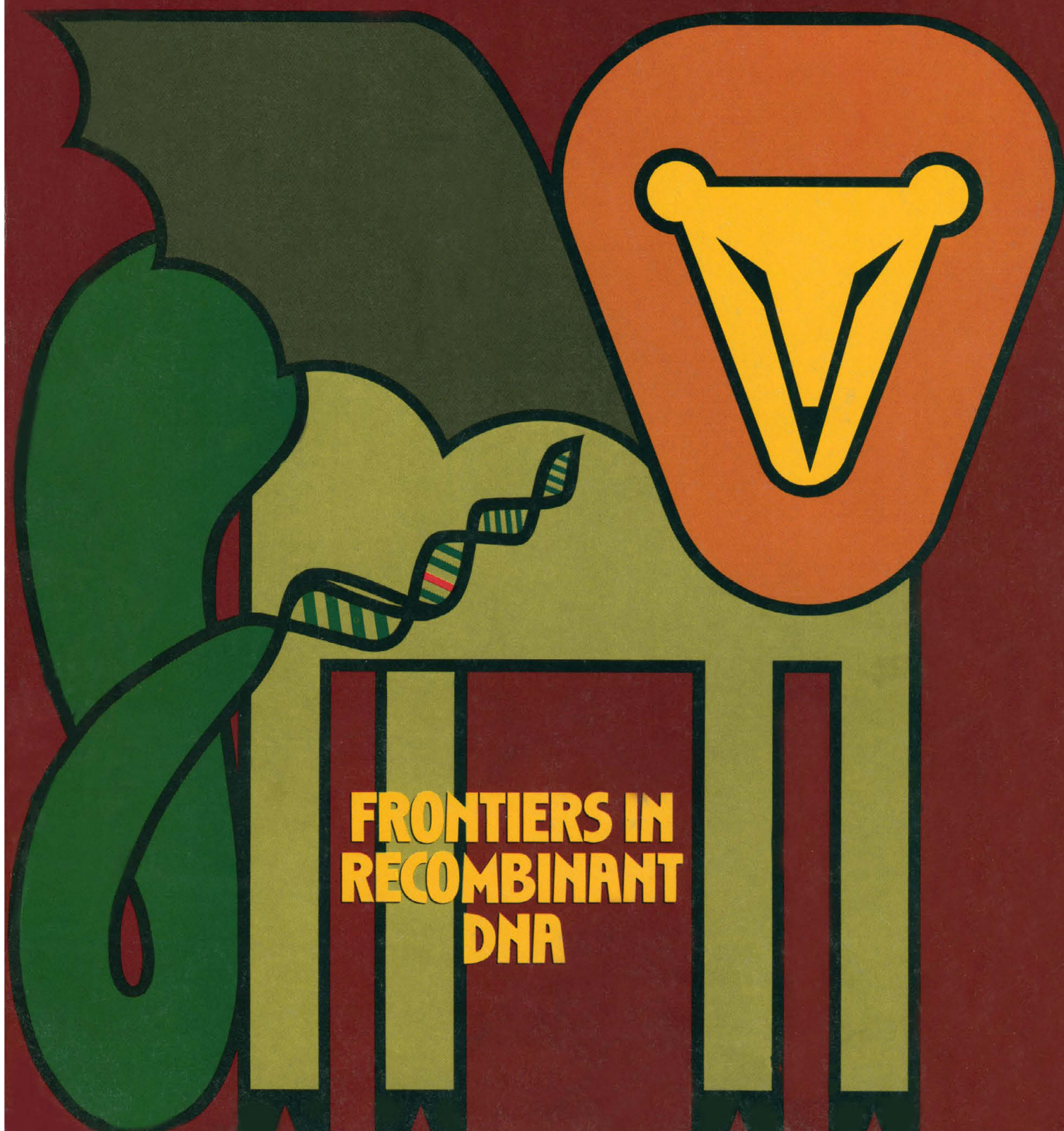


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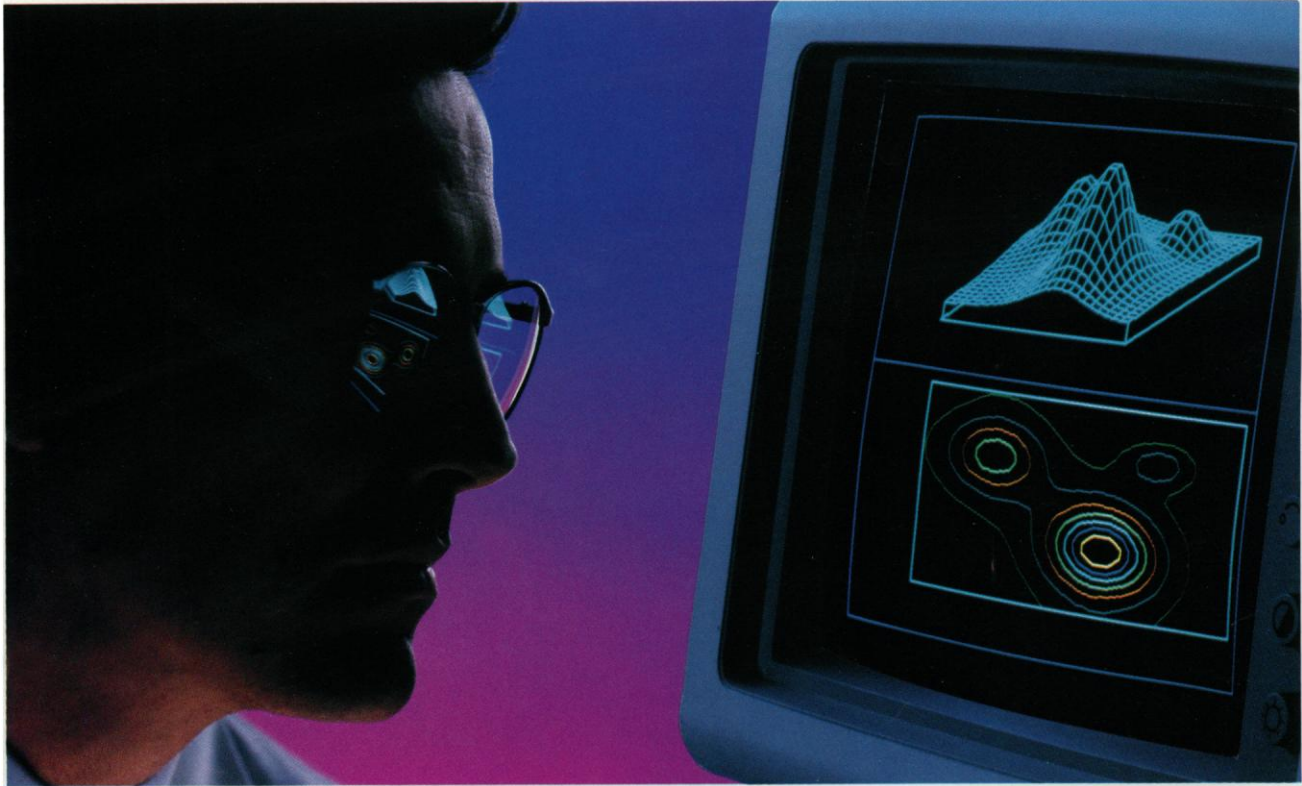
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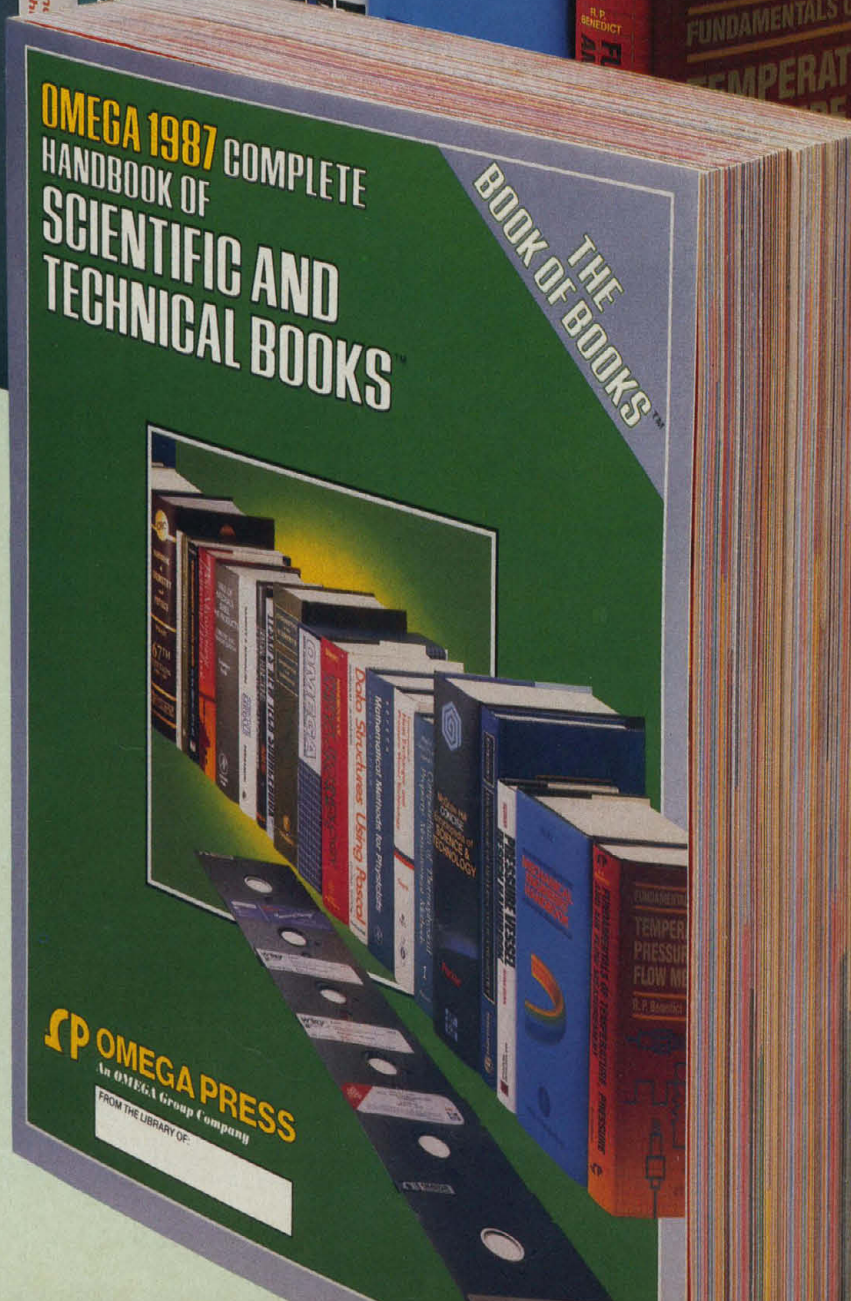
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**COVER** In Greek mythology, the chimera was a creature with characteristics of several animals. The construction of chimeric molecules from diverse pieces of DNA is now a cornerstone of recombinant DNA technology. See pages 1223 to 1263. [Cover illustration by Sharon Wolfgang, Washington, D.C.]

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#### **Expanding the frontiers of modern healthcare.**



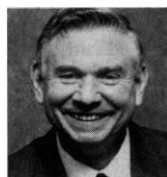
Jacques Luc Autran, founder of Seamen Without Frontiers, a philanthropic association, turned a fishing vessel into a floating hospital to bring healthcare and education to isolated societies, such as the islanders of the Maldives.

#### **Preserving endangered species.**



Stephen Kress's innovative techniques successfully repopulated near-extinct colonies of birds on Maine islands and will soon be employed in attempted recolonizations in the south of Japan.

#### **New insights into evolution.**



Entomologist Pierre Morvan will organize an expedition to Nepal to study the effects of extreme geographic isolation on the formation of particular species, and will complete a book on the subject.



## **The Rolex Awards for Enterprise**

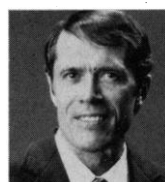
*For the Good of the Planet and its People*

#### **Religious teaching and environmental education.**



Nancy Lee Nash will glean teachings about nature from Buddhist writings and incorporate them into an educational syllabus to be used in Thailand colleges.

#### **Demystifying an ancient culture.**



Johan Gjeffen Reinhard will explore the peaks and lakes of the Peruvian Andes to determine the role of those ancient religious sites in the formation of pre-Colombian society.

*The Spirit of Enterprise, The 1987 Rolex Awards*, a book about the five laureates' projects, as well as 238 other outstanding proposals, is available in bookstores and from the publisher, Van Nostrand Reinhold.

Additional information about the awards is available from The Secretariat, The Rolex Awards for Enterprise, P.O. Box 178, 1211 Geneva 26, Switzerland.



**ROLEX**



## This Week in SCIENCE

### Disease diagnosis

As a result of developments in recombinant DNA technology, growing numbers of diseases—genetic, infectious, and neoplastic—are able to be diagnosed (page 1223). A review of how gene probes, restriction fragment length polymorphisms, and other recombinant tools are aiding clinical diagnoses is presented by Caskey in this special issue on developments in recombinant DNA technology (see also page 1157 and pages 1223 to 1268). Some genetic diseases can now be diagnosed in the fetus and the inheritance of late-onset diseases can be tracked in families; for some of these, thorny ethical and legal considerations remain to be addressed, such as the responsibility of insurance companies to asymptomatic individuals who test positive for a late-onset disease and to normal individuals who are critical to a linkage analysis. Cancer diagnosis is improving and, as additional translocations in oncogenes are associated with specific cancers, is likely to increasingly rely on recombinant techniques. So is the diagnosis of infectious diseases, particularly viral diseases for which rapid and reliable methods were not formerly available. Accurate disease diagnosis is a crucial first step in treatment and prevention.

### Enzyme tinkering

SITE-DIRECTED mutagenesis is a recombinant technique that has been used for altering single amino acids in enzymes in a controlled fashion; similar precision cannot be achieved through chemical modification procedures (page 1252). Knowles summarizes results from some experiments in which single amino acids in or near an enzyme's active site have been replaced by another naturally occurring amino acid (at some future time, unusual substituents or unusual analogs of amino acids may be integrated into enzymes). Changes in single amino acids have caused subtle and dramatic structural alterations; these, in turn, can affect the enzyme's stability to heat and

proteolysis, the specificity of the enzyme for its substrate, the energetics of and steps in catalysis, and the types of intermediates generated in the catalytic reaction. As understanding of enzyme structure and function and their interdependence improves, new strategies may arise for restoring catalytic activity in defective enzymes (in diseases, for example) and for developing designer enzymes that efficiently catalyze useful biochemical reactions.

### Rock magnetic properties

MAGNETITE is an important ore of iron; it is one of the most common and powerful magnetic minerals (page 1287). An understanding of its properties may be key to explaining physical events in the earth's history because magnetite retains information about earlier directions of the earth's magnetic field. Crystals of magnetite ranging in size up to 1 millimeter were grown by Heider *et al.* by heating seed crystals in mineralizing solutions at temperatures between 400° and 800°C. Physical properties of these laboratory-grown crystals and of crushed magnetite that had been used previously as a model for natural magnetite were evaluated. The laboratory-grown crystals resembled similarly sized natural magnetite particles found in the earth far better than did the crushed magnetite. These crystals will be useful for elucidating properties of the natural magnetite, including the possible determination of how rocks are magnetized. Magnetite is used in permanent magnets and has other valuable applications in the preparation of magnetic recording devices.

### Bridging communication gaps

COMMUNICATION between cells can take place through groups of channels that form junctions, called gap junctions; this form of intercellular communication is mediated by electric and chemical signals (page

1290). A 28,000-dalton gap junction protein from rat liver is one constituent that participates in the formation of functional channels for intercellular communication. Dahl *et al.* inserted complementary DNA for this protein into an oocyte expression system. Channels of two types formed between pairs of oocytes, and they were readily distinguishable because they had different electric properties and responded differently to ions. One type was endogenous to pairs of oocytes; the other type, which formed as a result of the injected complementary DNA, had properties like those of channels that form between cells in liver, the parent tissue. This oocyte system should be useful for studying the mechanism of channel formation and other facets of the intercellular communication process.

### Viral probe for sialic acid derivative

HEMAGGLUTININS on the surface of influenza C viruses have a special affinity for the sialic acid derivative 9-O-acetyl-N-acetylneuraminic acid that resides on many cell surfaces; Muchmore and Varki capitalized on this relation to study properties of the hemagglutinin molecules and to develop a specific probe for this sialic acid derivative (page 1293). The hemagglutinin molecules have an esterase activity that typically destroys the 9-O-acetyl substituent of the sialic acid derivative. Therefore, esterase activity was specifically inhibited. The hemagglutination properties of the protein and the fusion properties of the virus were unaltered, and the viruses bound specifically and irreversibly to mammalian cells that had the derivatives of interest. Only the infectivity of the virus was decreased. Sialic acid derivatives are widely distributed amino sugars found in both bacterial and animal cells; they are thought to participate in a variety of processes involving surface-to-surface interactions, such as cellular homing. The development of this probe will help in understanding their distribution and functions.



# FARMING: A Picture of the Future.

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## Frontiers in Recombinant DNA

A cartoon in the *New Yorker* shows an aristocratic dowager in a Chippendale chair looking up from her newspaper and saying to her patrician-looking husband, "Dear, are they tampering with *our* genes?" Such vague worry that the young Turks of DNA may not only inadvertently create pestilence, war, and famine but may even invade the regions of good taste is prevalent in the general public. To the cognoscenti these worries are remote but not absurd; yet they rush on. If there is even the remotest chance of some misuse, should one not slow down and proceed with great caution?

The answer is that, in fact, fuller understanding of the DNA methods has revealed the areas in which caution must be applied as well as the power of this research tool. The sweep of subjects in which recombinant DNA has provided breakthroughs is incredible. In this issue a few of many examples are selected to show how it has been applied to the understanding of learning, development, diagnosis of disease, stimulation of colony growth, generation of new plant foods, design of new catalysts, and the switching on of genes and viruses. Although the applications described here relate to these fundamental biological processes, the potential for practical applications is clear.

Maniatis *et al.* describe a research area that has moved with lightning speed, but still leaves many mysteries. The role of promoters and enhancers in turning on and turning off gene expression and the apparent crazy quilt pattern of upstream and downstream elements could never have been unraveled by classical genetics. Gehring illuminates a phenomenon that was initially revealed by classical genetics: the homeotic genes, mutations in which cause legs to grow out of the heads of flies. By recombinant DNA studies the homeo gene has led to new understanding of morphological development. Cocking and Davey describe the breach of a new barrier—the cereals—previously resistant to the techniques that allowed genetic engineering of other types of plants. Clark and Kamen discuss the application of recombinant DNA techniques to the elusive elements that stimulate cell growth, the colony-stimulating factors. Caskey outlines recombinant DNA procedures that can lead to the identification of molecular defects accounting for heritable diseases and acquired neoplasia in *Homo sapiens*, and Black *et al.* describe the application to one of the most difficult experimental challenges, the understanding of the molecular events in learning and memory. Knowles tells of the application of genetic engineering to the vital catalysts that control all dynamic biological processes—the enzymes.

The intellectual excitement of rapid progress in some of the most vital problems in biology is, by itself, an enormous stimulus; but in each case practical applications are almost at hand. The prospect of an age of designer catalysts, of quick medical diagnosis of genetic defects, of new cereals for starving millions, and of brain therapy in neurological diseases is another spur to progress in these already rapidly advancing areas.

Biologists asked for a moratorium to assess risks in the initial days of recombinant DNA. How is it, now that the tools appear to be more powerful than was expected then, that there can be confidence that these experiments no longer threaten humankind? The answer has two parts. First, much is now known about the events that lead to uncontrolled growth of cells and about the safe application of recombinant DNA. Second, experiments have revealed that genetic engineering has been occurring in nature for eons without catastrophic consequences. Recombination in vivo results in events such as attachment of the hind end of one protein to the front end of another. Nature's genetic engineering through selection is much slower than modern laboratory manipulation, but it has been going on for billions of years. That fact can not only induce some humility in molecular biologists but also ease some fears of onlookers.

