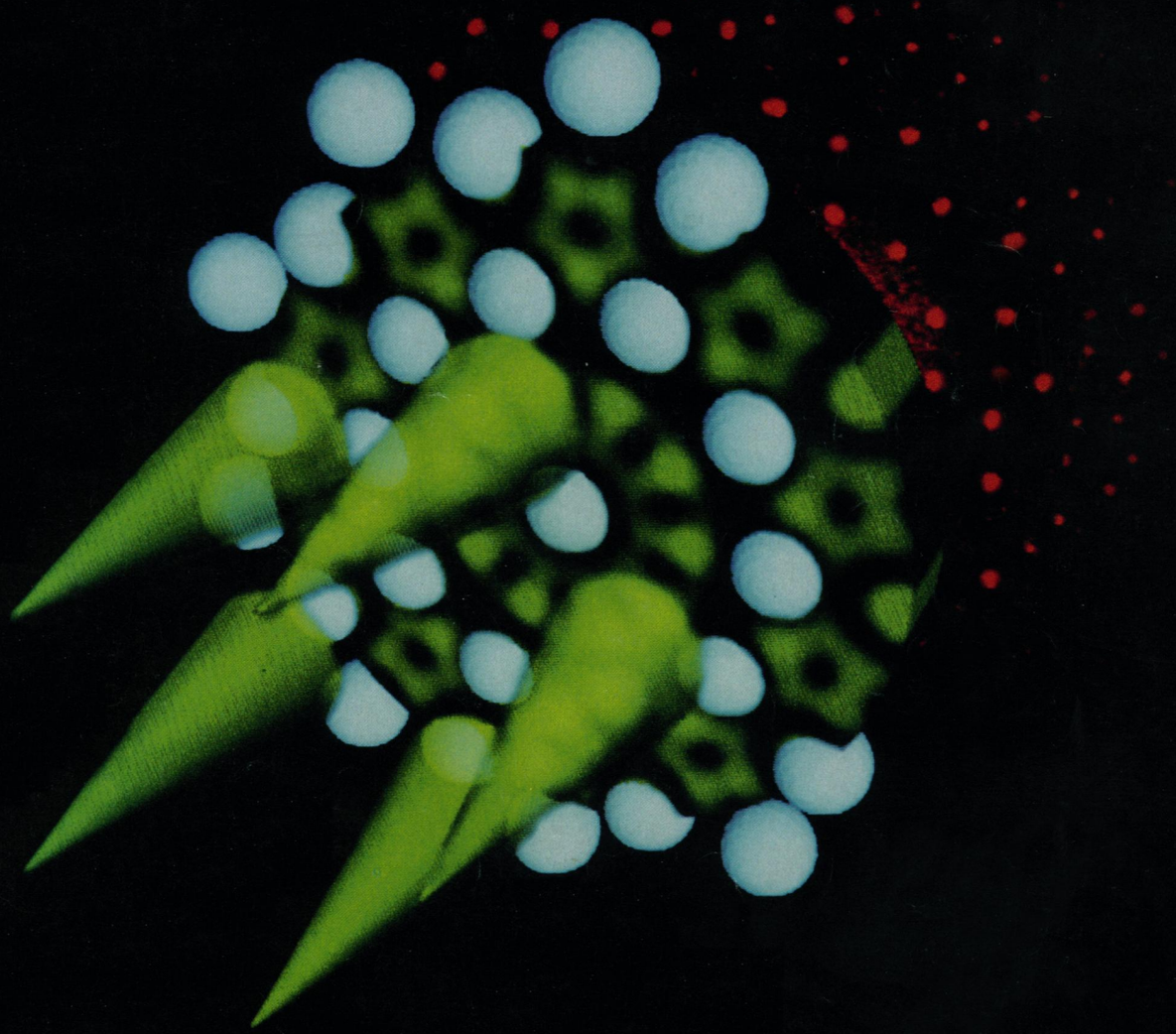
American Association for the Advancement of Science

# SCIENCE

17 August 1990 $3.50
Vol. 249 ■ Pages 713–828



# Southerns/Northerns: Electrophoresis, Blotting, and Crosslinking in 2.5 Hours Instead of 30.

Stratagene has streamlined agarose gel electrophoresis and blotting. The system decreases the time required, from sample loading to prehybridization ten fold.

