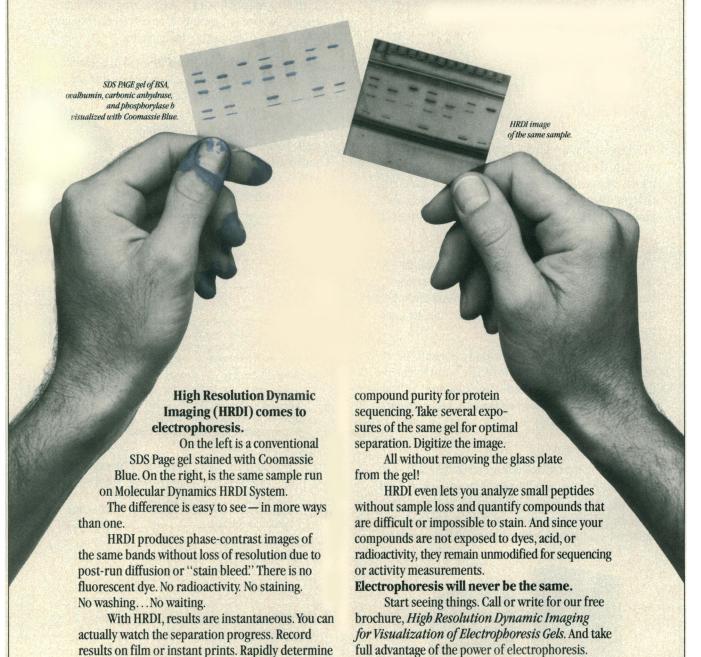
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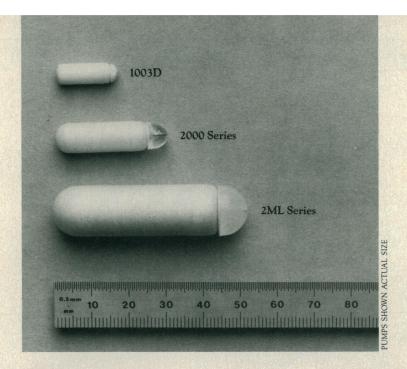
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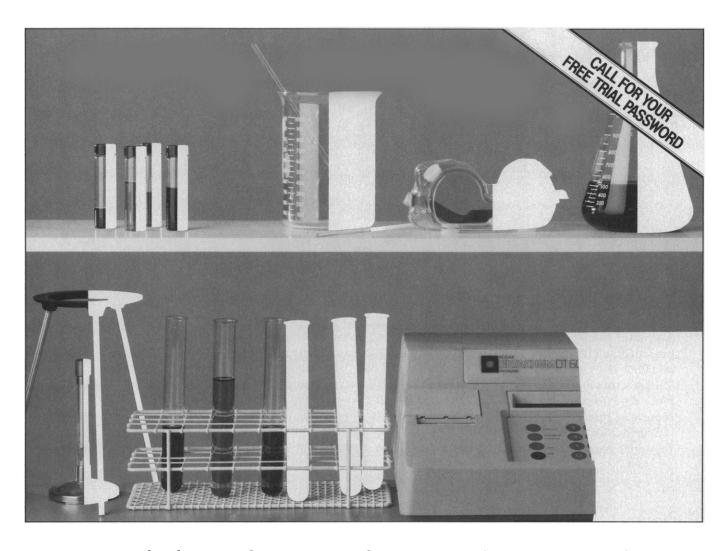
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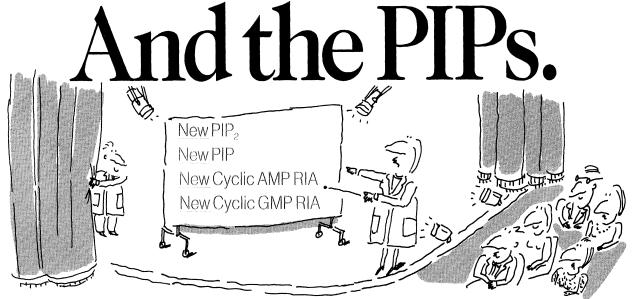
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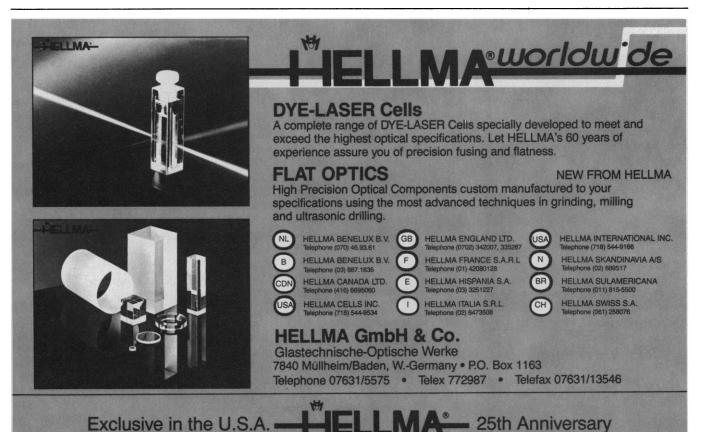
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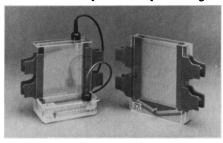
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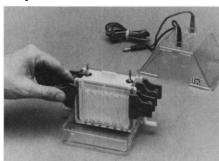
You can use the Tall Mighty Small to run 7 cm mini gels and 2-D gels as well. To run 7 cm gels, you simply use standard Mighty Small plates and spacers and clamp them into place on the SE 280. To run 2-D gels, you will need the SE 220 Tube Gel Adaptor described below.