Ecological and moral dilemmas created by these new technologies are appreciable and will require new ideas. Tampering with the mind is generally considered to be bad, but should genetic engineering to alleviate Alzheimer's disease be outlawed? To feed starving populations is desirable, but if new crops help add a billion people to a crowded globe, is that necessarily good? The powerful new methods are here. Applying them may well require the use of brain enhancers.—DANIEL E. KOSHLAND, JR.

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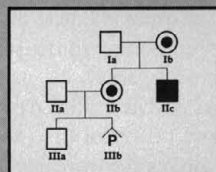
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### Applications Data Available

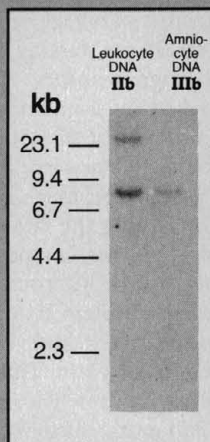
Data, from applications including RFLP's and screening of transgenic mice, are available by contacting one of the offices listed below, or by indicating reader service number 405.

## Prenatal diagnosis of Duchenne's muscular dystrophy (DMD) using Southern blot analysis.\*



Partial pedigree of a three-generation family.

- Ib:** Grandmother identified as DMD carrier by pedigree and elevated creatine kinase level.
- IIb:** Mother with normal creatine kinase level; 25% carrier risk.
- IIc:** Male sibling, DMD (deceased).
- IIIa:** Unaffected male.
- IIIb:** Fetus (cultured amniocyte DNA purification performed on a Model 340A)



Autoradiogram shows mother (IIb) is heterozygous at Bgl II polymorphism. Both the fetus (IIIb) and the unaffected male (IIIa, not shown) have the same haplotype as shown by the 8 kb band. Fetus is at low risk for DMD.

\*Source: Dr. Tom Caskey, Houston, Texas

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by 46 countries (Argentina and Chile not among them), including all of the major maritime nations. It imposes strict rules on tanker operators to prevent oil pollution. These rules not only prohibit the type of dumping that Boersma highlights but also incorporate vessel design and equipment requirements. These include segregated ballast tanks, crude oil washing, and other features that minimize the amount of oily waste that is generated aboard a tanker. The rules also require the installation of oil-in-water monitors that measure and record the oil content of ballast that is discharged by a tanker. In fact, these monitors are designed to stop the discharge of ballast automatically should oil concentration in the water exceed strict limits.

Thus, there are international regulations that prohibit tankers from "dumping" oil into the sea, and, contrary to Boersma's assertion, most tankers follow these rules.

In dealing with the "oily penguin problem," it appears first necessary to consider possible sources of contamination, for example, spills occurring during drilling and producing operations in the Tierra del Fuego area, indiscriminate discharges of oily engine room bilge wastes from any type of vessel operating in the area, and discharge of oily ballast water from tankers that may operate in the area and not conform to international operating standards.

Second, it will be necessary to heighten the level of awareness of government, industry, and the public with respect to the nature of the problem. Oil-producing and transportation operations are routinely conducted in other environmentally sensitive areas without adverse effects on those areas. Such environmentally acceptable operations should be sought and are achievable in Tierra del Fuego.

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### Man's Role in Space

Peter M. Banks and David C. Black (Perspective, 17 Apr., p. 244) write optimistically and philosophically about what might be gained through manned research facilities in space. James A. Van Allen has already written factually (1) about what has been gained through unmanned spacecraft and what further surely could be gained. One might add that that work (in which I participated some three decades ago) (2) led to new and largely

unforeseen technological applications of unmanned spacecraft as communication satellites. Since then earth observation satellites of various sorts and navigation satellites have assumed great importance.

Our present humiliating position is that exaggerated emphasis on man-in-space has left us, temporarily, we hope, without any domestic means for launching either scientific or technological spacecraft.

Man-in-space is an old dream which I exploited in science fiction (3) at a time when no one had thought of the new capabilities we have seen in unmanned spacecraft. The old dream of man-in-space, magnificently realized in Apollo, has been extended in the Shuttle, with an emphasis that has had disastrous consequences for our exploration and exploitation of space.

Surely, the exploration of man's role in space is worthy of continued and intense investigation. The survivability of man-in-space, to which Banks and Black give no emphasis, calls for continued and intense investigation, but not at the cost of scientific and technological benefits which we know we could attain through unmanned spacecraft—if we had the resources to construct and launch them.

JOHN R. PIERCE  
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Stanford, CA 94305

### REFERENCES

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2. J. R. Pierce, *The Beginnings of Satellite Communications* (San Francisco Press, San Francisco, CA, 1968).
3. ———, "Relics of the earth," *Sci. Wonderstories*, March 1930, p. 894.

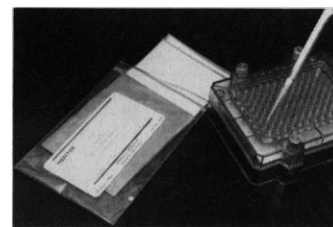
### Neutrino Shield?

M. Mitchell Waldrop (Research News, 1 May, p. 523) quotes a theorist as saying that the neutrino flux alone from supernova 1987A would have killed an "unprotected human" out to nearly a billion kilometers. I am curious about what sort of protection the theorist had in mind. Is this one of the theorists behind the Strategic Defense Initiative?

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*Erratum:* In Constance Holden's article "Adjusting to an aging population" (News & Comment, 15 May, p. 772), Secretary of Labor William E. Brock III is incorrectly described as "Commerce Secretary."

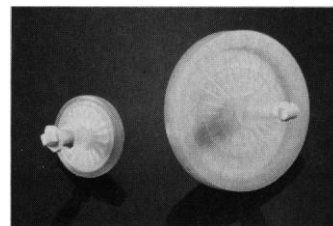
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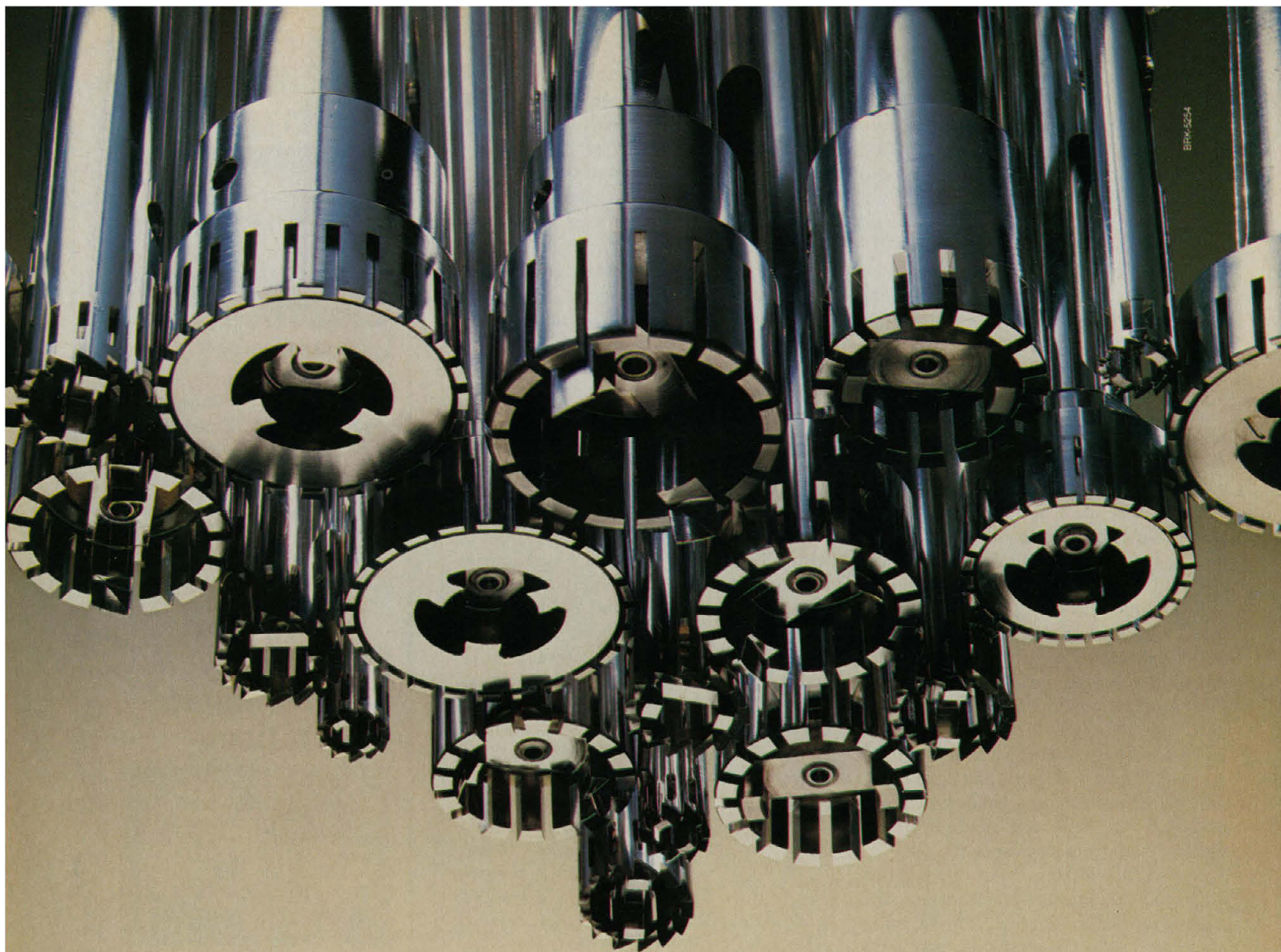
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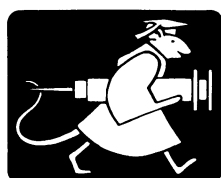
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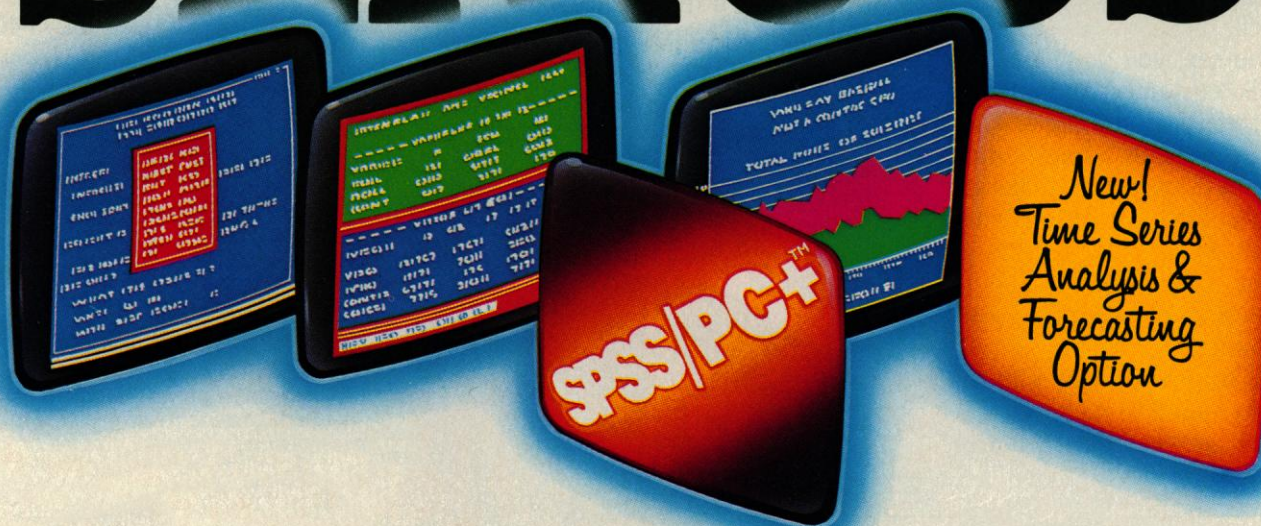
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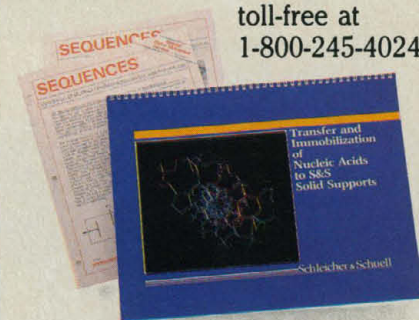
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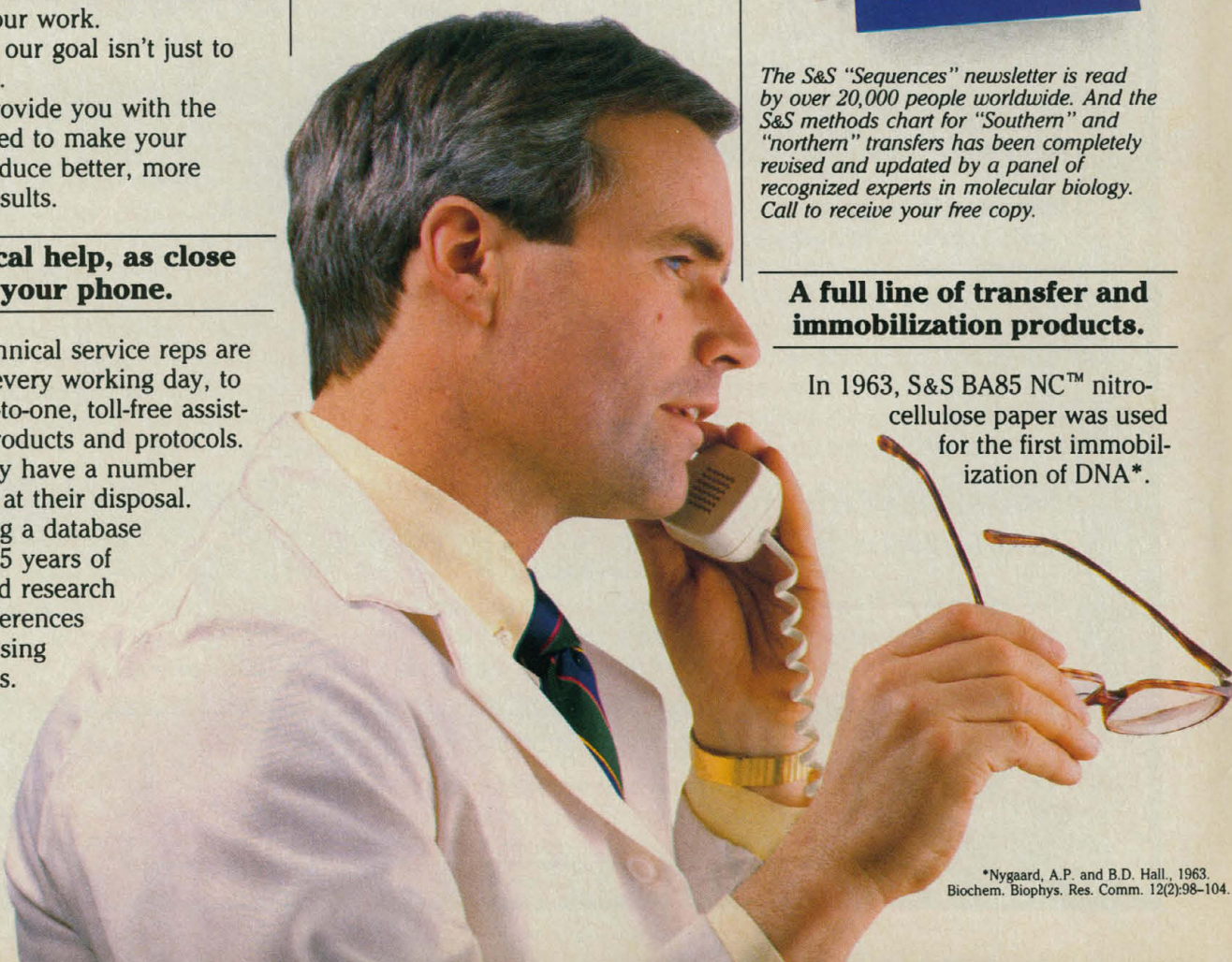
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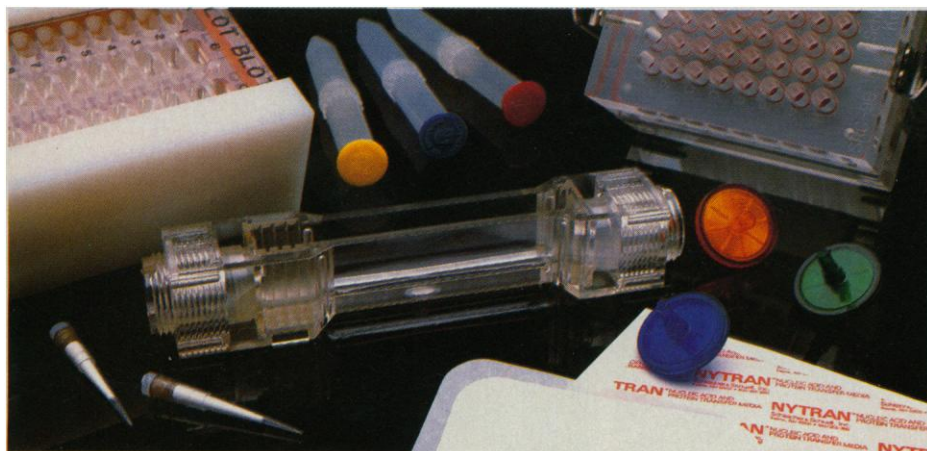
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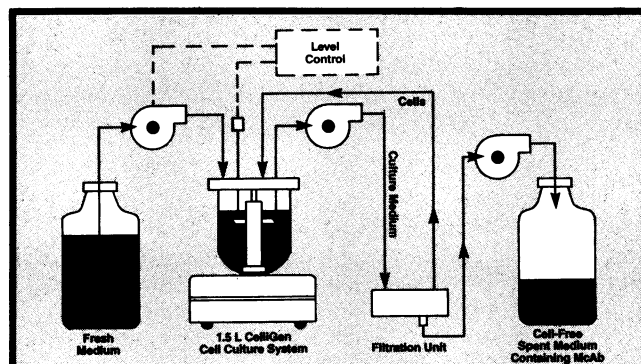


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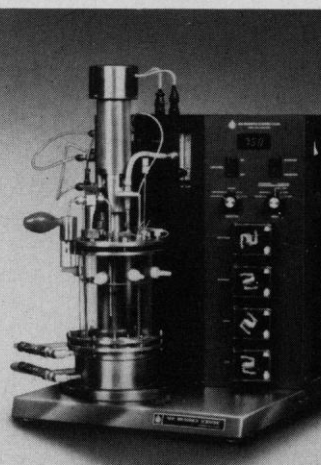
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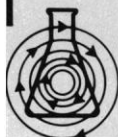
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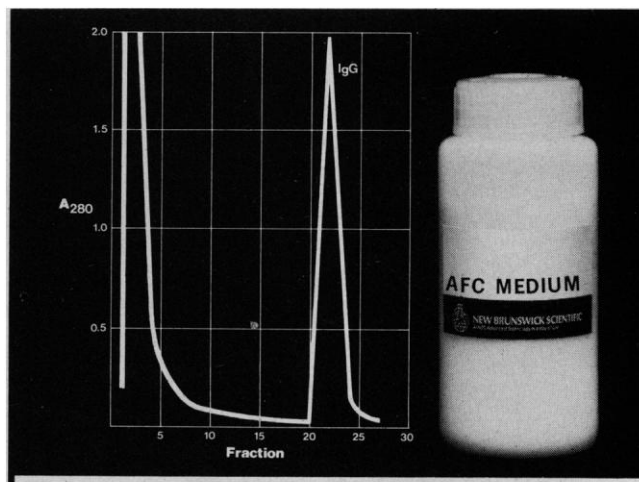