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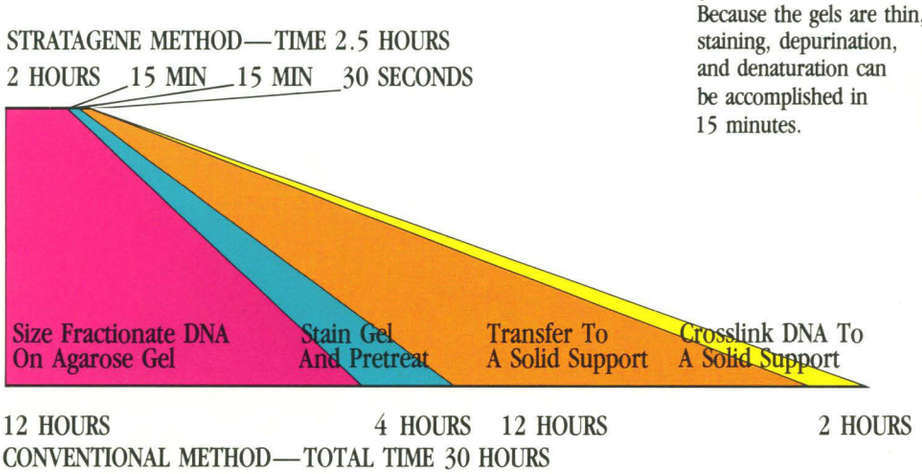
The VAGE™ vertical agarose/acrylamide gel electrophoresis system allows the casting of agarose or acrylamide gels in the unit. Nucleic acids can be electrophoresed through a 3 mm, 0.8% vertical agarose gel in less than two hours with excellent resolution (Figure 1). Because the gels are thin, staining, depurination, and denaturation can be accomplished in 15 minutes.