For casting 11 cm gels for use in the SE 280, there is the SE 295 Tall Mighty Small Gel Caster. It is possible to cast as many as four gels at a time in the SE 295. Gels may be 0.75 or 1.5 mm thick. The SE 295 will form either uniform concentration or gradient gels. A V-shaped cavity at the base of the unit allows the gradient to stabilize before entering the gel sandwiches, assuring that all gels are identical.

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• 2-D Electrophoresis In the Small-Gel Format. Hoefer's new SE 220 Mighty Small Tube Gel Adaptor now makes it possible for you to do 2-D electrophoresis using the Mighty Small I and II or the new Tall Mighty Small Vertical Slab Unit. The SE 220 clamps into place on the upper buffer chamber of either Mighty Small Unit. Using the SE 220 you can cast up to six tube gels at one time, 7.3 cm long x 1.5 mm in diameter. For casting fewer gels, stoppers are provided for sealing unused holes. On the SE 250 Mighty Small II, it is possible to attach two SE 220 Tube Gel Adaptors - one on each side of the upper buffer chamber pod.

When tube gels in the SE 220 are polymerized, you simply add buffer and sample, fit the Mighty Small lid in place, connect the unit to a power supply such as the PS 500XT (see below) and begin your run. During a run, gel tubes are completely surrounded by upper buffer, for even heat dissipation.



After focusing is complete, you can easily extrude gels from tubes with the extractor that comes with the unit. Then you can run the second dimension by placing a focused tube gel on top of a 1.5 mm slab gel in the Mighty Small vertical unit and running at 100 constant volts.

The new SE 250C-2D Mighty Small is a convenient, economical 2-D system. The package includes the Mighty Small II Vertical Slab Unit, the Mighty Small Tube Gel Adaptor and the SE 275 Mighty Small Gel Caster for casting up to four 7 x 8 cm gels at one time. Cost of the SE 250C-2D System is less than what you'd pay if you bought the individual instruments separately. Circle No. 48 on Readers' Service Card

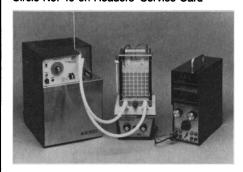
• Transfer from Four Mini Gels at a Time. Hoefer's TE 22 Mighty Small Transphor® is the ideal unit for transfer electrophoresis of small gels. Using the TE 22 you can transfer separations from as many as four Mighty Small gels at once.