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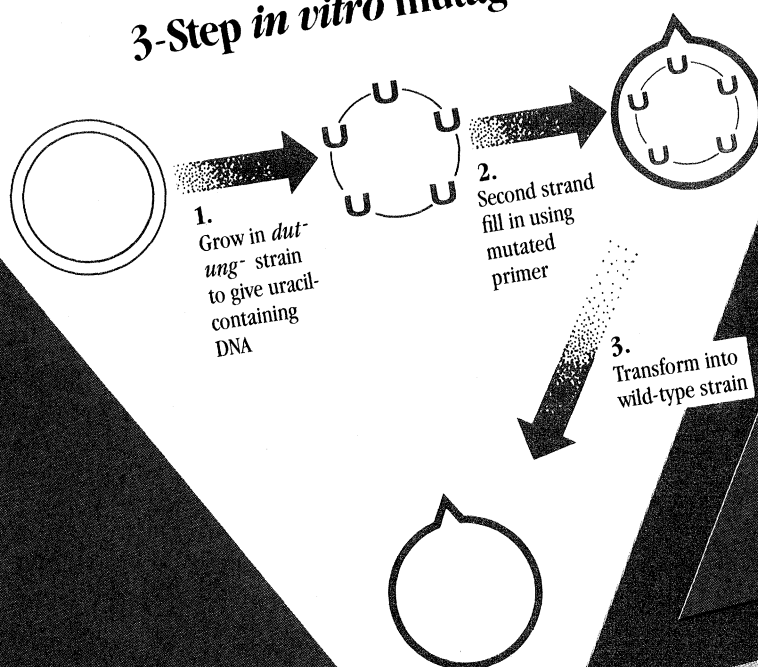
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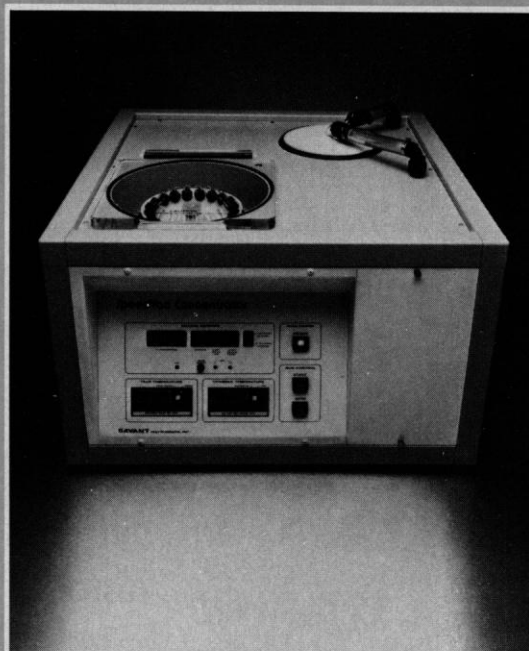
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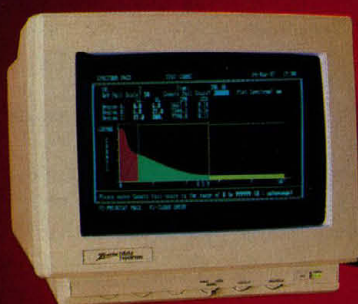
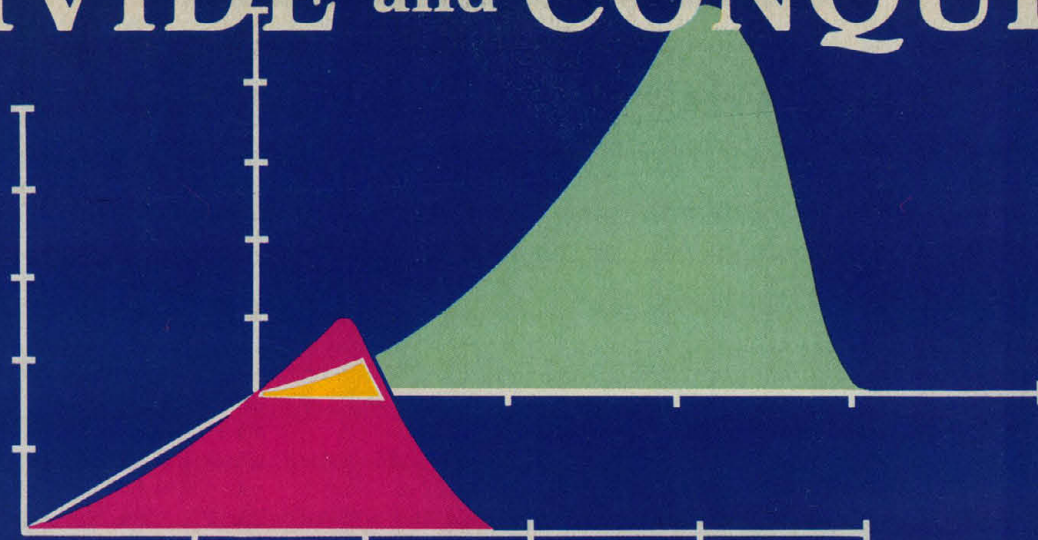


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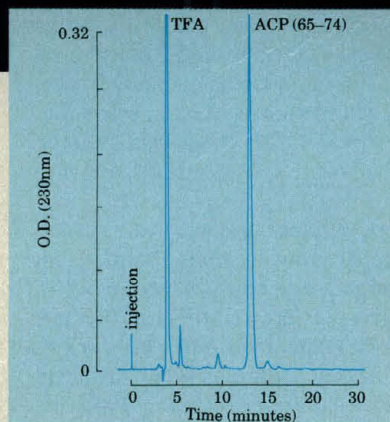
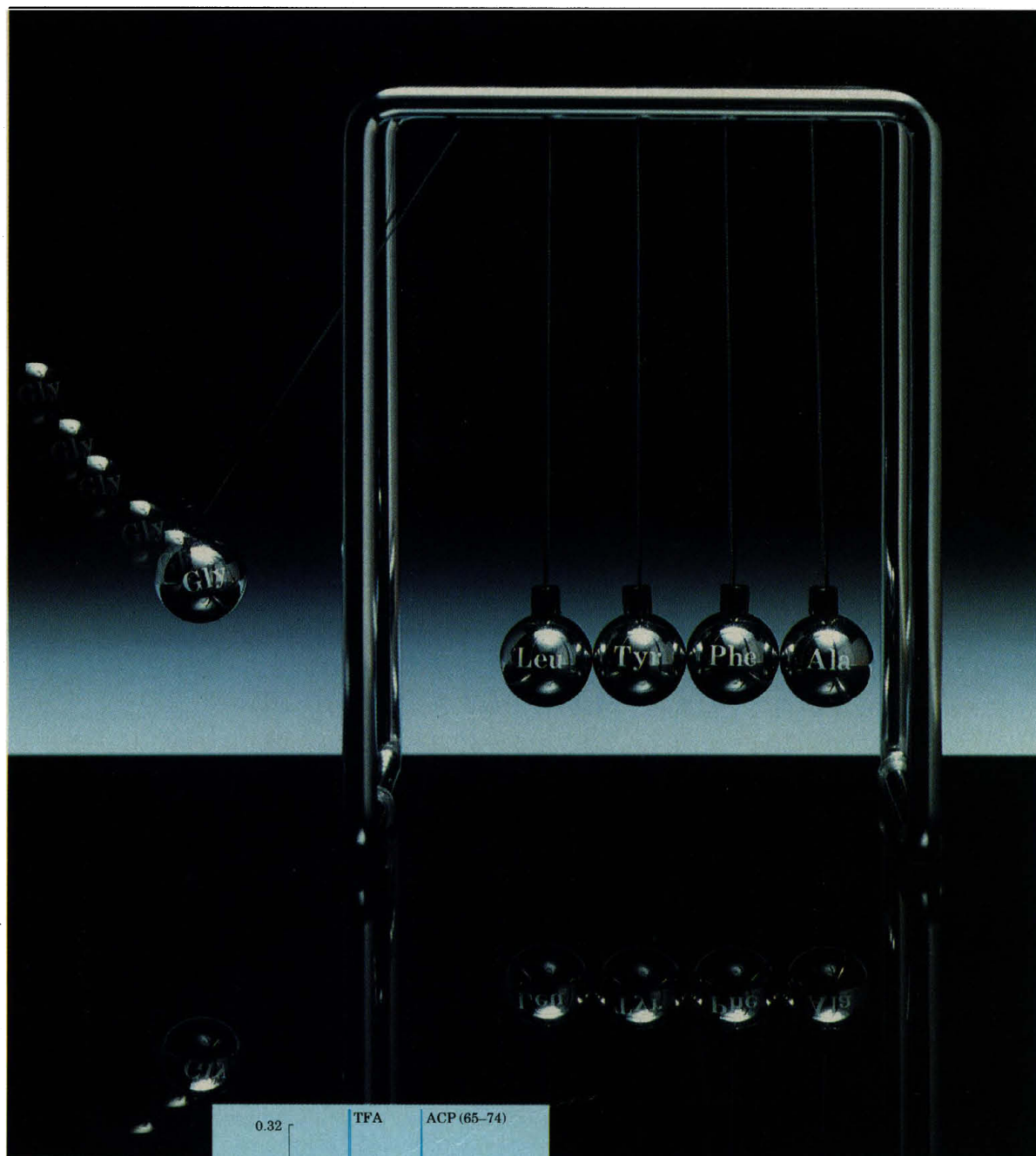
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*H*.Val-Gln-Ala-Ala-Ile-Asp-Tyr-Ile-Asn-Gly.OH.  
 LKB TSK-ODS120T (250 × 4.6 mm) column (5μ).  
 Elution with 20% CH<sub>3</sub>CN in 0.1% TFA at 1 mL/min.



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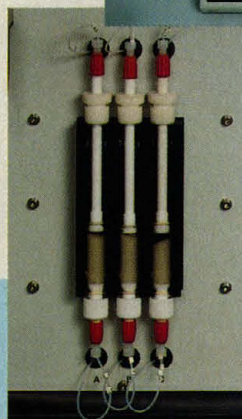
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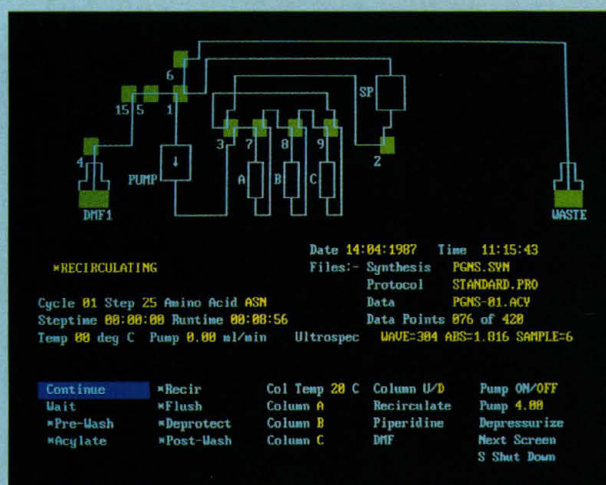
The unique polyamide resin has also allowed us to use a continuous flow methodology to facilitate total automation of synthesis thereby enabling the Biolynx to operate completely unattended to produce up to three peptide analogues simultaneously. Moreover, the combination of computer control and constant on-line monitoring provides reassurance that the synthesis is proceeding satisfactorily.

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The Biolynx 4170 peptide synthesis system.



Each of the three reaction columns is temperature controlled and produces an excellent yield of up to approximately 0.25 mmoles of peptide.



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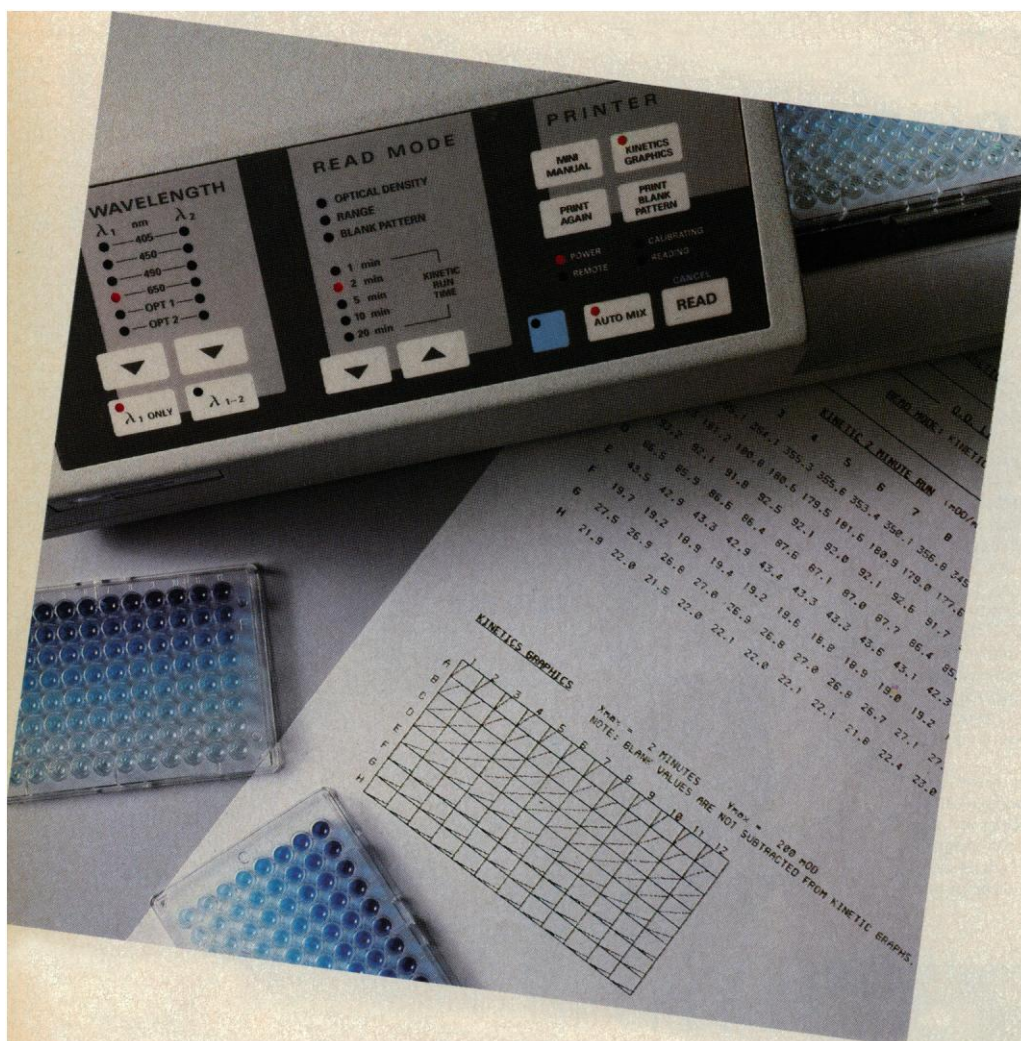
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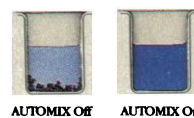


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The new Vmax Kinetic Microplate Reader reads all 96 wells in as few as 5 seconds. The result: a new level of throughput in endpoint analysis; and the ability to accurately monitor the initial linear portion of enzyme reactions for kinetic measurements.

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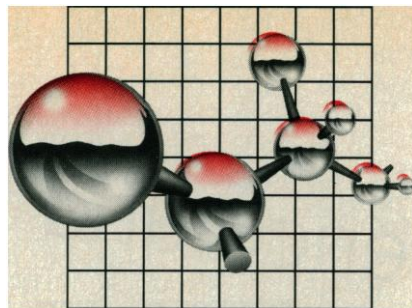
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August 9-13, 1987  
San Diego, California



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A scholarly society of scientists interested in the structure and function of proteins. The purpose of the society is fundamental; to foster discussion and interaction among scientists interested in all aspects of protein structure and function. The society already has over 700 members covering a broad spectrum of the different disciplines bearing on protein structure and function.

Interaction among many types of investigators utilizing the myriad of approaches and techniques to probe protein molecules is essential. The Protein Society ensures these interactions will occur by providing regular opportunities for protein scientists to meet and exchange ideas and findings.

**Full Membership**

Individuals holding a doctoral degree or equivalent experience with a demonstrated interest in the structure and function of proteins. \$50, 2 yrs.

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**The Second Symposium—  
San Diego, August 9-13, 1987**

The first biannual symposium of the Protein Society.

**Location**

The second San Diego symposium is the first opportunity for the membership of the Protein Society to meet and interact. The program of this first meeting is designed to attract a variety of individuals representing all the differing aspects of protein research.

The program committee under the chairmanship of Professor Jack Richards of CalTech is made up of expertise in all disciplines of protein structure and function enforcing the purpose of the Protein Society.

The symposium program is made up of plenary sessions focusing on major impact topics of general interest.

Dr. Eisenberg of UCLA and Dr. Huber of the Max Planck Institute will open the meeting. The meeting will close with plenary lectures from Dr. Wütrich of ETH, Zurich and Dr. Hood of CalTech.

To facilitate interaction among protein chemists from all aspects of the science, the remainder of the program is given over to minisymposia and poster presentations on the following topics:

**Session Topics and Invited  
Speakers for San Diego '87**

1. 3D Structure: Theory Folding and Dynamics.  
(Baldwin, Goddard, Rose)
2. MicroAnalytical Strategies: Structural Analysis and Micro Purification.  
(Simpson, Kent, Beiman)
3. Protein Kinases: Biological Control of Protein Function.  
(Walsh, Ullrich)
4. Protein/Nucleic Acid Interactions.  
(Altman, McPherson)
5. Studies with Synthetic Peptides and Proteins.  
(Kaiser, Degrado, Lerner, Richards)
6. Photoreceptors as Signal Transducers.  
(Khorana, Zucker)
7. Expression, Processing and Secretion.  
(Varshavsky, Beckwith, Wickner)
8. Mutagenic Studies of Protein Function: Design and Selection.  
(Schimmel, Shortle, Winters)
9. New Developments in Instrumentation, Chemicals and Accessories for the Protein Chemistry Lab.

**Stein and Moore Award and  
Symposium**

Part of the program will be used to honor the recipient of the first Stein and Moore award in the form of a half day symposium. The subject and the speakers taking part will be selected by the recipient of the award. Announcement of the awardee and the subject to be presented will be made in the spring of 1987. The award, to be presented biannually by the Protein Society will recognize significant achievement in protein research. In addition to the symposium, the awardee will receive \$5000 and a commemorative plaque presented at a banquet which will feature Dan Koshland as an after dinner speaker.

**Sample Workshop**

All registrants will be invited to participate in a workshop designed to demonstrate the variety of modern techniques available for the study of protein structure and function.

**Scientific Exhibition**

Leading manufacturers of scientific instrumentation and techniques relevant to protein research will be represented.