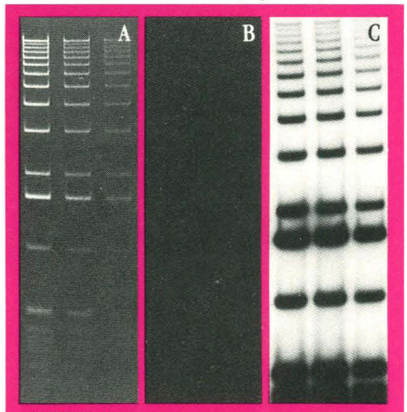
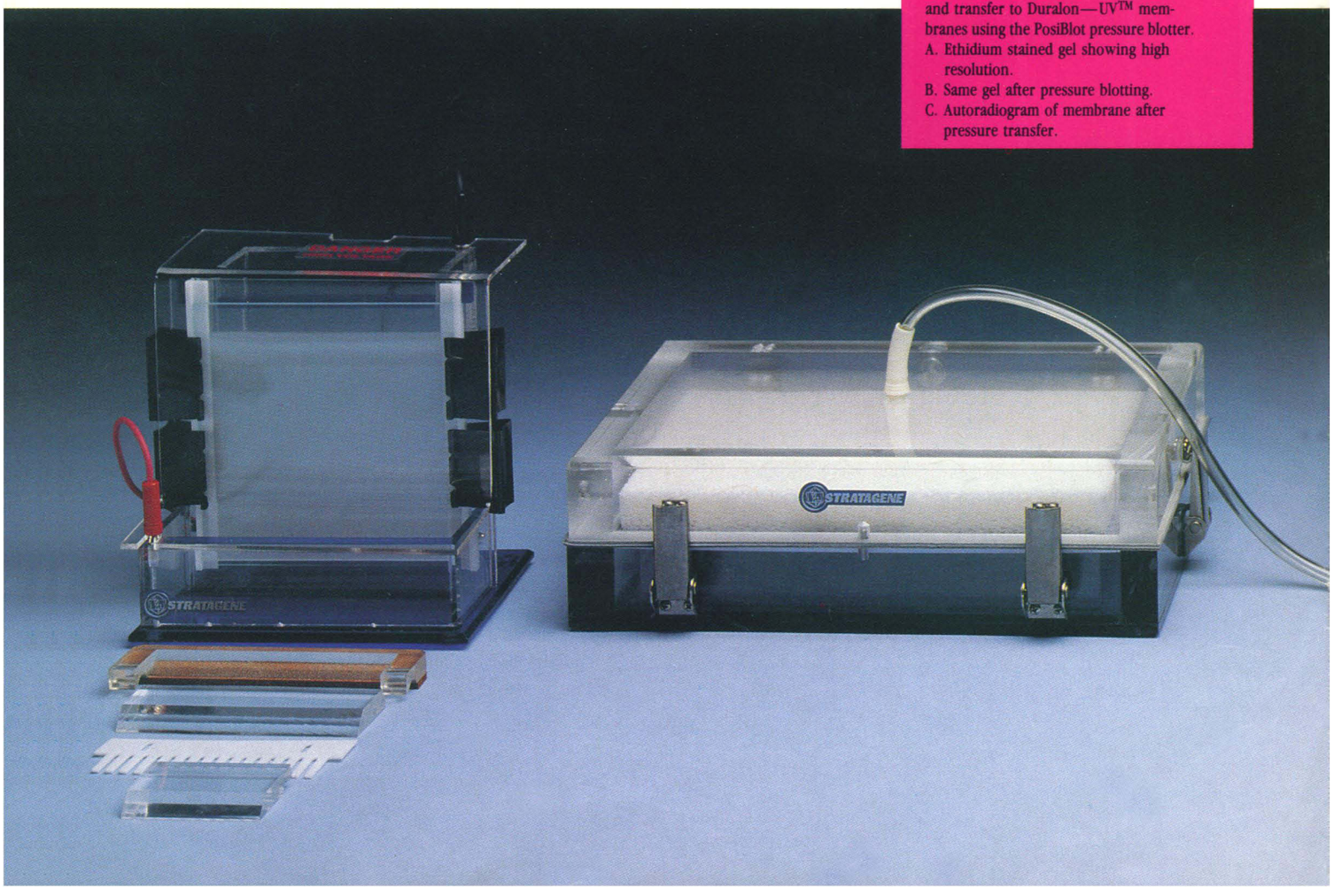




**FIGURE 1:**
Figure Legend: Fractionation of end labeled DNA markers on 3mm thick 0.8% agarose by the VAGE apparatus and transfer to Duralon—UV™ membranes using the PosiBlot pressure blotter.
A. Ethidium stained gel showing high resolution.
B. Same gel after pressure blotting.
C. Autoradiogram of membrane after pressure transfer.



## PosiBlot™ * Pressure Blotter

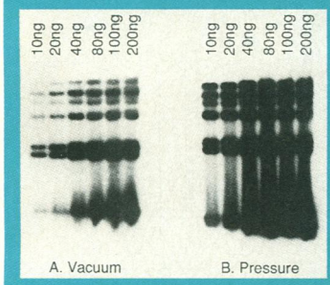



**FIGURE 2:**
Figure Lengend: $^{32}P$ end-labeled lambda Hind III markers were electrophoresed in 0.8% agarose. The DNA was then transferred to a nylon membrane with a vacuum blotter at 30mm Hg below atmospheric or with the PosiBlot pressure blotter at 100mm Hg above atmospheric. Both transfers were carried out for 15 minutes. As can be seen, pressure blotting transferred significantly more DNA in the same period of time, especially in the higher molecular weight range (largest band is 23 kilobases).

The PosiBlot™ positive pressure blotter permits the transfer of nucleic acids in 1/3 the time of vacuum blotters and 1/50 the time of capillary blotting (Figure 2). Pressure blotting does not dehydrate gels as do other methods. This allows the use of substantially higher pressure differentials, compared with vacuum blotting, without gel collapse. The PosiBlot apparatus reduces blotting time to 15 minutes.