Mighty Small Transphor has an electrode configuration that uses 155 cm of platinum wire, optimally spaced, to create a uniform electrical field—the key to successful transfers. To handle the heat generated by transfer electrophoresis, there is a serpentine cooling channel. The channel is covered with alumina, a conductor 40 times more efficient than glass. When a cooling liquid is pumped through the channel, buffer can be maintained at only a few degrees above the temperature of the liquid.

TE 22 gel cassettes are easy to load and hold gels firmly without squeezing. The cassettes have a 74% open-grid pattern to allow for maximum transfer. A crushable foam sponge packed into the cassette

assures total, completely even contact between gel and membrane. When cassettes are loaded and locked, tab locks ensure that perfectly even pressure is applied all the way around so there is no squeezing of the gel to cause distortion. After cassettes are loaded, they fit into grooves inside the unit.

Safety interlocks on the TE 22 lid automatically break the electrical connection when the lid is removed. There is no chance of accidental contact with charged buffer. Circle No. 49 on Readers' Service Card



• Outstanding Cooling With a Compact Unit. Hoefer's new RCB 300 Refrigerated Circulation Bath is the ideal cooling unit to use when benchtop space is at a premium. The unit is only 23 cm W x 28 cm D x 35 cm H. The RCB 300 has a temperature range of -15°C to +50°C, a temperature stability of 0.1°C, a temperature uniformity of 0.1°C and a cooling capacity of 300 watts at 20°C. The unit's high-performance circulation pump is designed for continuous running.

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- A Versatile 500 V, 400 ma Power Supply. The PS 500XT Power Supply with 7-Hour Timer can power up to four Tall Mighty Small and Mighty Small I and II units at one time. The unit can deliver up to 500 V and 400 ma simultaneously and it has an automatic crossover feature that will switch a run from constant current to constant voltage, or vice versa, when a preset limit is reached. The PS 500XT's timer will turn off the unit automatically. Set "On Hold," the unit will run indefinitely. Circle No. 51 on Readers' Service Card
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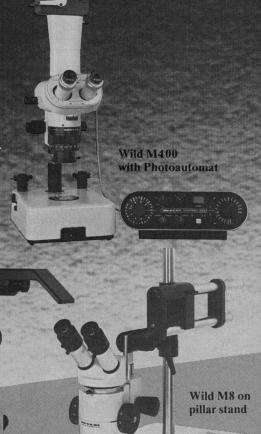
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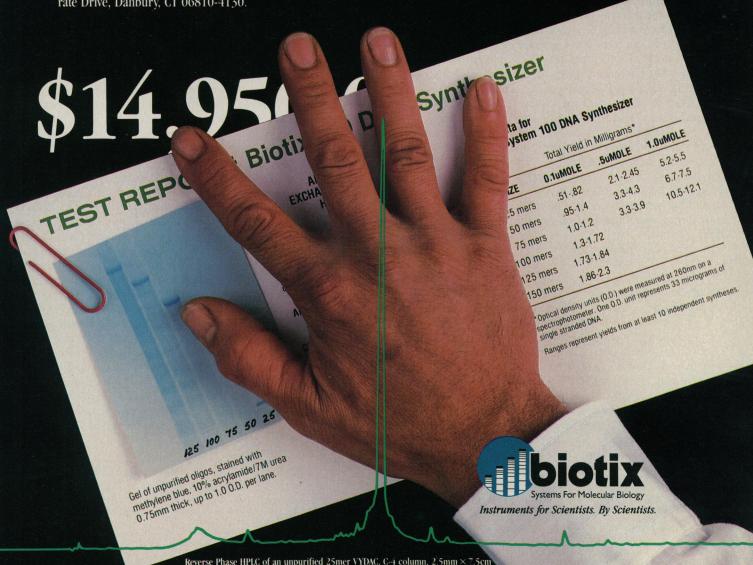
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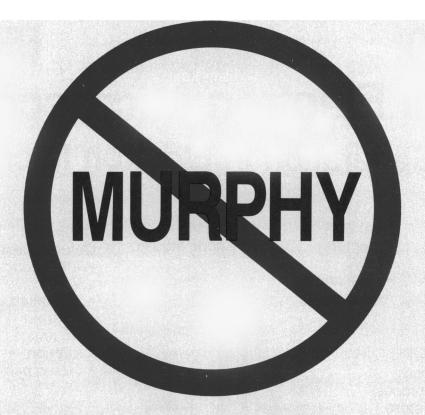