**Symposium Registration**

\$275—Full Members  
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\$330—Non Members  
\$180—Students

**Symposium Announcement  
and Call for Papers went out  
January '87**

If you are interested in becoming a member of the Protein Society or attending the San Diego Symposium of the Protein Society, please circle the appropriate number on the reader information card, or contact the Protein Society directly:

**The Protein Society**

Shirley E. Schlessinger  
Symposium Manager  
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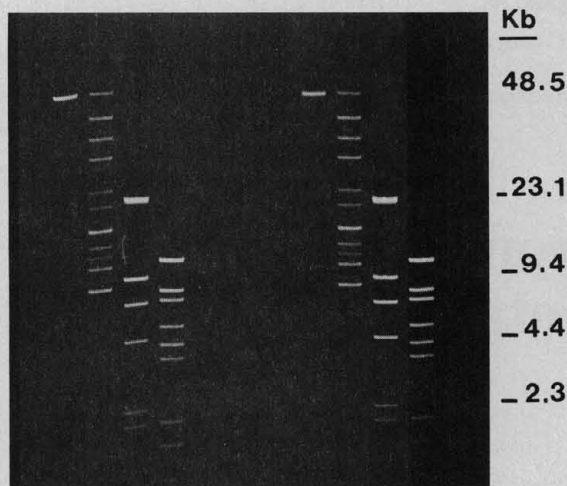
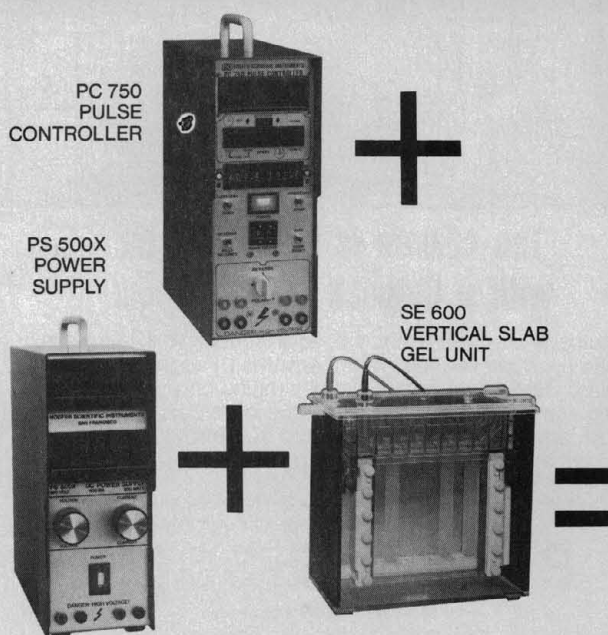
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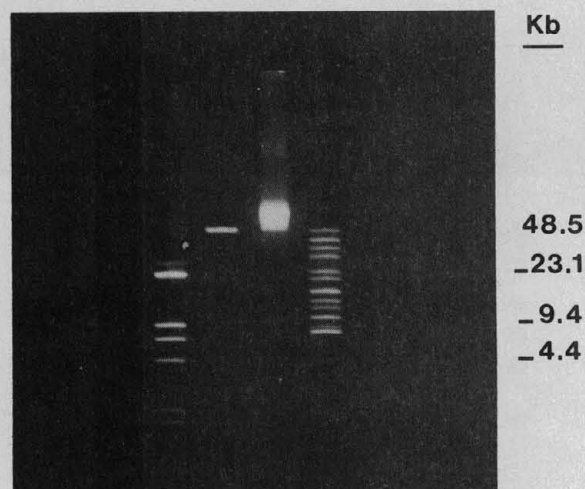
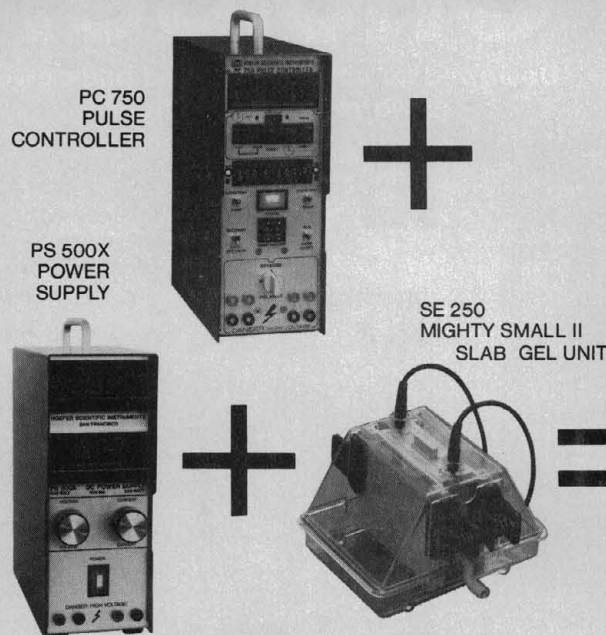


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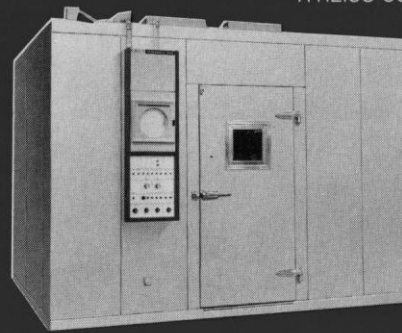
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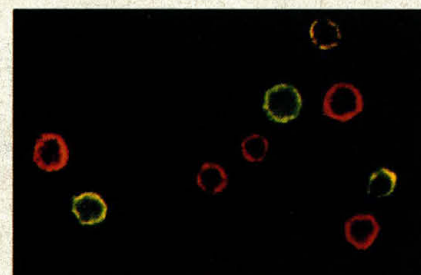


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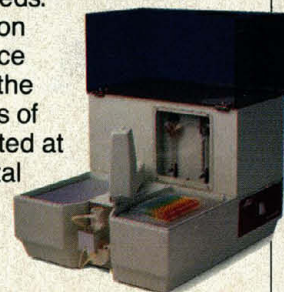


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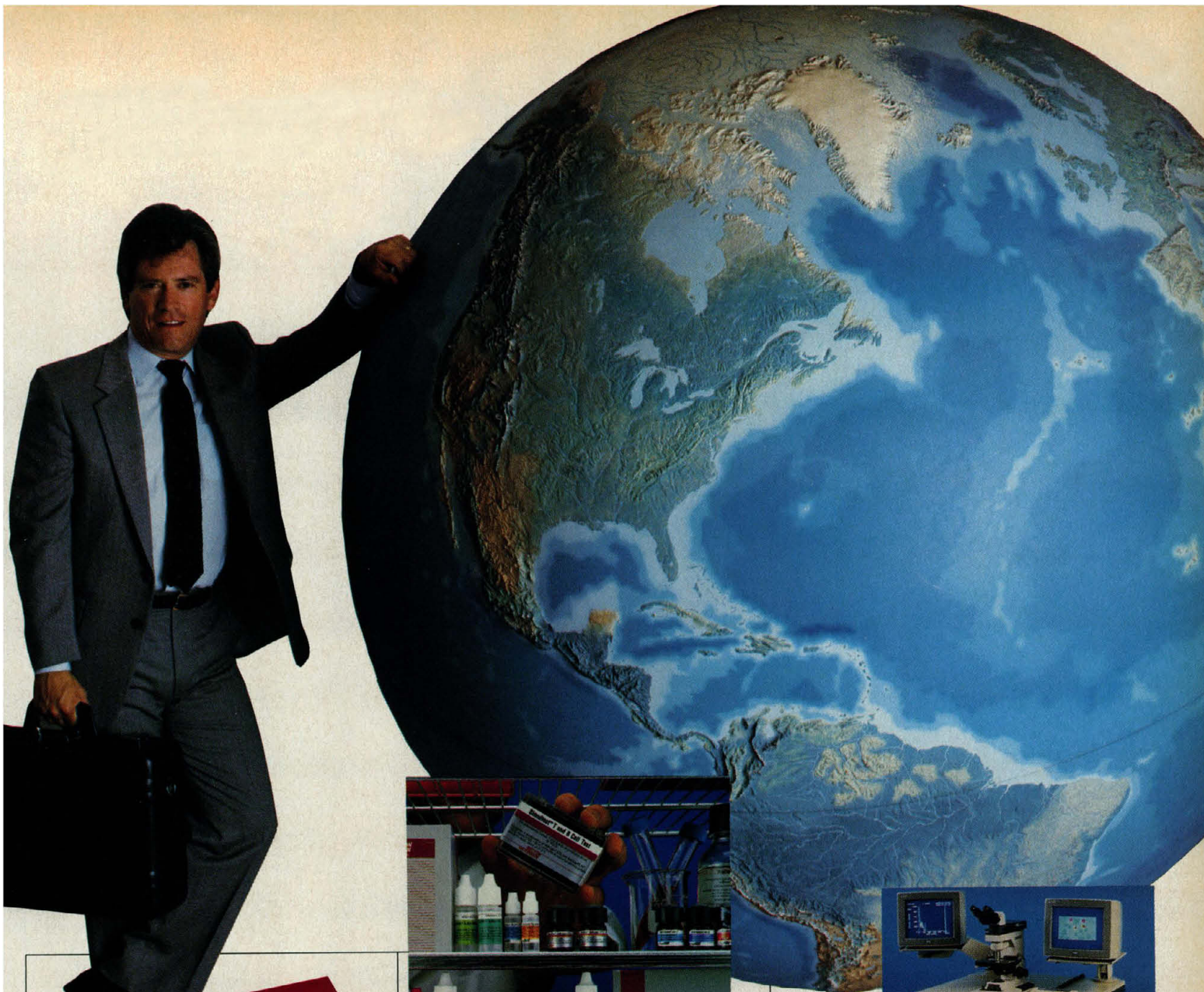
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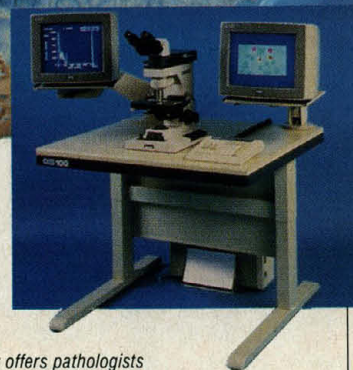
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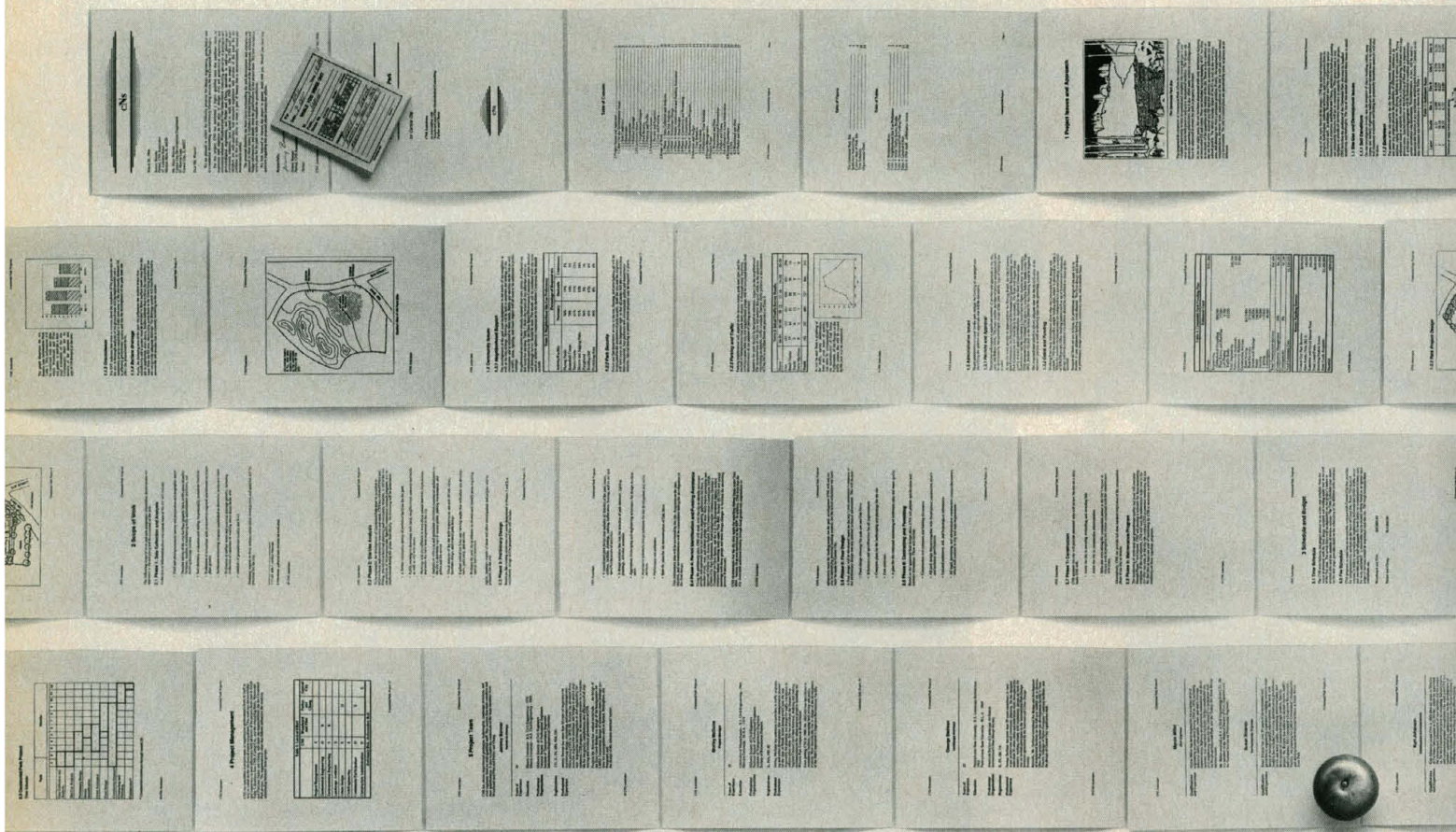
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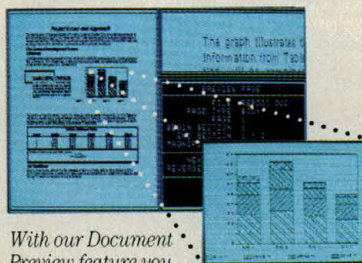
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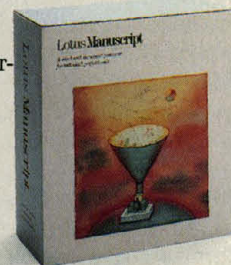
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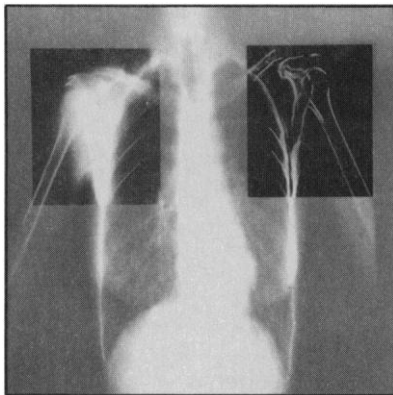
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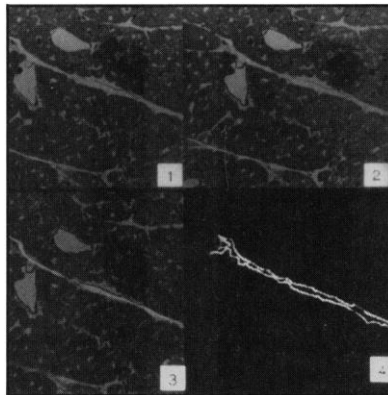
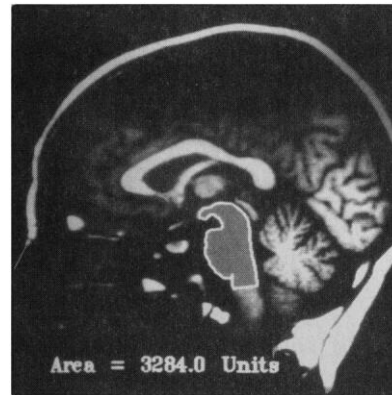


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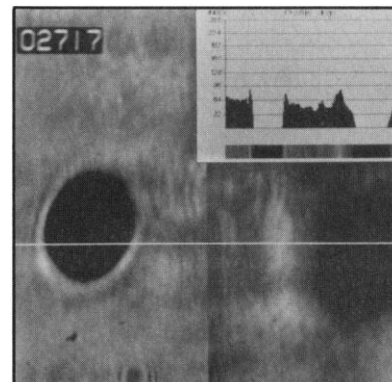
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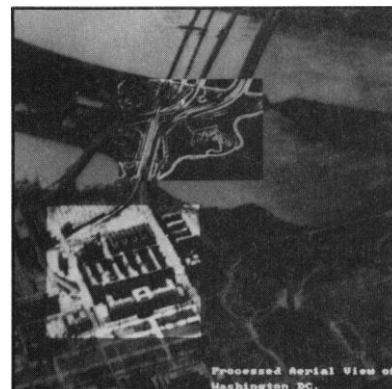
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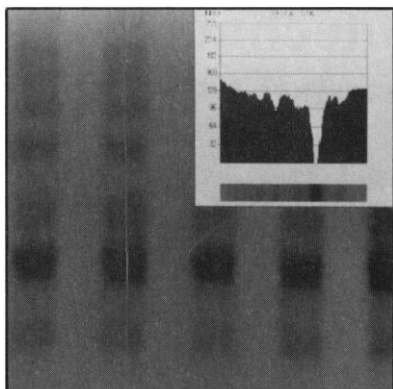
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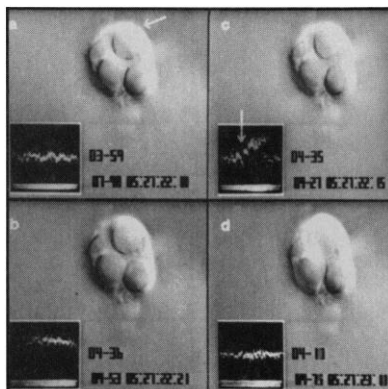
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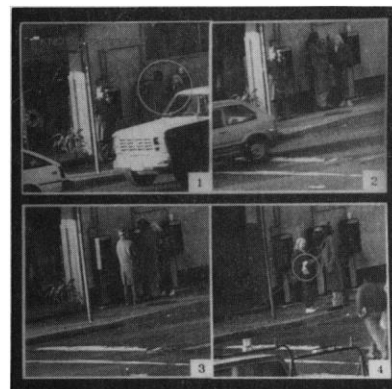
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Composite Image of Video Frames for Cell Study.



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# FTS Laboratory Freeze-Dryers—Engineered for Results.

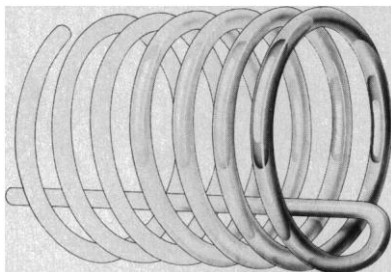
## **Performance that doesn't quit**

FTS lyophilizers deliver the high-quality, repeatable performance you need for *your most demanding laboratory applications*.

Our titanium condensers—standard on floor models and optional on bench-top models—provide superior corrosion resistance even if water is the main vapor you're trapping. For better trapping of low freezing-point vapors, we offer a bench-top system with condenser temperature to  $-90^{\circ}\text{C}$  or lower.

## **Technology that's constantly evolving to meet your needs**

FTS leads the industry in laboratory freeze-dryer technology because we work closely with customers and understand your changing requirements. We continually improve and upgrade our freeze-dryer line to bring you the most advanced systems available.

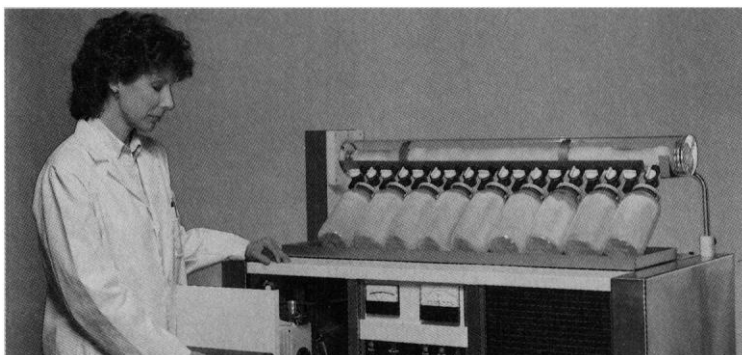


Advanced helical condenser acts as baffle, increases cold surface areas as freeze-dry run progresses.

## **Mix-and-match components maximize efficiency**

To maximize efficiency, all FTS freeze-dryer systems are available as separate components. You can mix and match refrigeration, vacuum and product addition components. And, you can count on our trained, experienced representatives to help you put together a system just right for your application needs.

Efficient, reliable Maxi-Dry™—with the shortest vapor path in freeze-drying.



Dura-Dry™ condenser with Dura-Stop™ tray dryer—production-size performance in a laboratory-size tray dryer.

In bench-top units, choose between stainless steel (for organic solvents), acrylic (for inorganic acids) or Teflon (for the greatest corrosion resistance) manifolds. Stoppering and non-stoppering tray systems are available down to  $-40^{\circ}\text{C}$  or  $-50^{\circ}\text{C}$ , with compatible condenser modules available down to  $-84^{\circ}\text{C}$ .

A full line of accessories and instrumentation add to the efficiency of your freeze-dryer system.

## **Designed to make your job easier**

Every feature of our freeze-dryers is designed to make your job easier. Manifold bench-top models feature easily accessible ports for addition of flaskware without restrictive adapters. To facilitate stoppering and reduce contamination, our stoppering units use efficient electro-mechanical stoppering rather than leak-prone air-bladders.

Taper-lock trays with wedge-shaped side rails, forced fluid shelf design and optional removable bottom trays combine to maximize heat transfer on tray units.

FTS freeze-dryers are also *easy to operate and maintain*. Digital control and indication are standard on tray dryers.

FTS freeze-dryers are available on GSA contract.