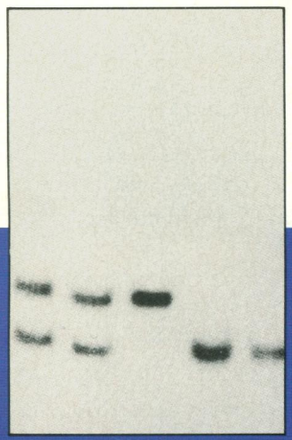


**FIGURE 3:**
Figure Legend: Autoradiogram showing the resolution of 2.8 and 1.3 Kb Msp I RFLP alleles revealed by a cystic fibrosis human DNA probe using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

## Stratalinker™ * UV Crosslinker

The Stratalinker™ UV Crosslinker fixes nucleic acids to solid supports such as nitrocellulose or nylon membranes, in less than one minute. This compares favorably to vacuum baking, which requires 2 hours. The Stratalinker actually monitors the ultra violet energy flux and deactivates the light source upon reaching the user-programmed energy level (Figure 4). Figure 3 shows an autoradiogram of a human genomic Southern blot performed using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

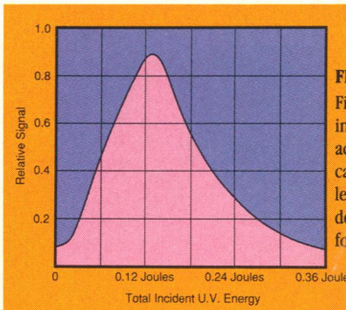



**FIGURE 4:**
Figure Legend: The effects of altering the incident energy for crosslinking nucleic acids to nylon membranes. The significant drop in signal intensity at energy levels below and above 0.12 Joules demonstrates the limited optimal range for UV treatment.

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American Association for the Advancement of Science

# SCIENCE

ISSN 0036-8075
17 August 1990
Volume 249
Number 4970



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COVER Schematic representation of how matter can be organized in optical standing waves formed by interfering laser beams. Here five beams force the microscopic spheres into a quasi-crystalline lattice. The red spots in the background indicate the fivefold diffraction pattern obtained from a separate probe laser. See page 749. [Illustration courtesy of M. Burns and J. Scarpetti, Rowland Institute]


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*This Week in*
# SCIENCE

## Trapped wave detection

RECORDING devices positioned at depths of 200 to 300 meters in boreholes along two California faults—the San Andreas fault at Parkfield and the Cleveland Hills fault at Oroville—have detected seismic waves that are trapped in and traveling along these faults. Because the movement of the waves is constrained and guided by the physical properties of the fault zone, trapped waves provide new information about the shape, thickness, and other features of the zone; similar information cannot be obtained from the surface, in part because high levels of seismic background interfere with the measurements. Li *et al.* have used the trapped wave data obtained at the Oroville fault for developing physical models of the fine structure and geometry of the fault zone and surrounding rock and for accurately locating seismic events (page 763). The information provided by trapped waves is likely to be useful in ongoing efforts to clarify earthquake dynamics and to attempt to predict future ruptures.

## Phytoplankton in paleotimes

PHYTOPLANKTON are the organisms at the base of marine food webs. Molfino and McIntyre show that the abundance of phytoplankton in the sea provides information about the depth of the nutrient-rich surface layer of the ocean, which is affected by climate conditions and ocean dynamics (page 766). In the equatorial Atlantic, for example, when nutrients are depleted in the upper part of the sunlight-penetrating (photic) layer, the relative abundance of *Florisphaera profunda* is enhanced because these algae grow near the base of the photic zone, deeper than other phytoplankton species. When nutrients are concentrated only at the top of the zone in the shallowest waters, growth of *Florisphaera profunda* is less. *Florisphaera profunda* leaves calcite plates of distinctive shape in the fossil record; therefore, variations in the *Florisphaera profunda* signature in a sediment core—in this case, one stretching back 200,000 years—have made possible determination of nutrient availability during that time and have led to inferences about the paleoclimate conditions.