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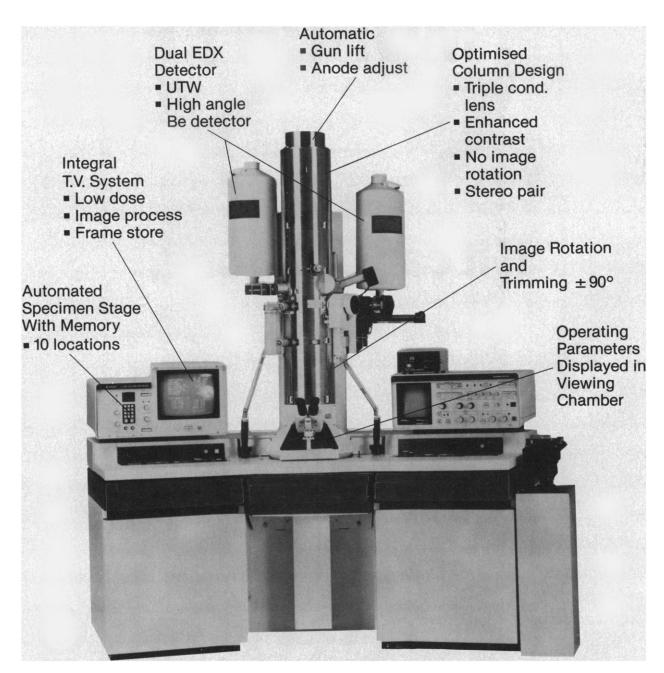
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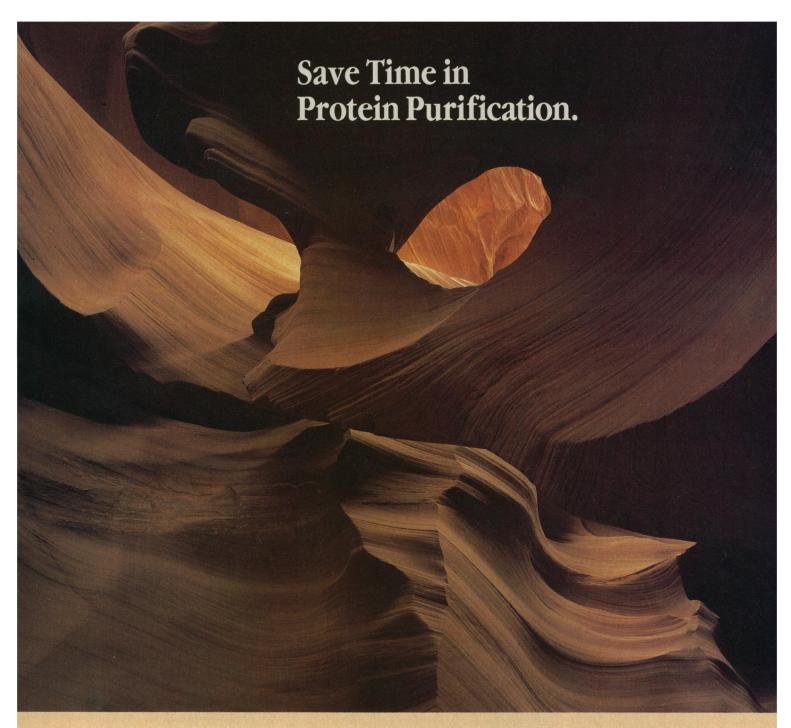