To learn more about how FTS freeze-drying systems can help further *your* research, CALL TOLL-FREE 1-800-251-1531 (Except New York State).

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Engineered  
for  
Results.**



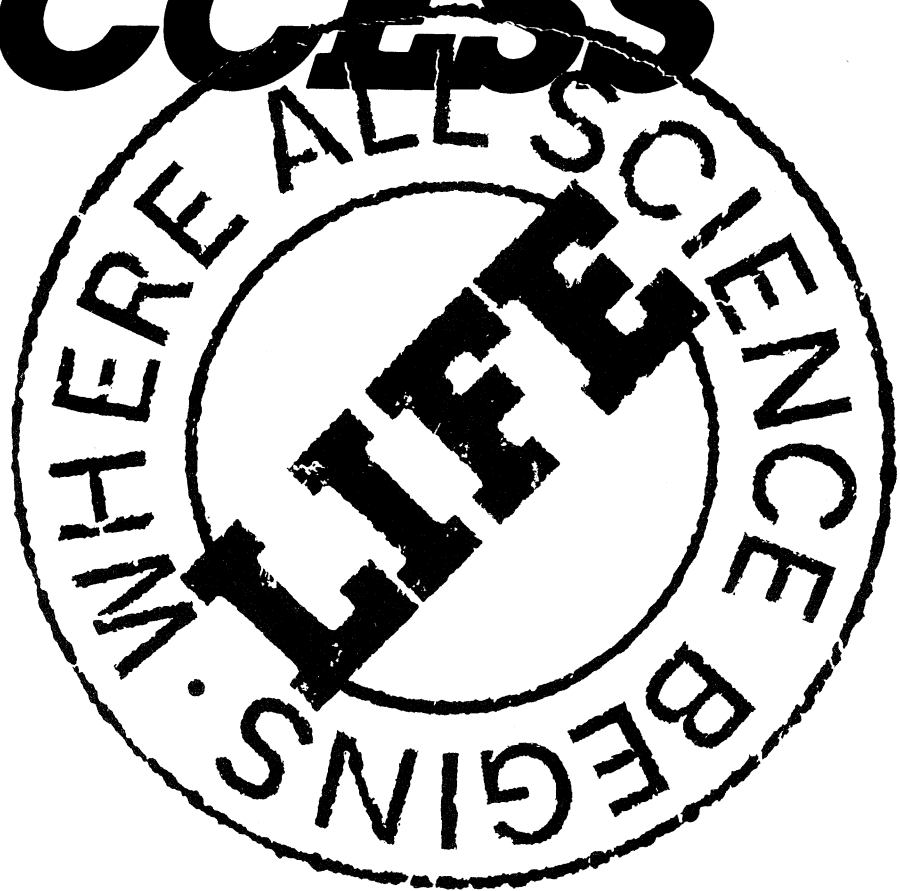
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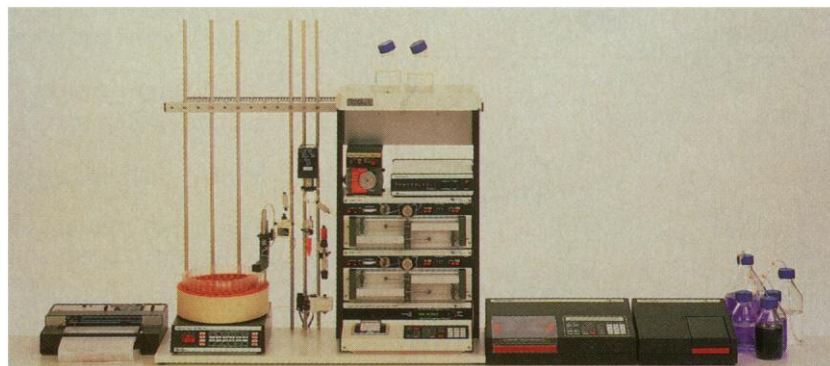
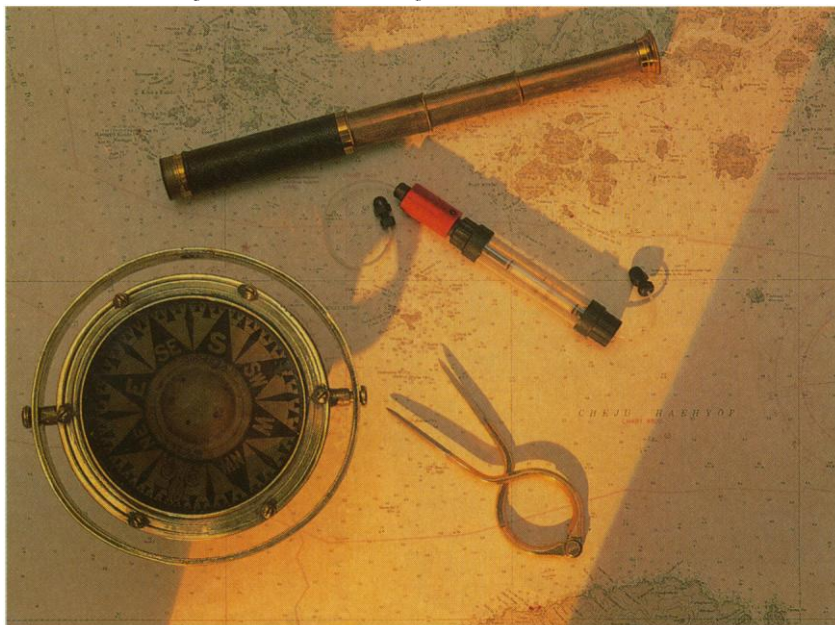


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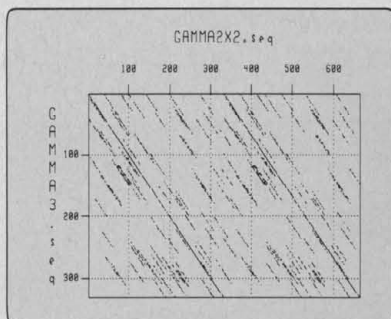
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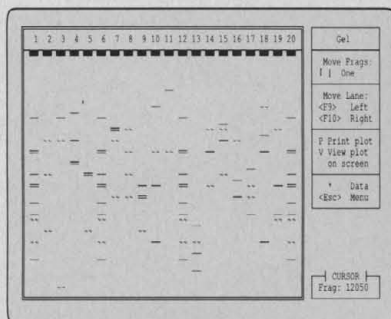
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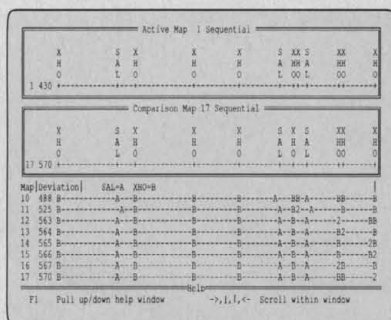
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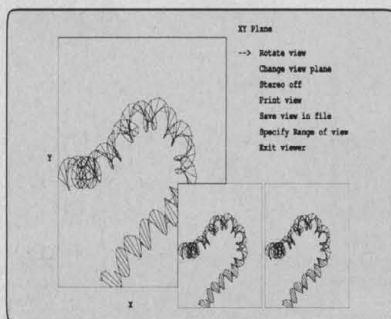
**DOTPLOT**



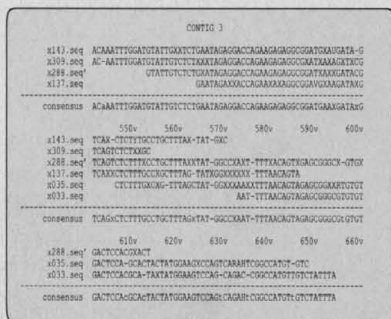
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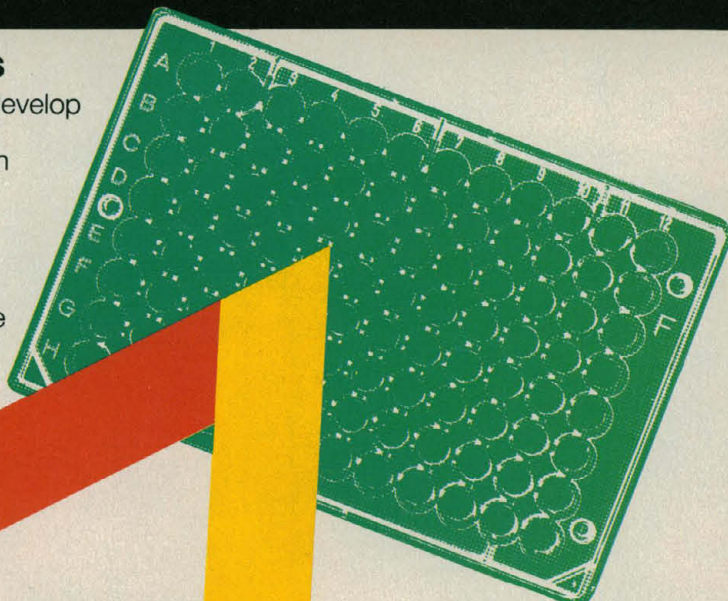


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Eurogenetics is a label of quality in the biotechnology and clinical laboratory market.

Now, Eurogenetics Bio-link program offers an integrated range of products for immunoassay : hardware, software and reagents.



# the BIO-LINK

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## ● Hardware:

The Euroreader microtiterplate reader is designed for ease of use, speed and flexibility. It offers networking via RS232C with IBM compatible hookup.

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- RF - Prolactin
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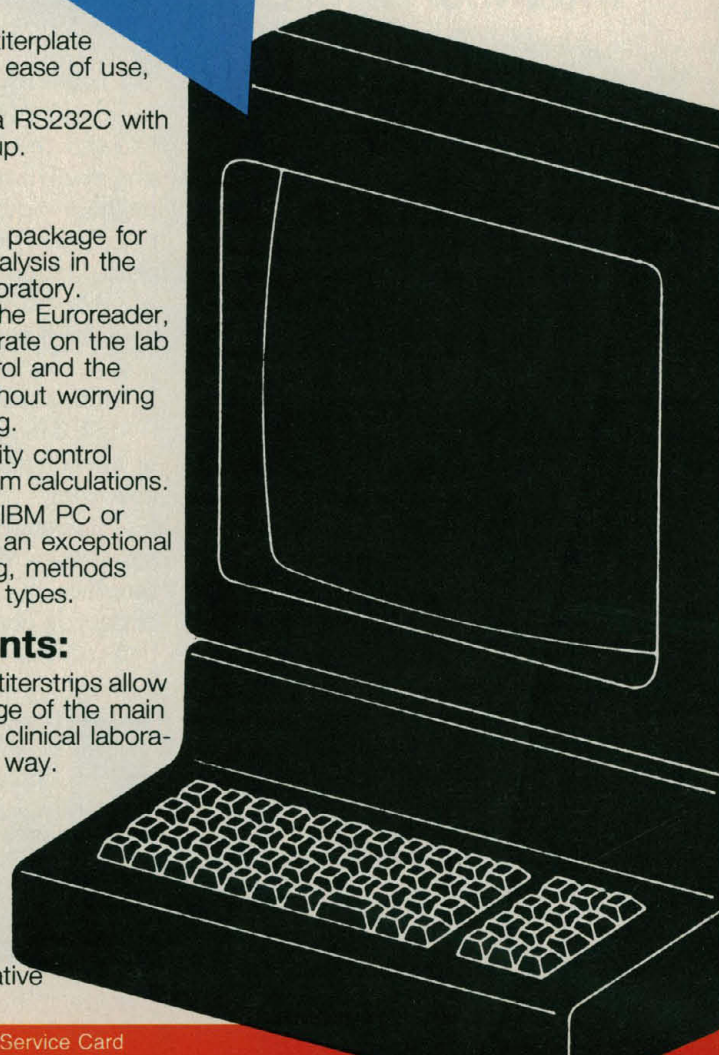
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## **The problem.**

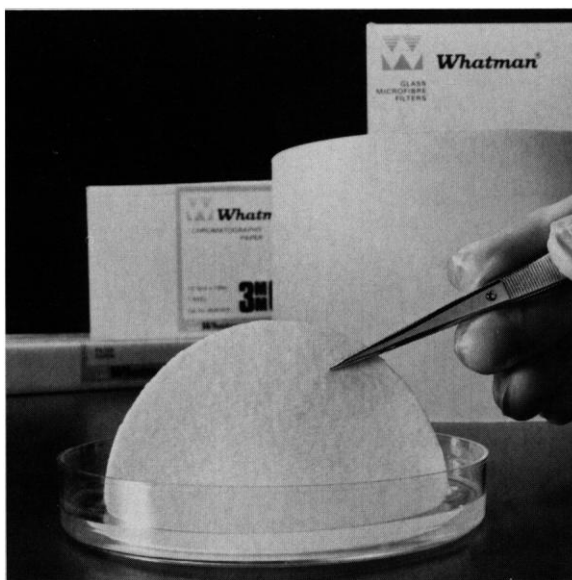
Often, biologically active proteins of interest to a researcher are available in very limited quantities. While the sensitivity of the gas-phase sequenator has pushed the detection limit to as low as 10-20 pmol, isolation of such amounts of proteins in a form suitable for sequencing remains a challenge.

## **A solution.**

Aebersold et al<sup>1</sup> developed a method involving the direct electrophoretic transfer of proteins and cleavage fragments onto activated Whatman GF/C or GF/F glass microfibre filter paper. The activated Whatman paper also acts as a support during the sequencing. The result: high yield and superior microsequencing characteristics.

## **Versatile. High recovery.**

The authors reported the successful application of the method to a variety of proteins and peptides isolated from one-dimensional and two-dimensional polyacrylamide gels. There is no apparent restriction regarding the solubility, size or charge of the proteins. When using SDS-PAGE techniques, neither the acrylamide concentration nor the presence of a gradient affects the sensitivity or high transfer efficiency. Detection levels are 50 ng or less. Transfer efficiencies are typically in



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## **Superior for microsequencing.**

The activated Whatman glass microfibre filter paper provides high initial yields and increased step-wise yields. As a result, dramatically extended sequence determinations are possible. Based on theoretical calculations, for example, for 20 pmol of protein and a detection limit of 2 pmol, 33 residues can be determined

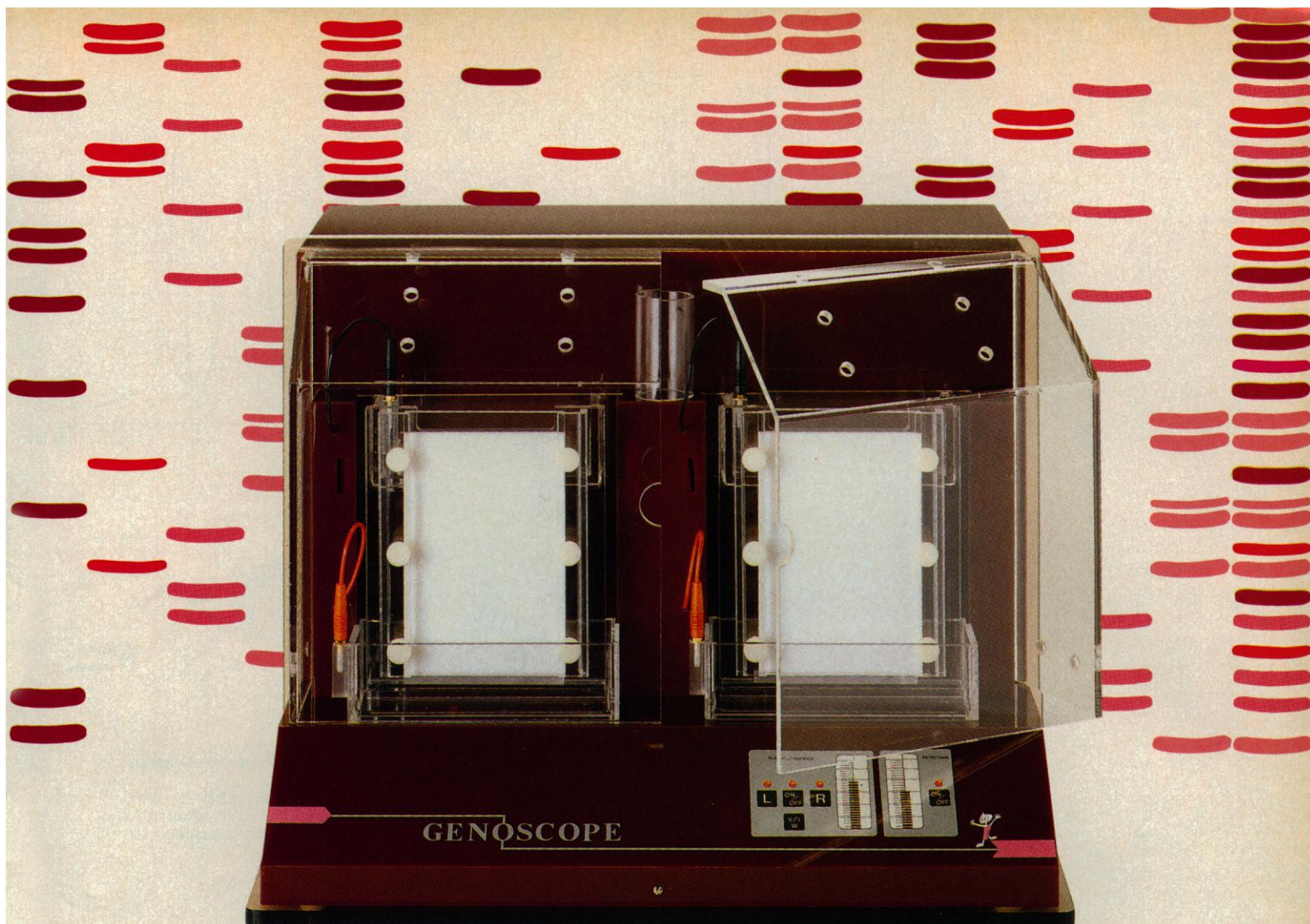
where only 25 were possible previously. Background levels are much lower, too. As little as 3 pmol of material can be sequenced due to the absence of extraneous peaks. If appropriate precautions are taken during electrophoresis, no  $\text{NH}_2$ -terminal blocking occurs.

## **Get more information today.**

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<sup>1</sup> Aebersold, R.H., Teplow, D.B., Hood, L.E., and Kent, S.B.H. (1986) *J. Biol. Chem.* 261, 4229-4238.