## Biosensor for environmental pollutants

BACTERIA can be used both to detect organic contaminants in the environment and to get rid of them. King *et al.* illustrate these dual roles of bacteria in a series of experiments in which naphthalene was the contaminant, soil slurries were the test materials, and the biosensors and metabolizers were specially constructed bacterial strains that lit up when naphthalene was being degraded (page 778). The bacterial luciferase genes (*lux*), which are responsible for bioluminescence, had been inserted into the gene for salicylate hydroxylase, an enzyme that participates in the breakdown of naphthalene. Bioluminescence was measured with a photomultiplier detection system and in pure cultures appeared to be proportional to the naphthalene degradation rate. The bioengineering strategies used in this construct are adaptable for detection of other organic contaminants in soils and waters. This technology requires no separation or purification steps.

## Hypertriglyceridemia

HIGH concentrations of triglycerides in the bloodstream can be found both as an independent syndrome and in association with diabetes, heart disease, stress, infections, alcoholism, and a number of other diseases and conditions. Experiments in transgenic mice indicate that one way hypertriglyceridemia may be brought about is through the overproduction of the protein apolipoprotein (apo) CIII (page 790); this protein is a major constituent of the two transporters of triglycerides in the circulation, chylomicrons and very low density lipoproteins. Ito *et al.* found that lines of transgenic mice that carried 100 copies of the human apo *CIII* gene produced large amounts of the apo CIII protein. The plasma of these mice had a milky appearance, which in humans is indicative of excess triglycerides; a condition of hypertriglyceridemia was confirmed by direct tests. Even lines of mice that had incorporated only one or two copies of the human gene and showed only a small amount of overproduction of apo CIII had excess plasma triglycerides. Although mice and humans may handle triglycerides differently, these results hint that even low levels of overexpression of the gene for apo CIII could be a cause of hypertriglyceridemia, a common human condition.

## AIDS in western Africa

IN the seaport of Abidjan, the capital city of the Ivory Coast, AIDS was the leading cause of death in 1988 and 1989 among men; among women, it was the second leading cause, surpassed only by deaths associated with pregnancy (page 793). Infections with AIDS viruses were found to be responsible also for substantial morbidity and premature mortality (referred to as years of potential life lost) for both men and women. The figures, obtained by De Cock and co-workers, were higher than would be expected for a community in which AIDS has only been recognized since 1985. The findings were based on postmortem examinations of 698 adults at morgues in the city's two largest hospitals. Many factors contribute to the uncertainty of these data: for example, hospital autopsies may not directly mirror all of the deaths that are occurring in the community; furthermore, it is the custom in Abidjan for gravely ill individuals to leave Abidjan and return to their home towns to die. Nonetheless, the data point up the fact that AIDS is not a potential threat but is already a key health problem in western Africa just as it is in the central African sub-Saharan countries.

■ RUTH LEVY GUYER

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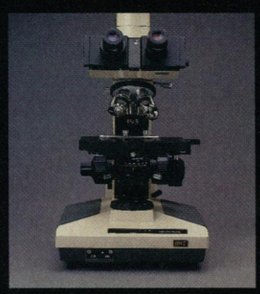

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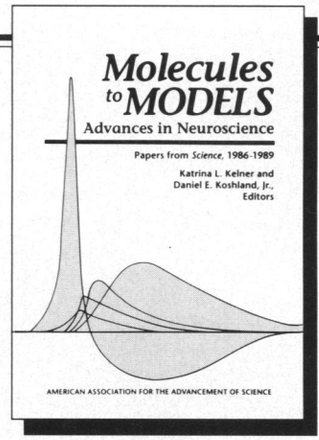


*1989; 464 pp.; fully indexed and illustrated; color plates*
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This collection of current *Science* magazine articles in the neurosciences provides a comprehensive survey of the entire field. It is especially valuable for graduate students who want to gain a broad understanding of the neurosciences, and for neuroscientists who want to learn more about other areas of these disciplines. Contributors include William A. Catterall, Joseph B. Martin, Corey S. Goodman, Michael I. Posner, Terrence J. Sejnowski, Stephen G. Lisberger, Larry R. Squire, and many other well-known specialists in the field.