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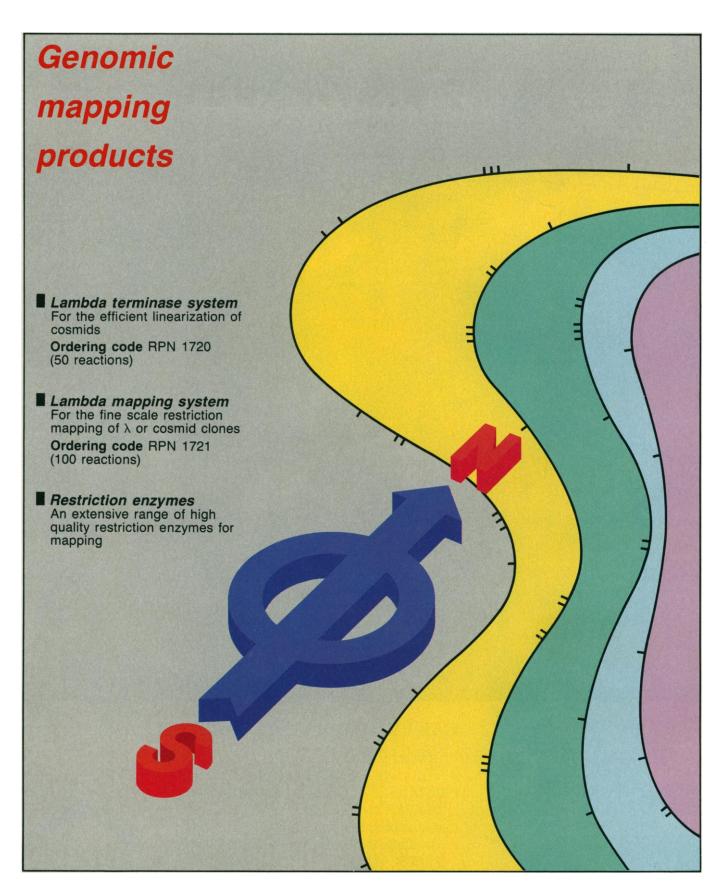
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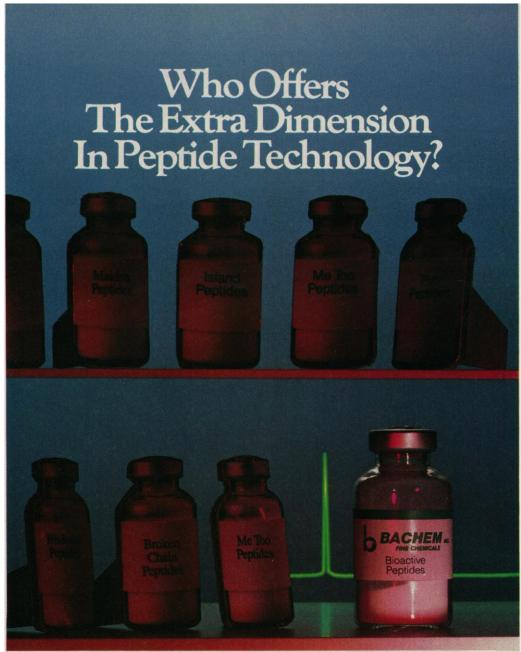
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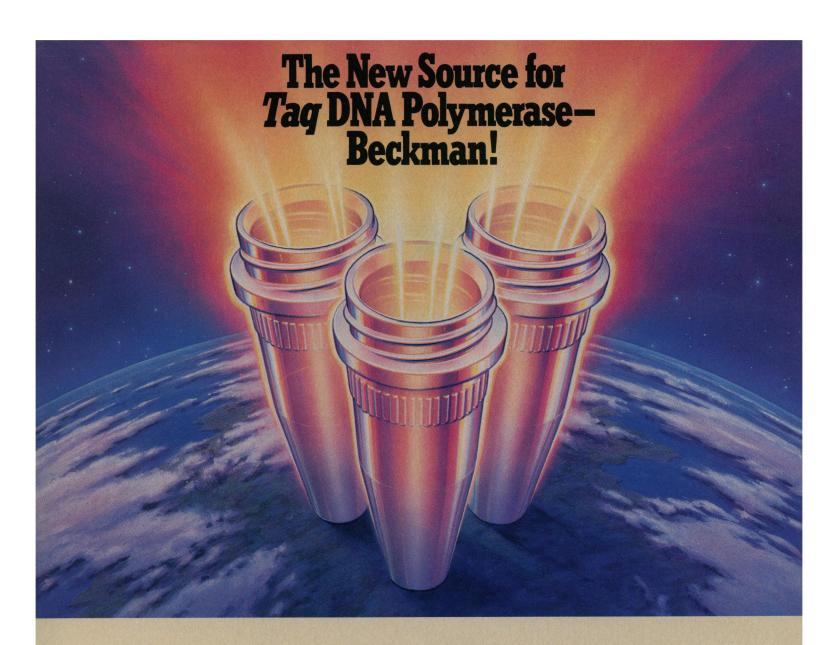