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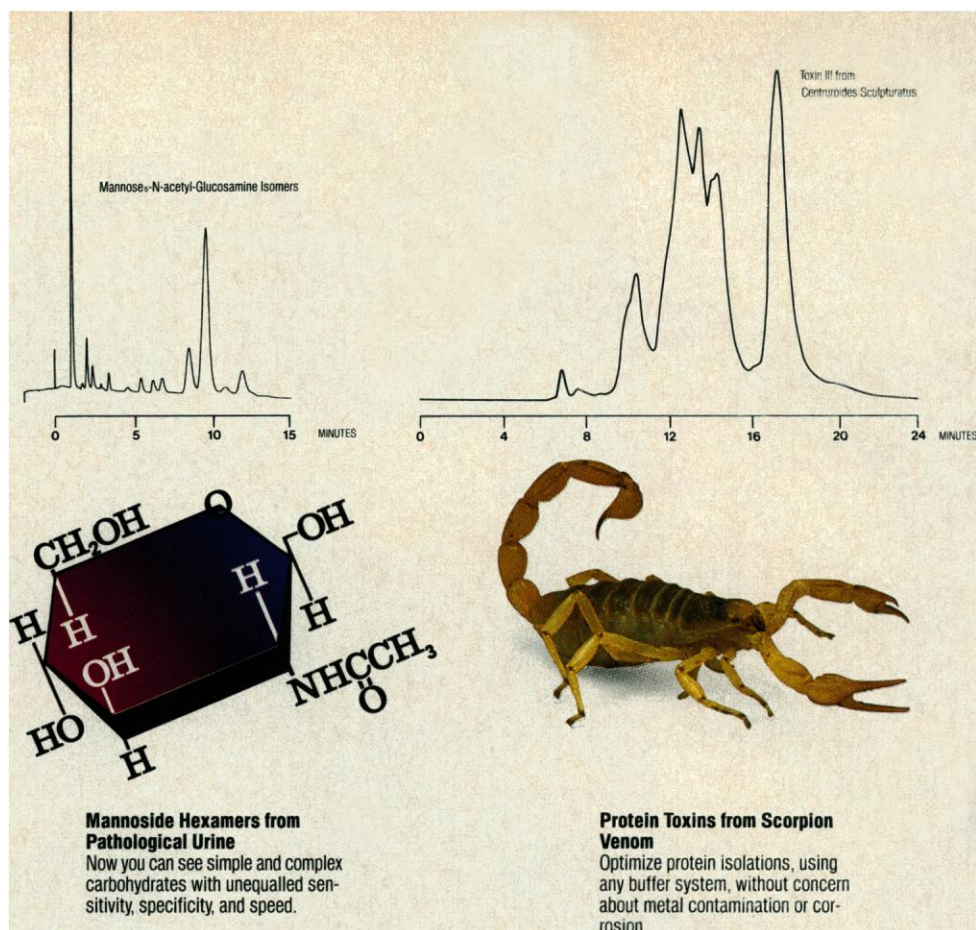
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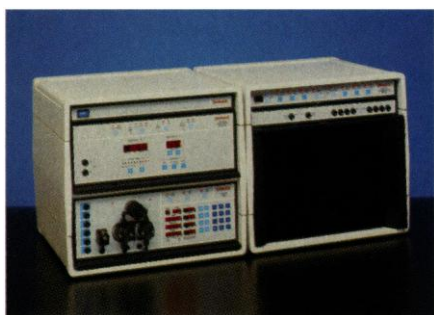
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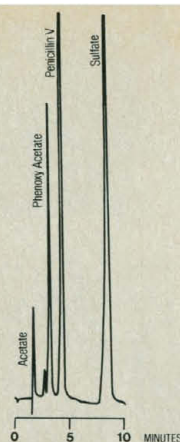
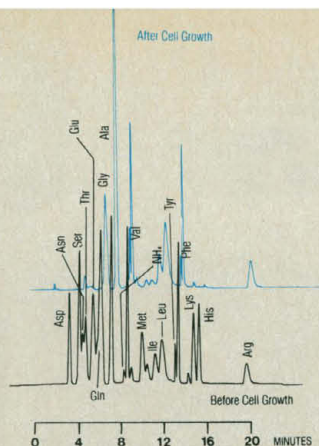
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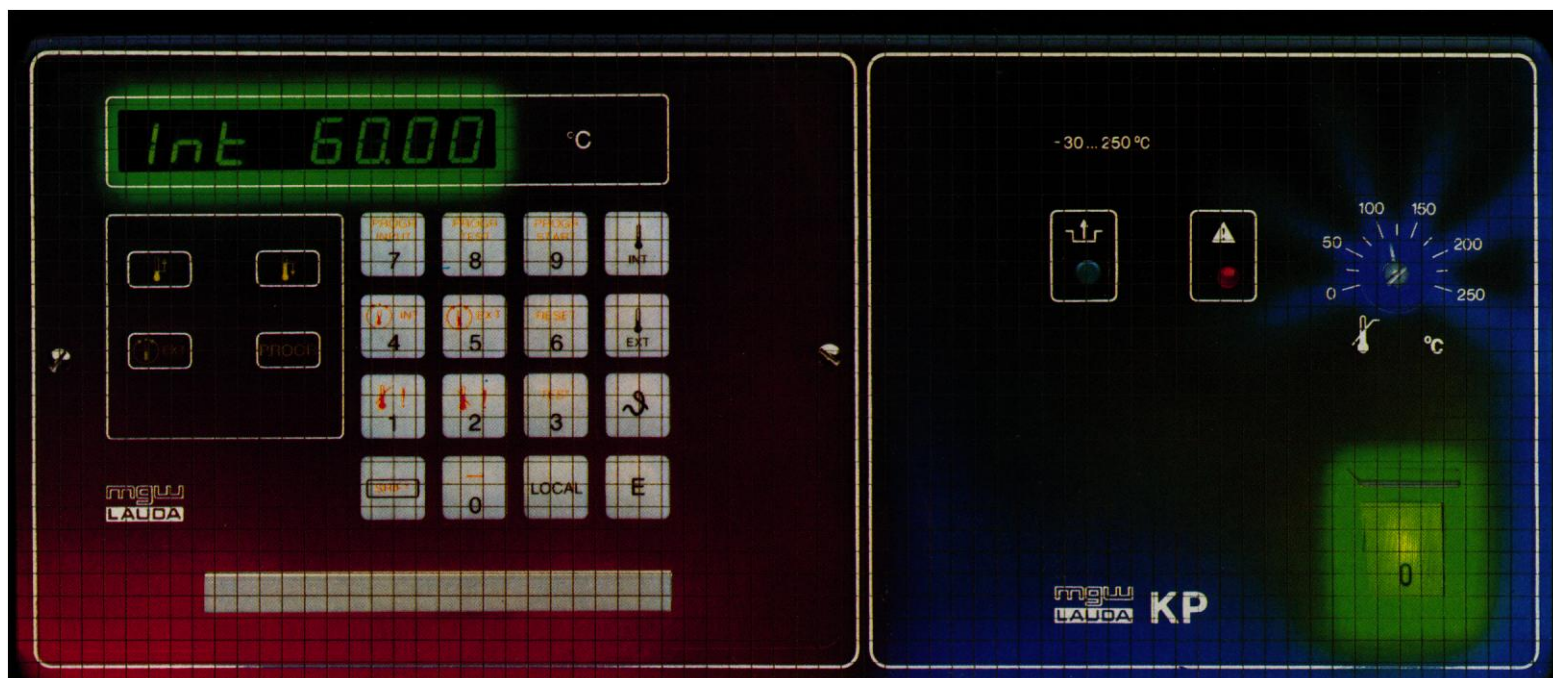


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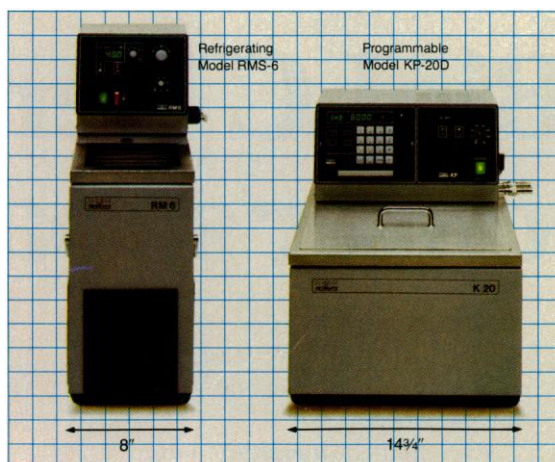


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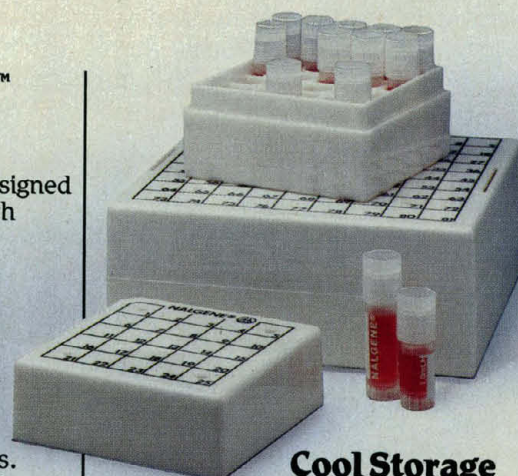
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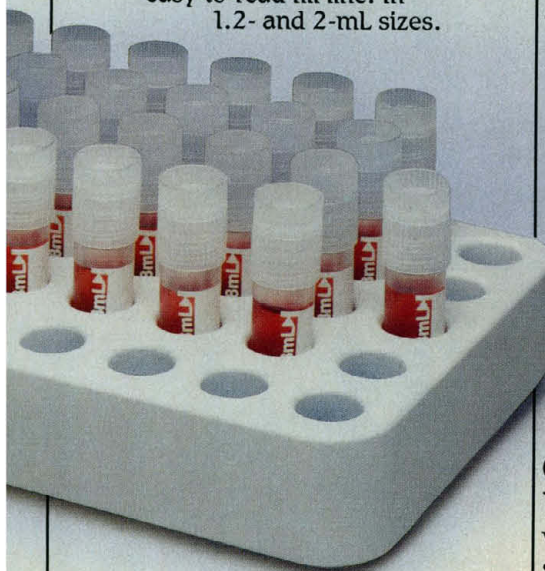
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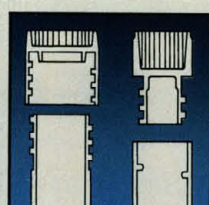
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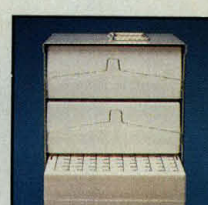
All-plastic Nalgene Cryovial Holder locks Nalgene Cryovials firmly in place for single-handed opening of closures.



Outside thread design on Nalgene Cryovial (left) reduces possible sample contamination. Inside thread of conventional vial (right) increases contamination risk and sample hang-up.



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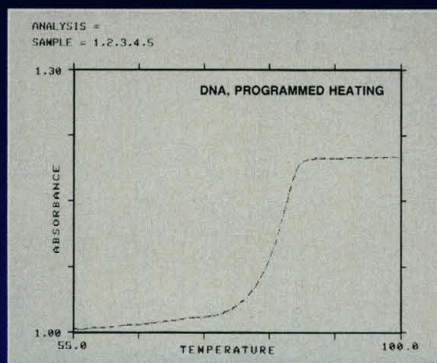
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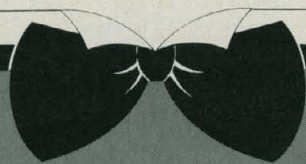
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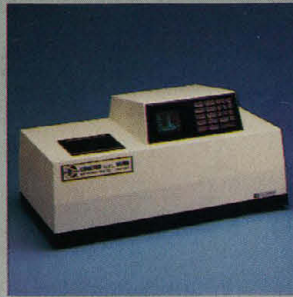
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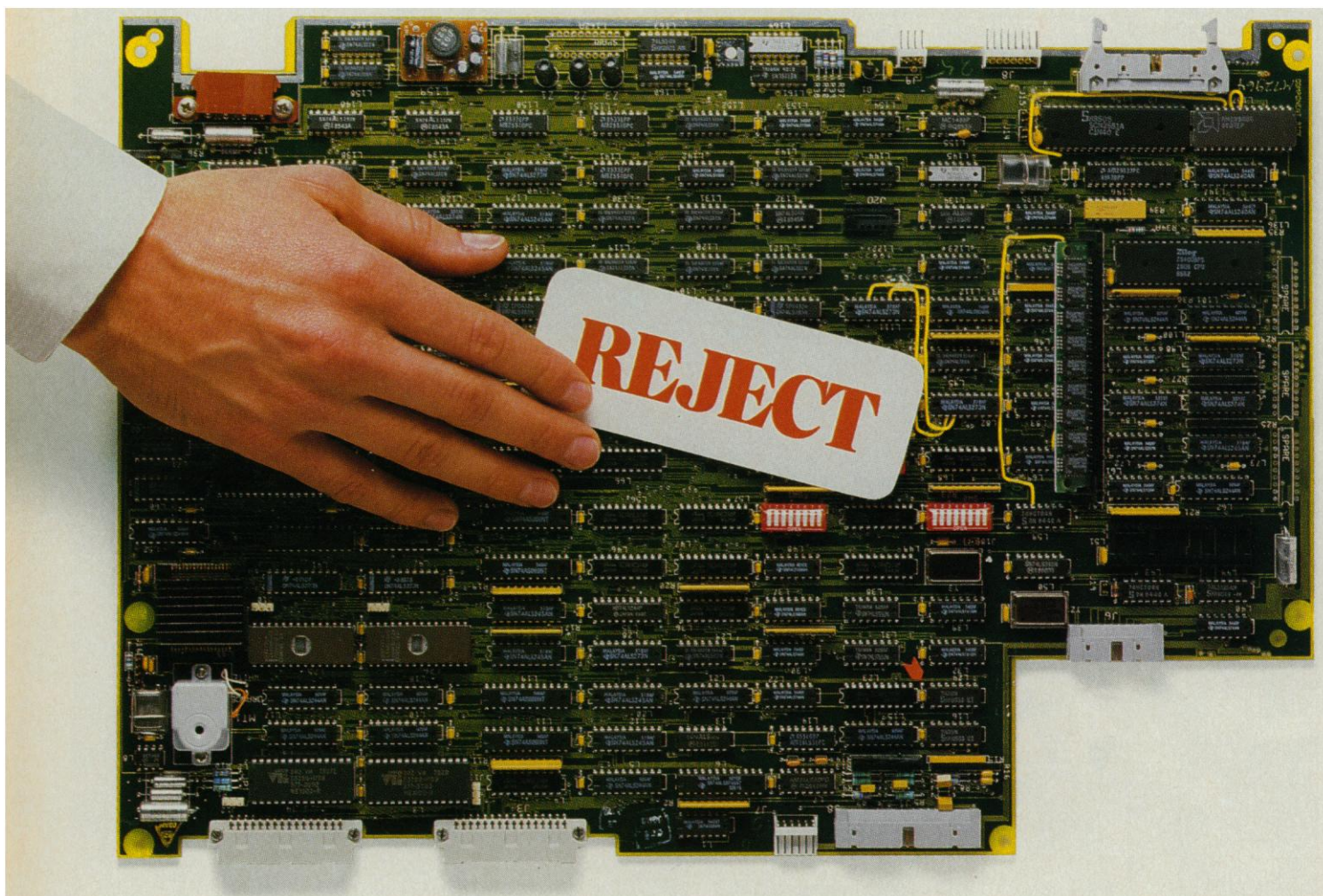
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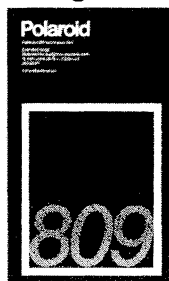
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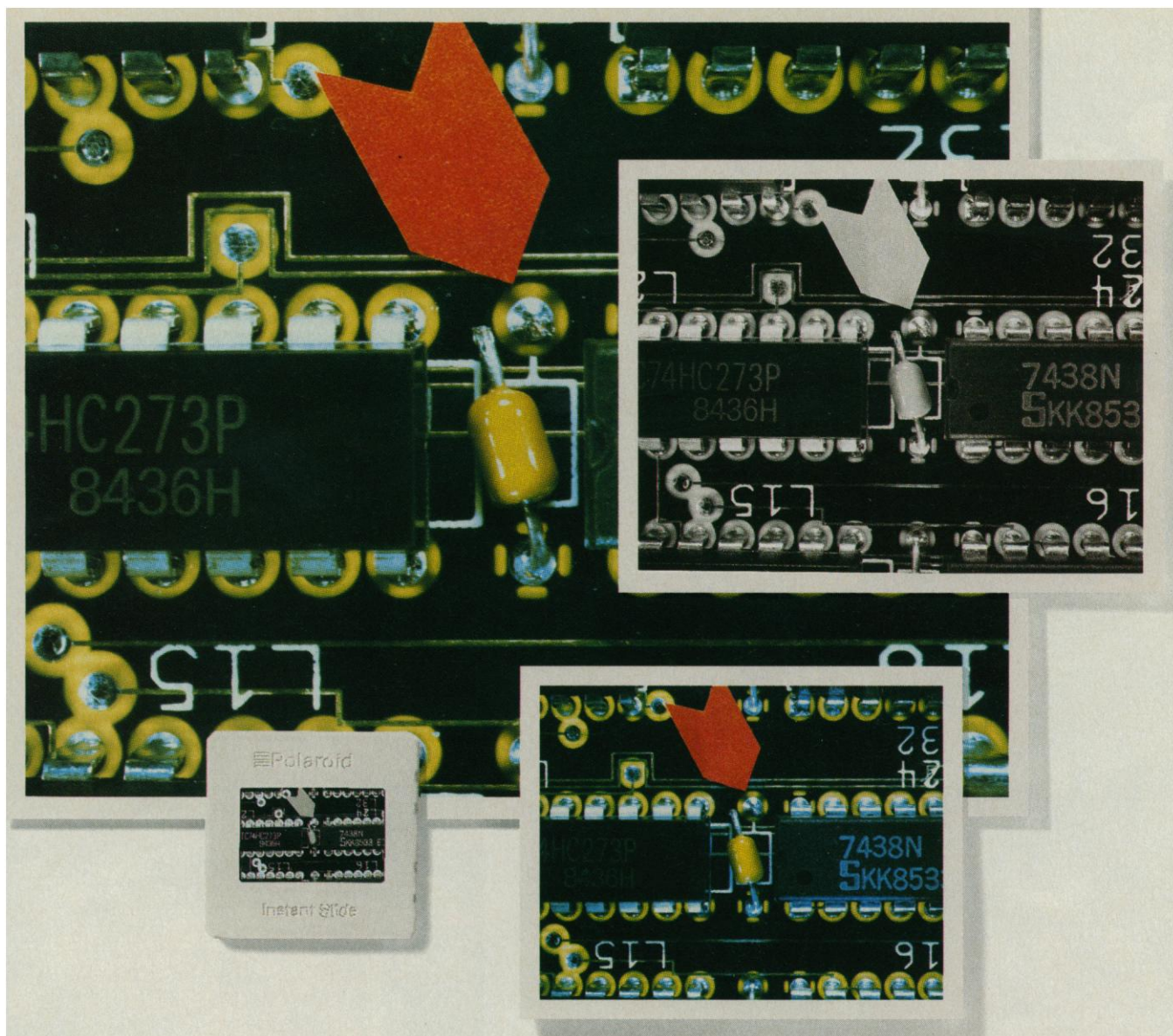
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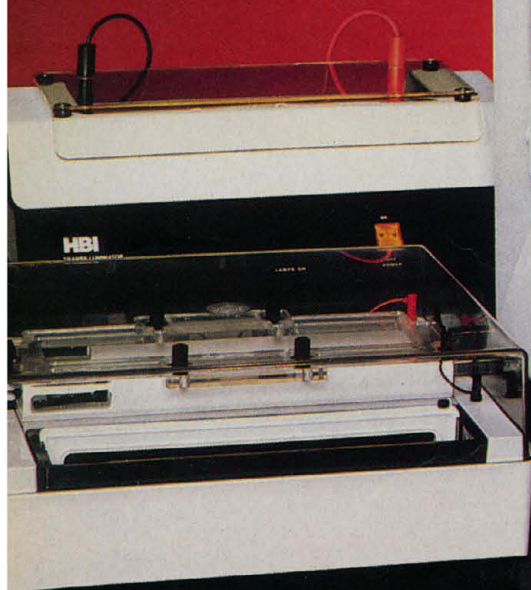
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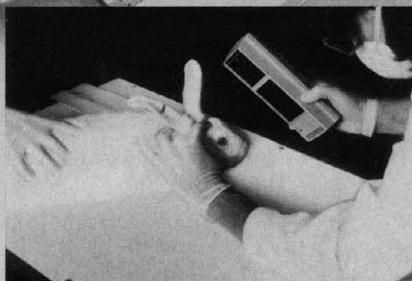
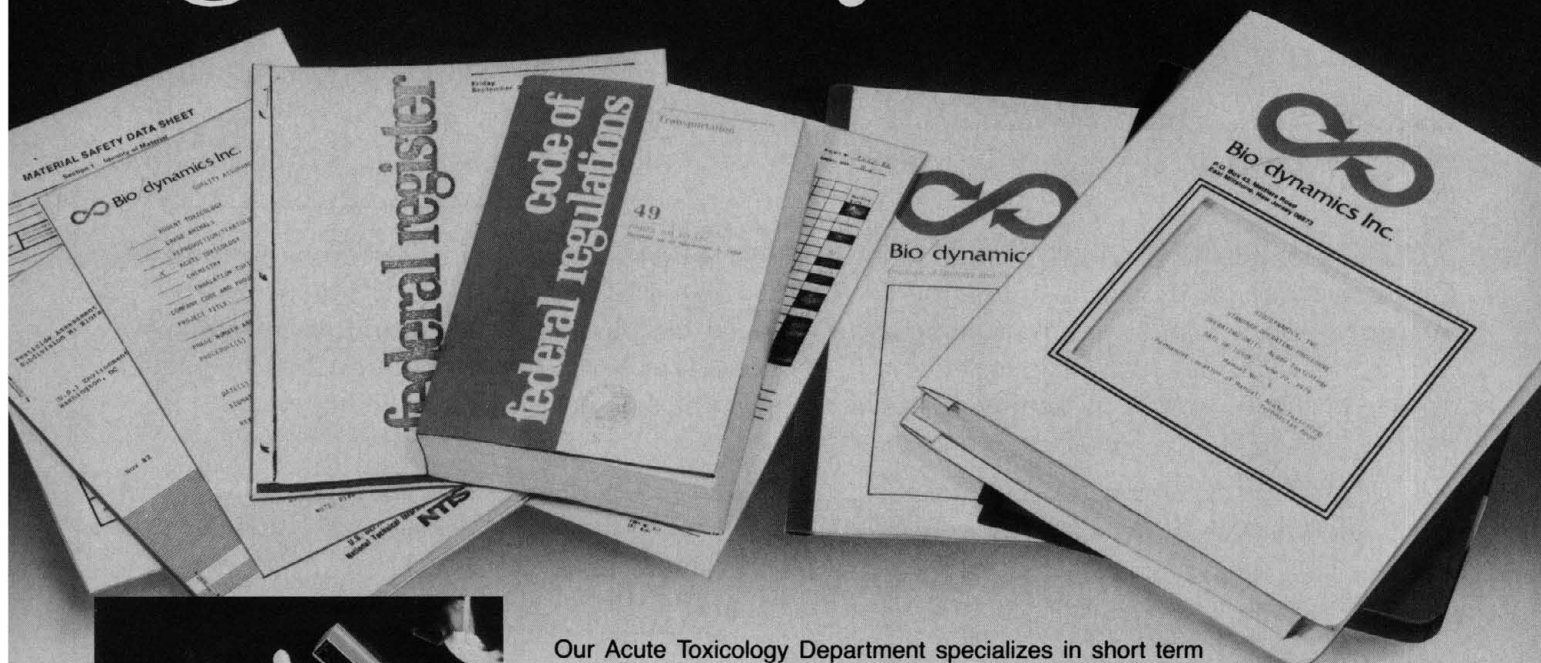
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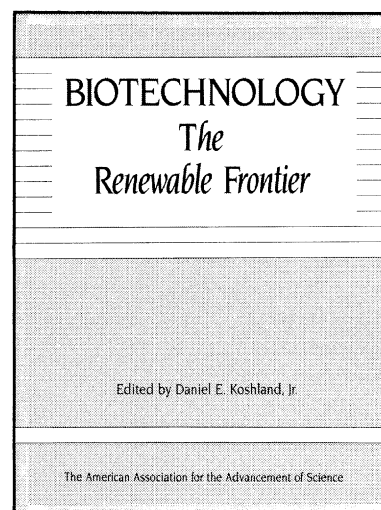
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*Edited by*  
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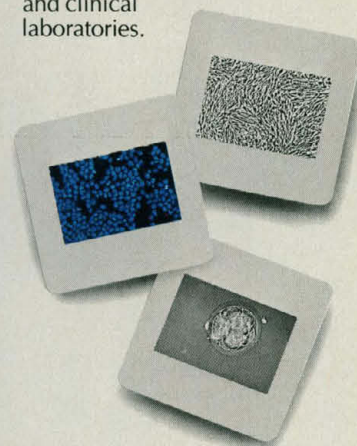
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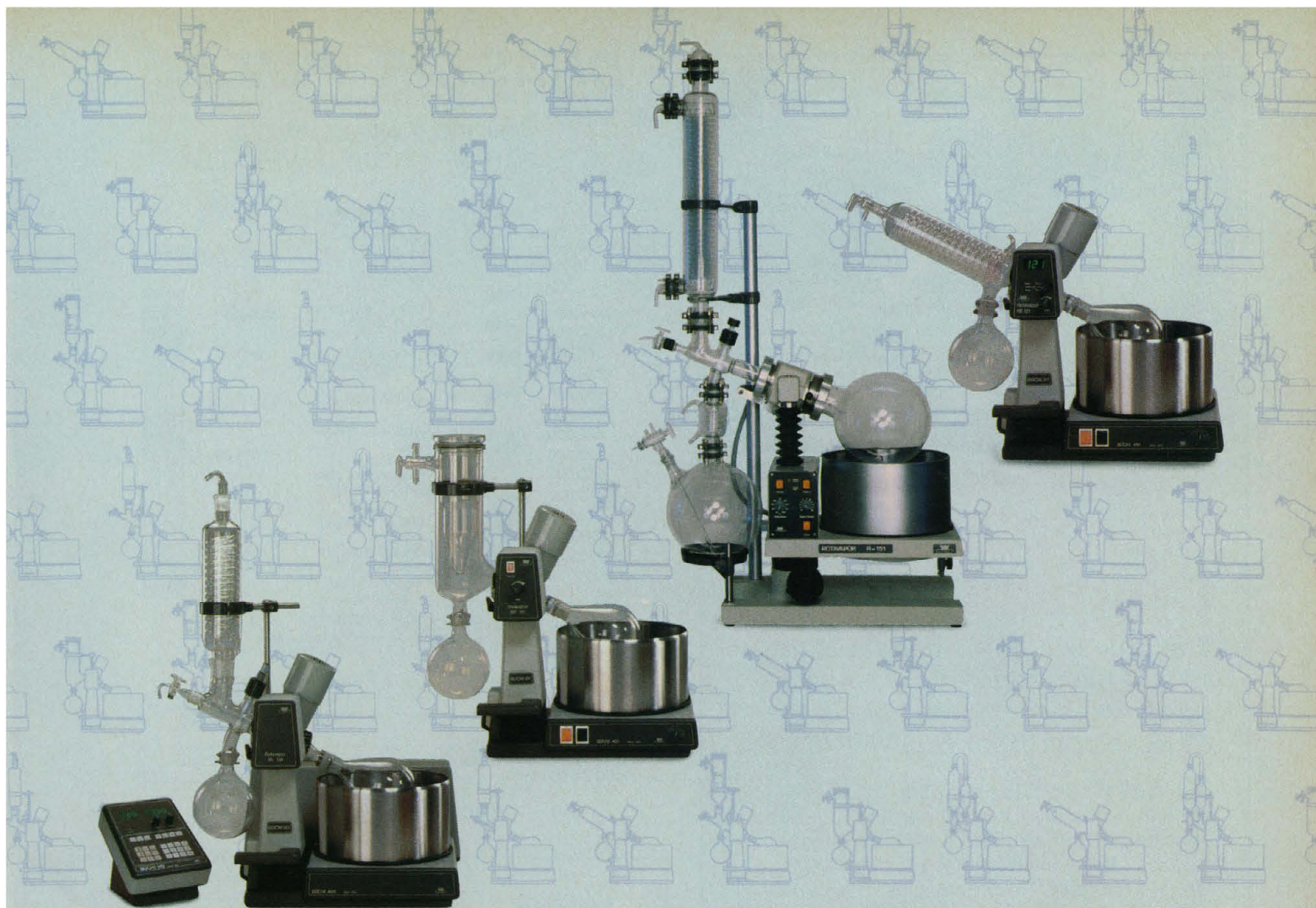