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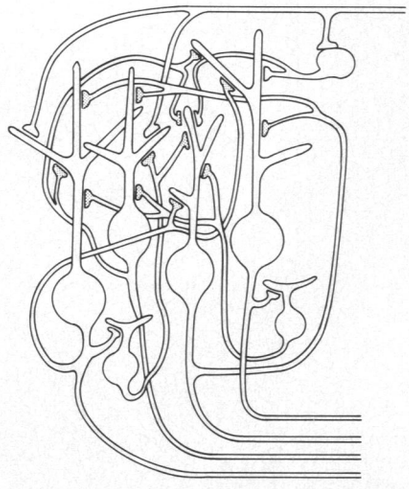

*"Anatomy" of a simple model neural circuit, from the chapter "Computing with Neural Circuits: A Model," by John J. Hopfield and David W. Tank.*

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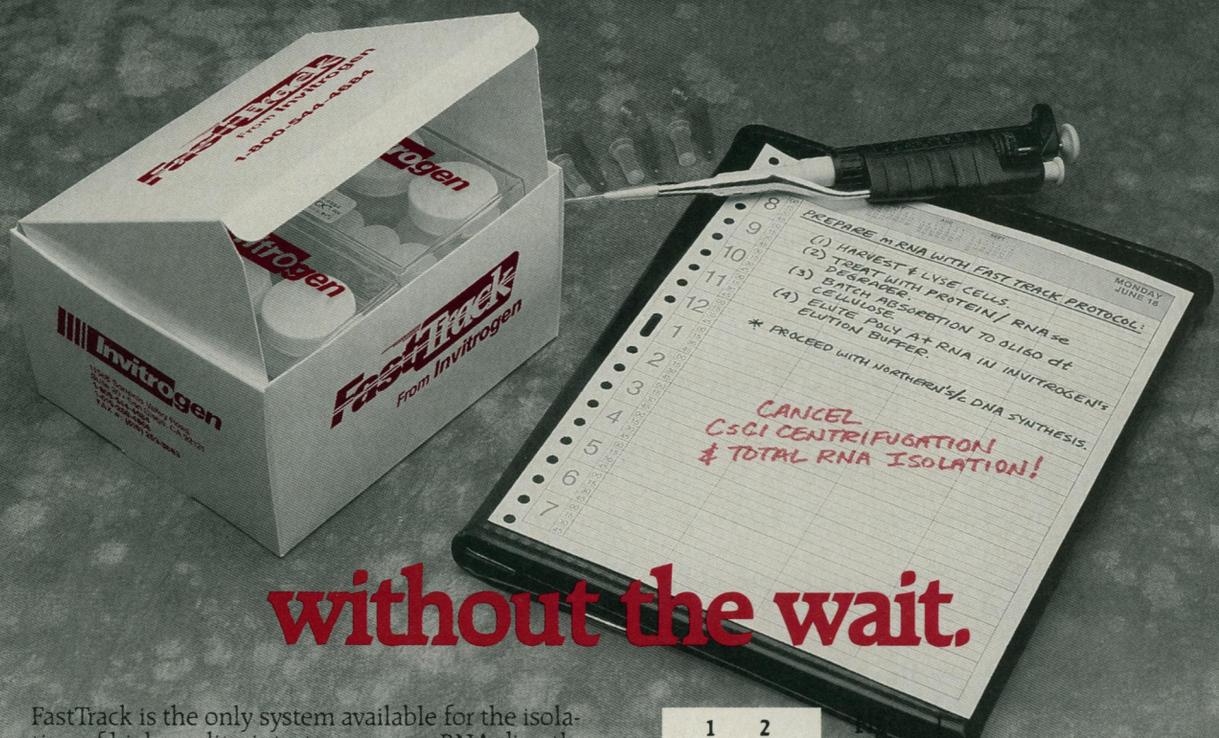


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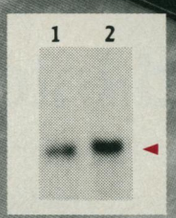


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