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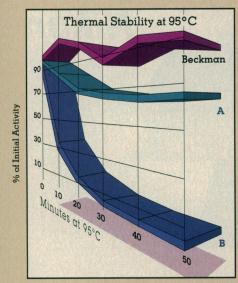
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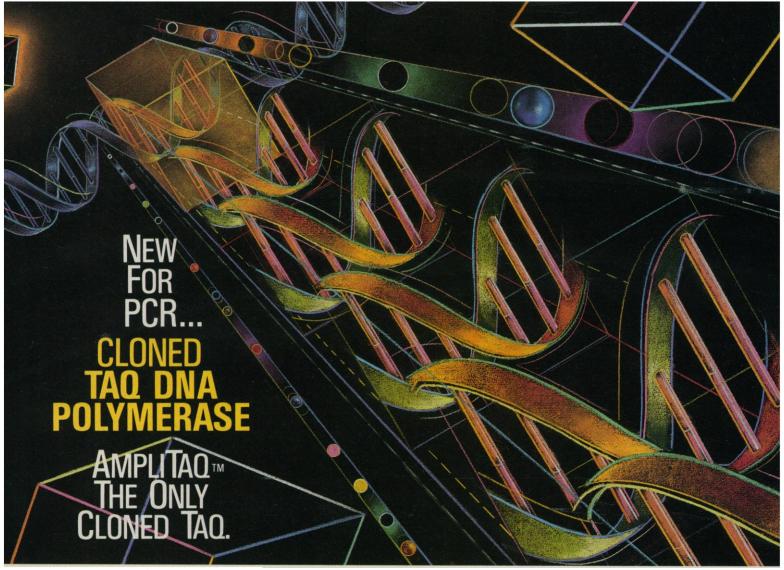
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1. Saiki, R.K., et al, Science 23, 497-491 (1988).