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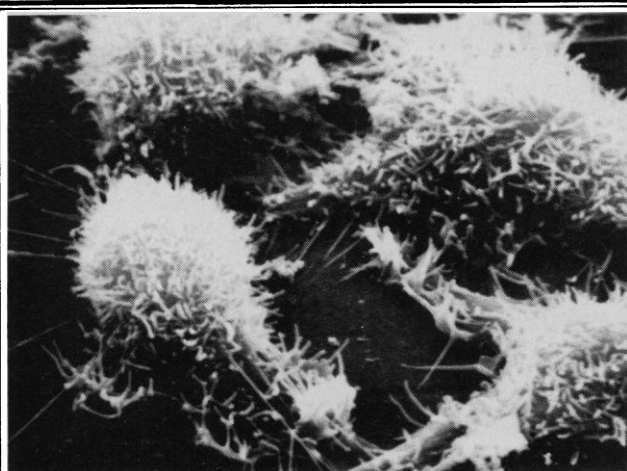
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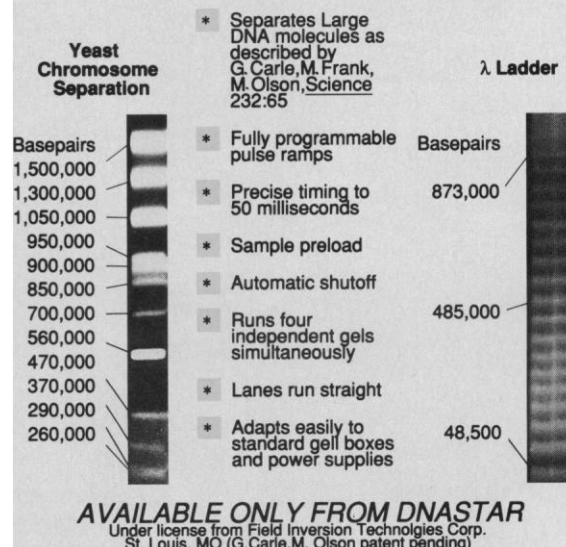
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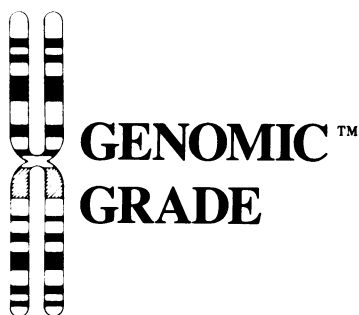
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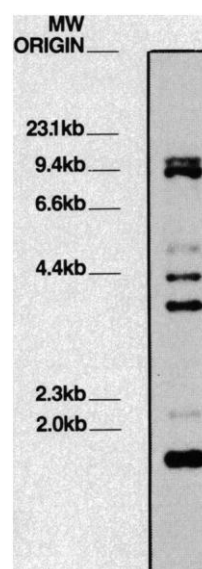


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■ **OPTIMAL SIGNAL-TO-NOISE RATIO** — Minimum acceptable signal-to-noise ratio is determined by laser densitometry of blot autoradiograms. High levels of background or smeared lanes can obscure complex or faint patterns making data difficult or impossible to interpret. Each lot of Genomic Grade enzyme has passed this sensitive functional assay.



DNA was prepared from normal peripheral blood leukocytes, digested to completion with *Pvu* II (Genomic Grade) and transferred from a 1.5% agarose gel to a nylon filter membrane. A 1.2 Kb DR $\beta$  cDNA clone contained in the *Pst* I site of pBR322 was used as the probe. Densitometry values are presented as ratios in the following format: filter background/lane background/band signal or, in this example, an average signal-to-noise ratio of 30:1.

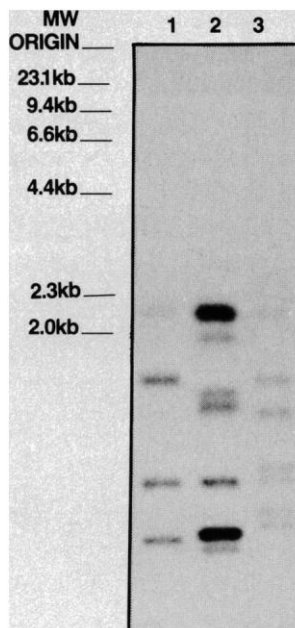
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DNA was prepared from three different cultured  $\beta$ -lymphoblastoid cell lines, digested to completion with *Rsa* I (Genomic Grade) and transferred to a nylon filter membrane. A DR $\beta$  clone contained in the plasmid pBR322 was then nick-translated and used as the probe. DR $\beta$  was employed because of its highly polymorphic nature. As is evident in the autoradiogram, no signals are present in the molecular weight range  $>2.3$  Kb, where one would expect to detect plasmid contamination.

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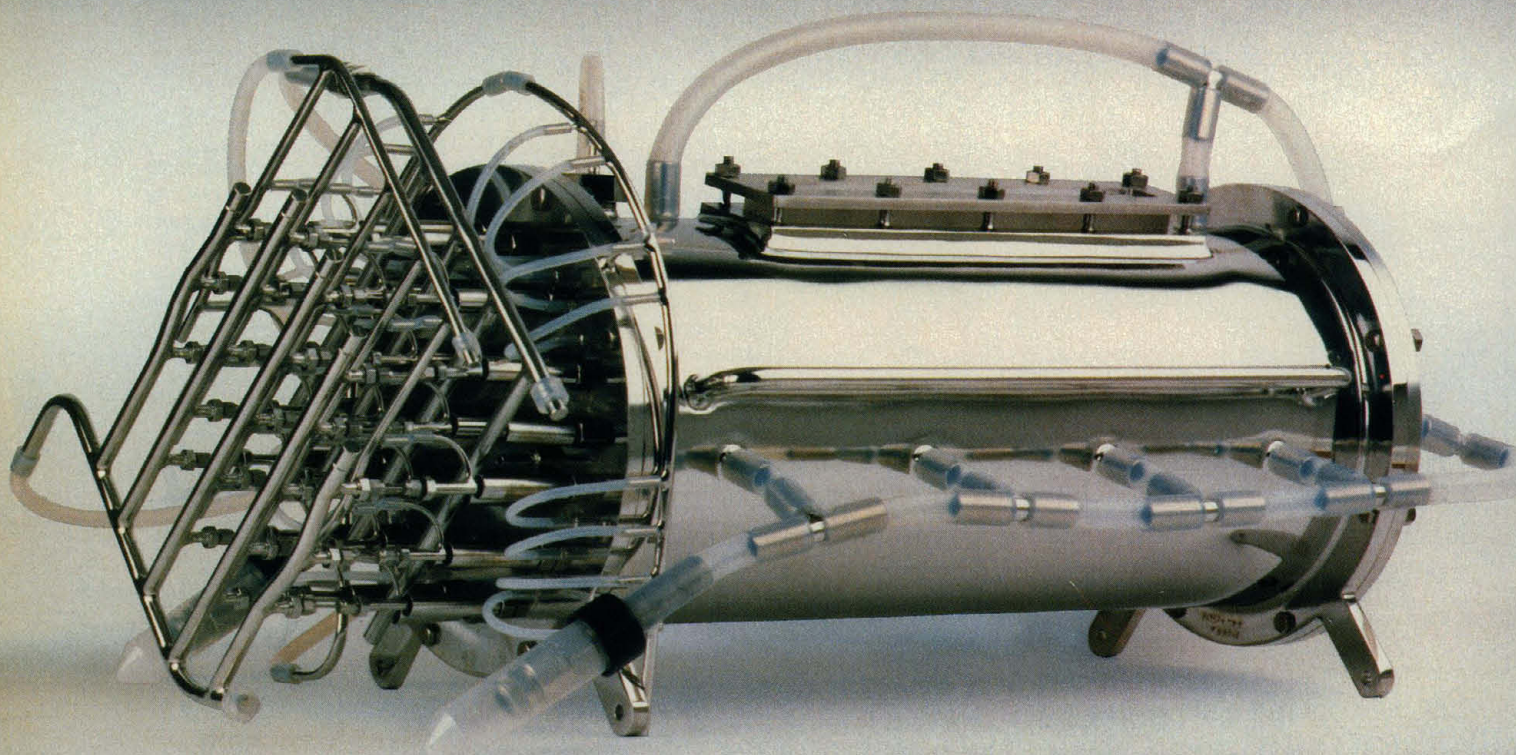


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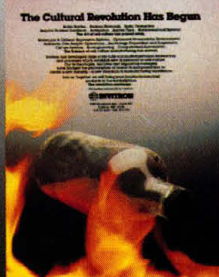
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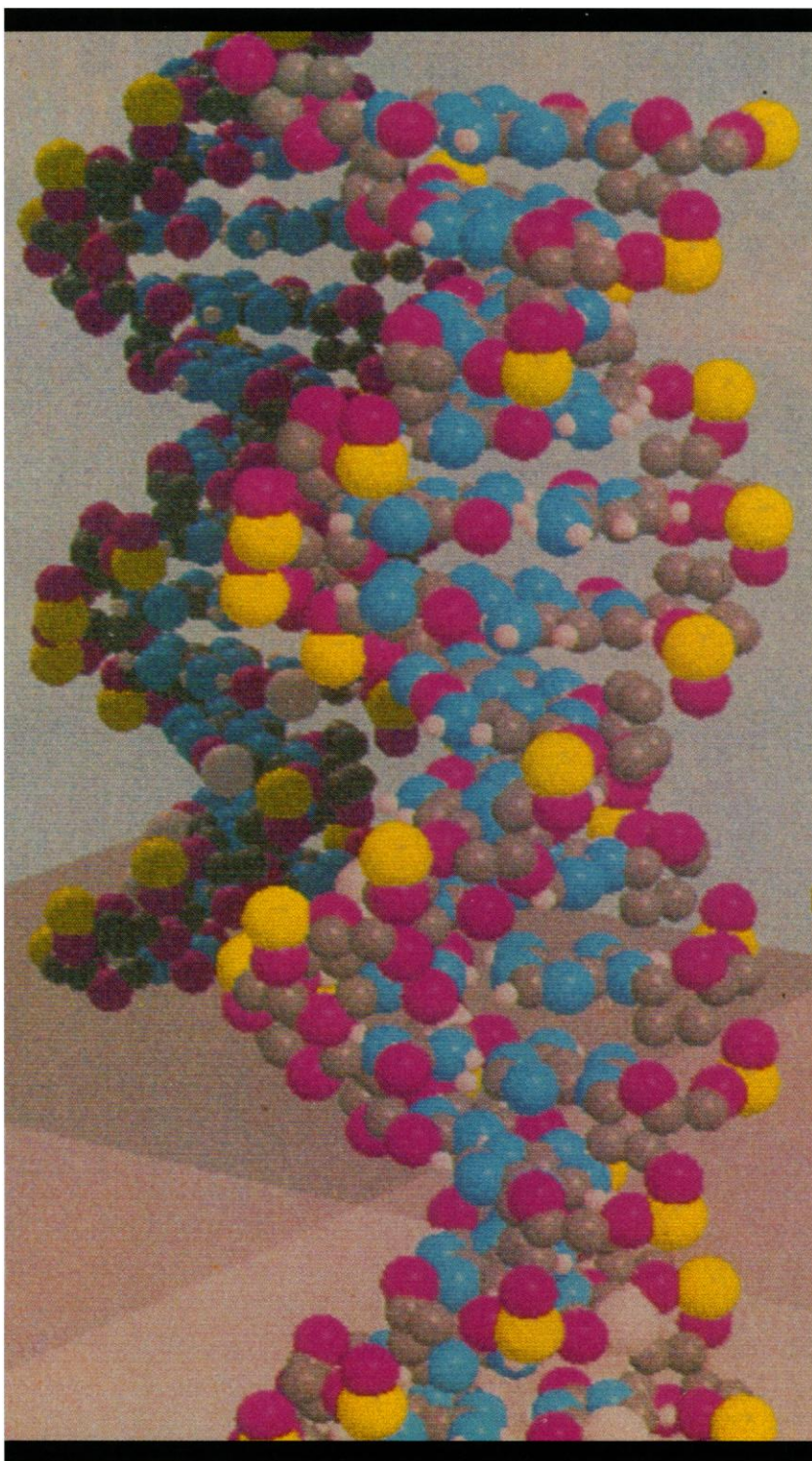