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responding to the facts and equities of matters at hand and to different mixes of political and policy considerations. The continuous formation and reformation of law are affected by the beliefs and attitudes of these lawmakers and by circles of influence within and without legislative and legal communities.

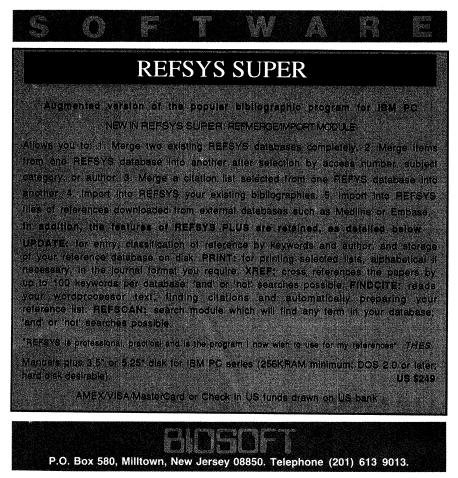
Reforming the Law is also a complex enterprise. It posits social scientists as outsiders to legal cultures and seeks to instruct them in penetrating those cultures as bearers of socially useful scientific truths. Its authors, a study group sponsored by the Society for Research in Child Development, describe the history of legal thought concerning the relationship between science and law. They review previously published analyses of judicial recognition of scientific facts and of the professional and networking behaviors of legal policy makers. They provide original data, both anecdotal and systematic, concerning the gathering and use of scientific information by legal advocates and policymakers. They catalog structures that facilitate dissemination of scientific information to consumers in the legal professions. They describe the opportunities and pitfalls associated with involvement of social scientists in litigation, legislative processes, and publication for legal audiences.

The information and advice offered are useful, but the authors' original research suffers from important limitations of design. Many of the authors reason from experiences with the dissemination of information concerning child development. Theories of child development are so diffusely and so differently relevant in legal decision-making that coherent analysis of the use of scientific evidence is difficult. These difficulties are most apparent in the context of a set of citation studies. Reforming the Law offers, for example, an analysis of citations of legal and scientific literature in cases coded by a legal research service under broad headings that appear to relate to children. The citations in these cases often refer to procedural and other matters to which child development theories are irrelevant. Because the research design fails to include a procedure for correlating citation patterns with particular issues to which scientific knowledge is arguably relevant, the results of the study are ambiguous. A second, more narrowly focused citation study is similarly imprecise. It tracks references to child development authorities in Supreme Court cases addressing agerelated restrictions upon the right of choice with respect to abortion. These cases number only six. They involve a congruence of complicated factual, constitutional, and policy concerns (for example, concern that state anti-abortion policies had been masked as child protective policies and that judicial or parental veto or notification were inappropriate responses to problems posed by immaturity). Many of these concerns relate tangentially or not at all to principles of child development. Moreover, in none of the cases was the developmental status of particular minors directly at issue. Here too, decisions to seek, offer, withhold, use, or reject the views of child development authorities are deeply ambiguous and are inadequately probed.

The authors' original research also reflects the risks of taking measurements in an unfamiliar system. As the discussion above indicates, their more systematic research attempts to make sense of the legal system by counting things. They count the numbers of legal and non-legal citations per page in judicial opinions; the numbers of publications of various kinds read by actors in the judicial system; the numbers of judicial citations of particular child development research reports; the proportions of primary and secondary citations in the opinions of particular Supreme Court justices; and the numbers of law review and non-legal citations in the opinions of "liberal" and of

"conservative" justices. Analyses of this sort can be useful, but they can also produce results akin to a Martian speculation that there is a correlation between spitting and batting averages. Closer study of the sociology of juvenile and family courts would lead to more pointed questions about the learning patterns of judicial and non-judicial personnel, just as closer study of the legal process would have helped the researchers to distinguish cases in which scientific facts inform judicial legislation (in which facts can serve the function implied by precise usage of the phrase "legislative facts") and those in which they only serve to suggest the policy implications of a rule of law that a judge feels bound to follow.

The penultimate chapter of Reforming the Law shines. This chapter, by Lois Weithorn, provides a means of integrating the information and advice contained in the preceding chapters and liberates the reader from the conception of social scientists as outsiders at the gate of a hostile legal community. Weithorn shares her coauthors' sense that law and public policy should be informed by the sciences. Indeed, she argues that the scientist's duty to inform social policy is a



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