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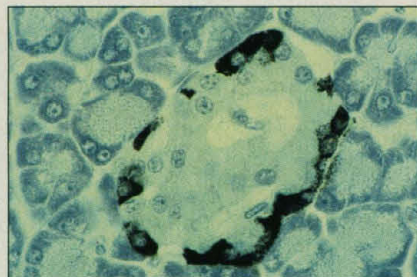
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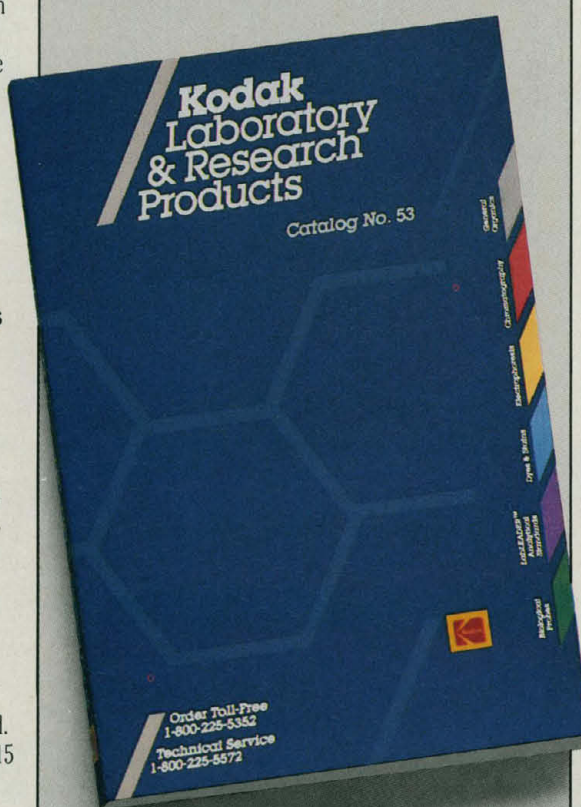
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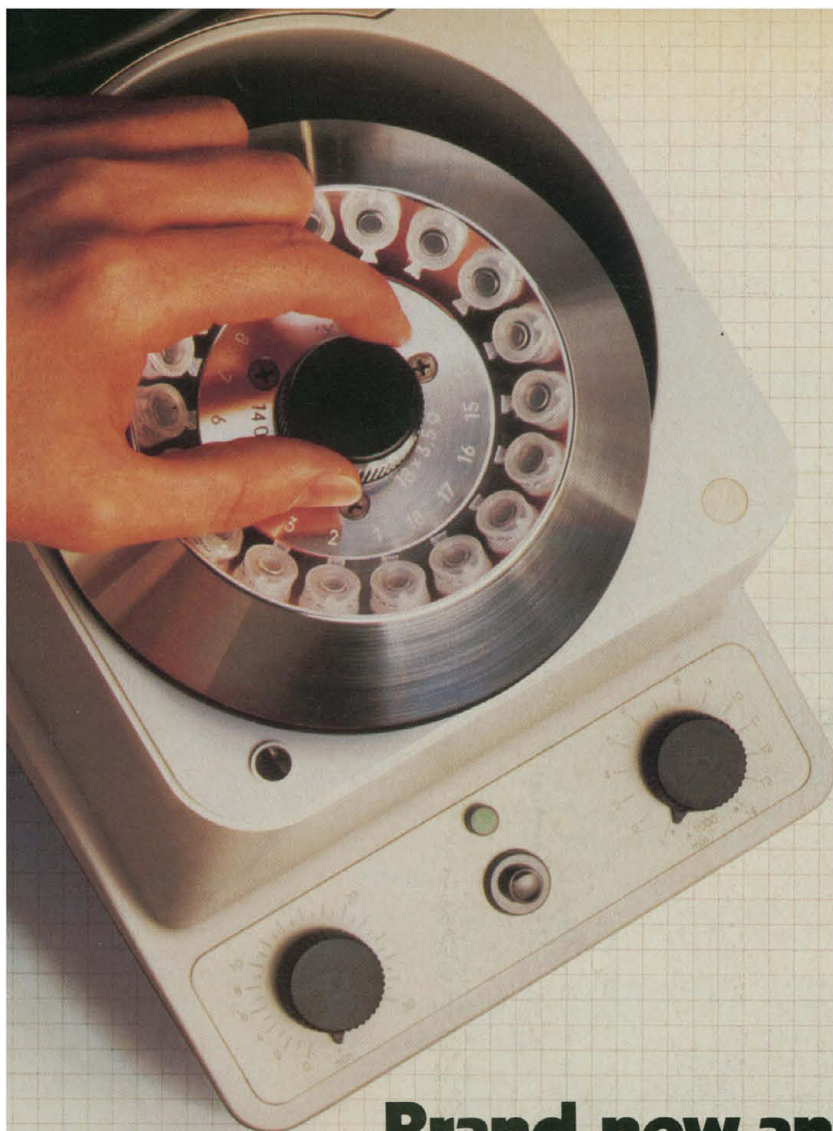
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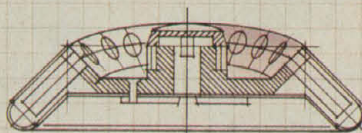
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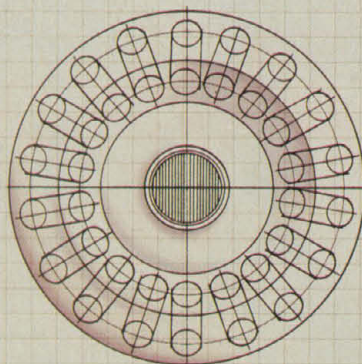
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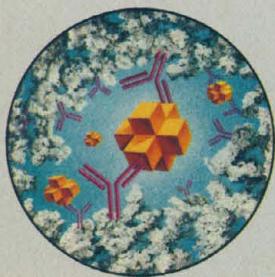
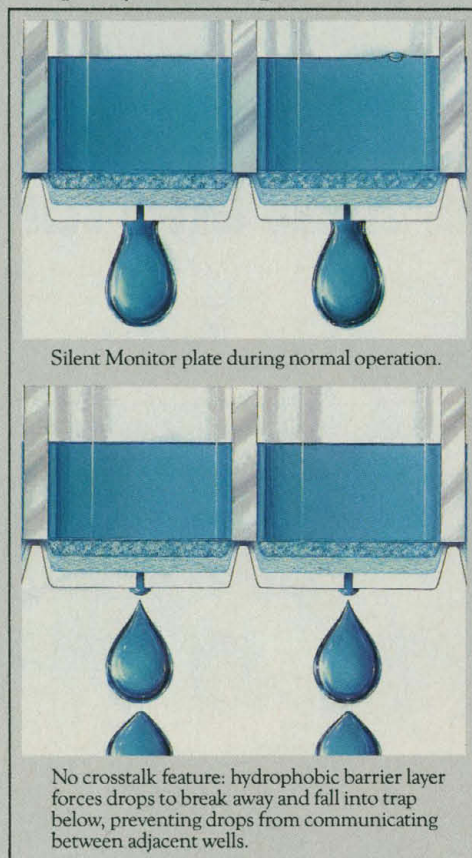
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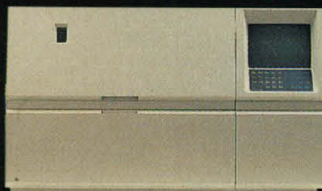
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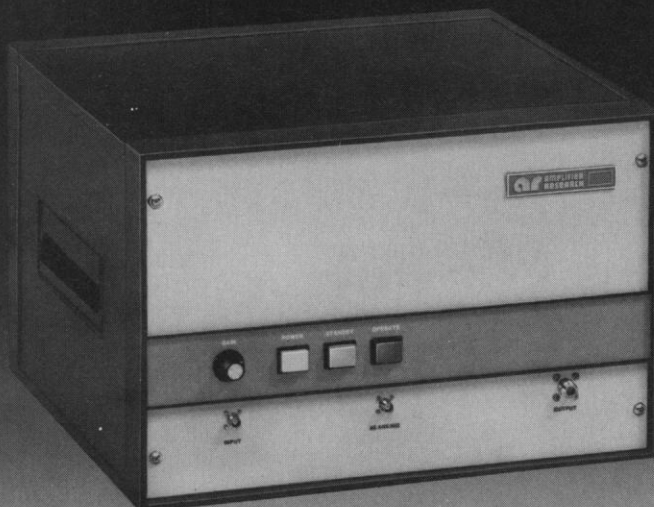


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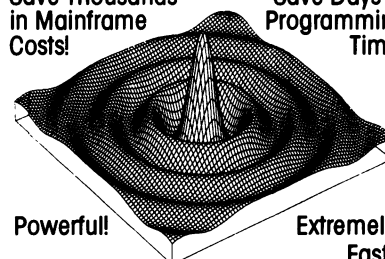
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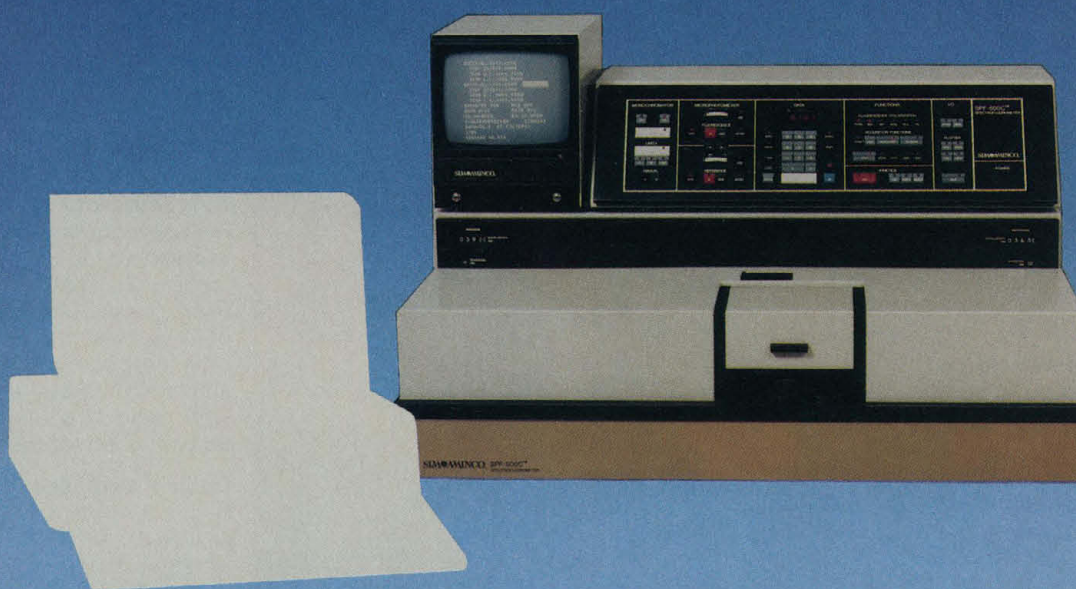
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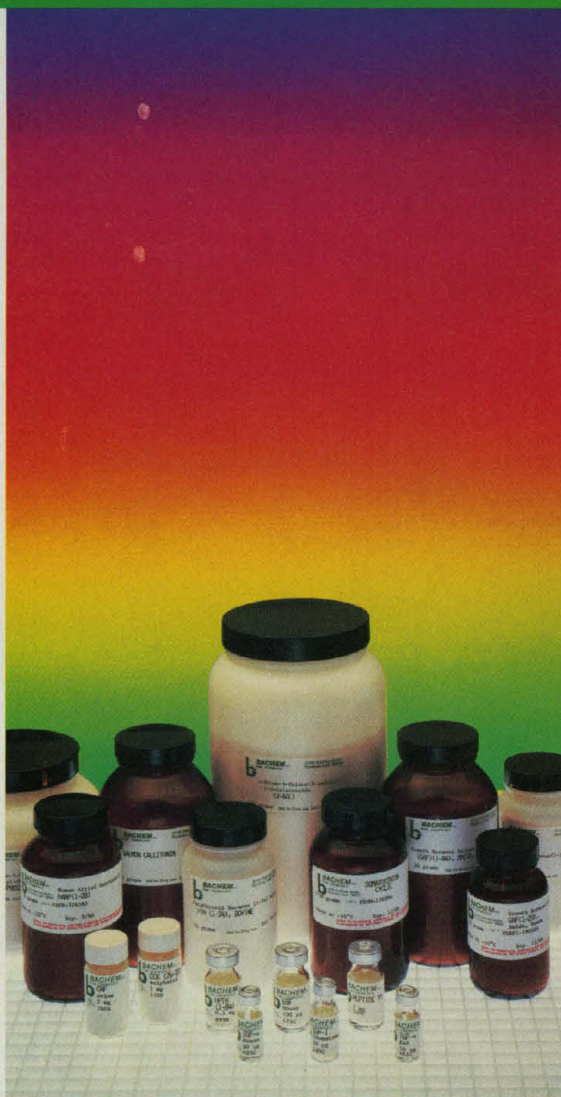
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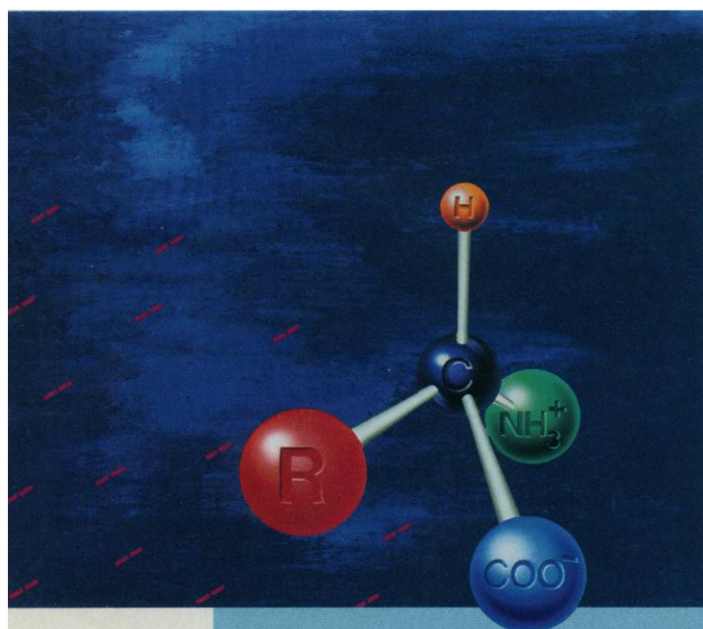
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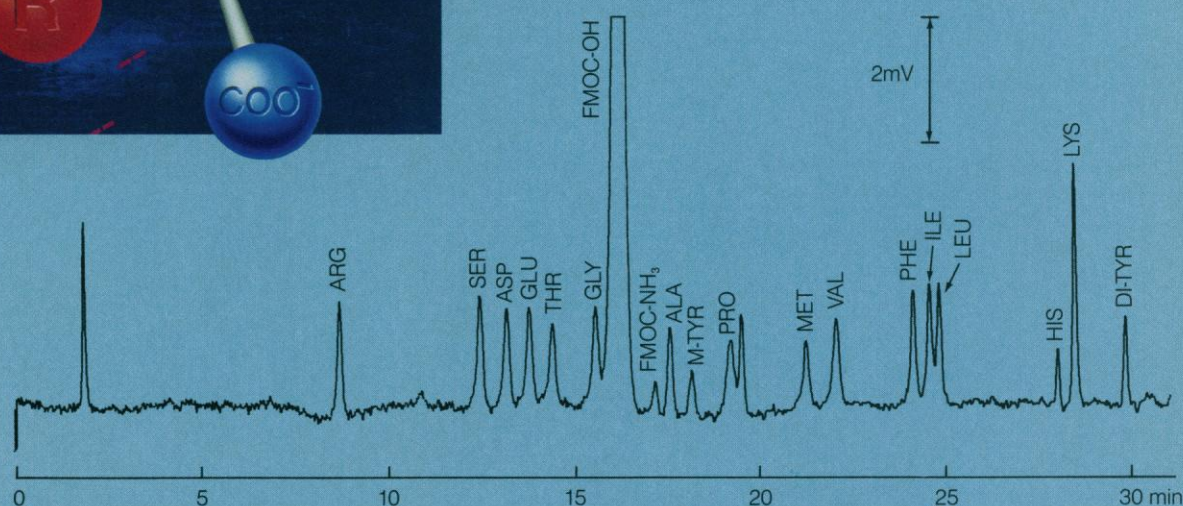
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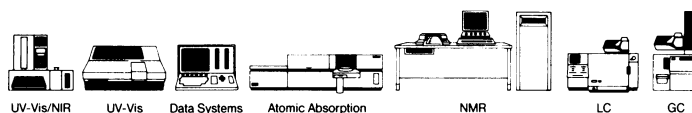


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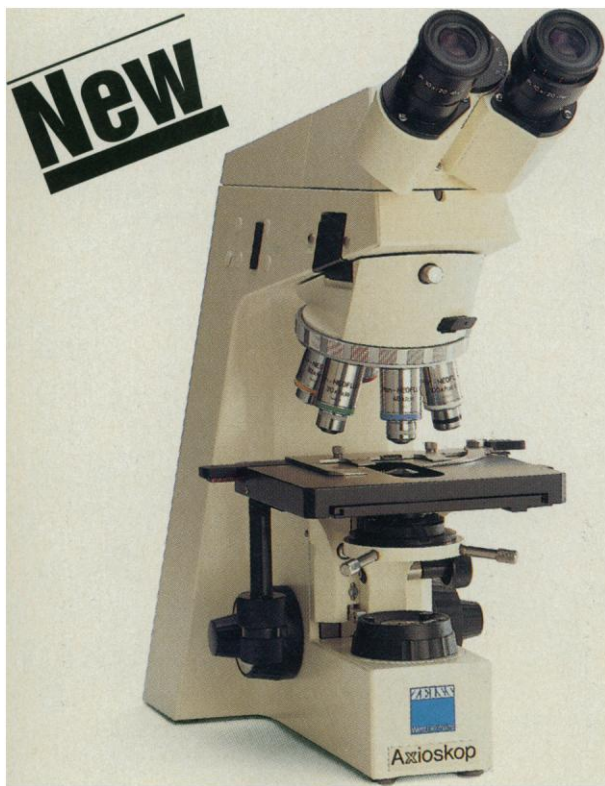
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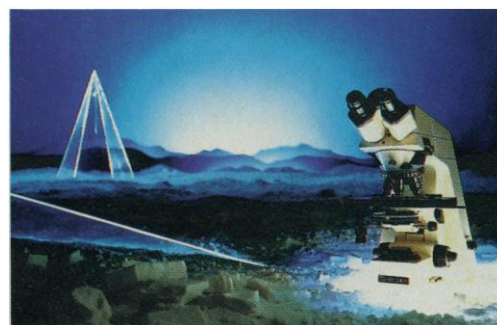
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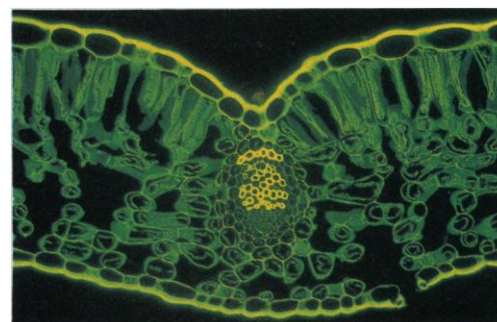
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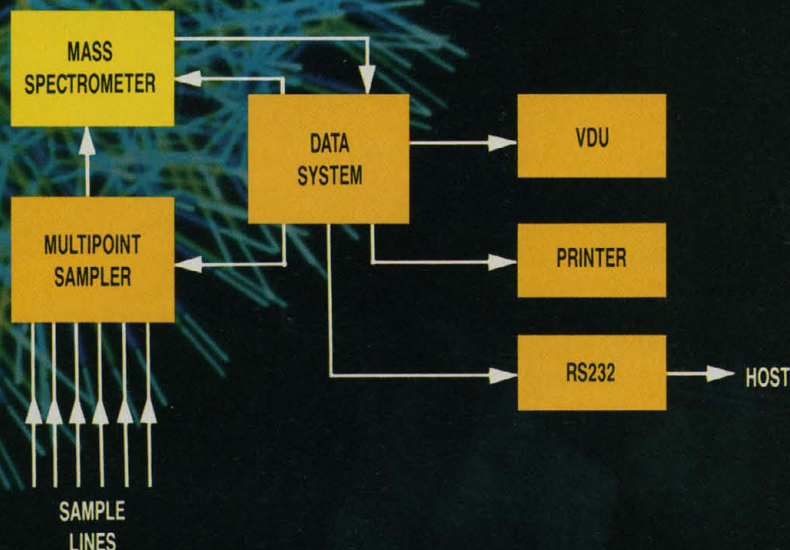
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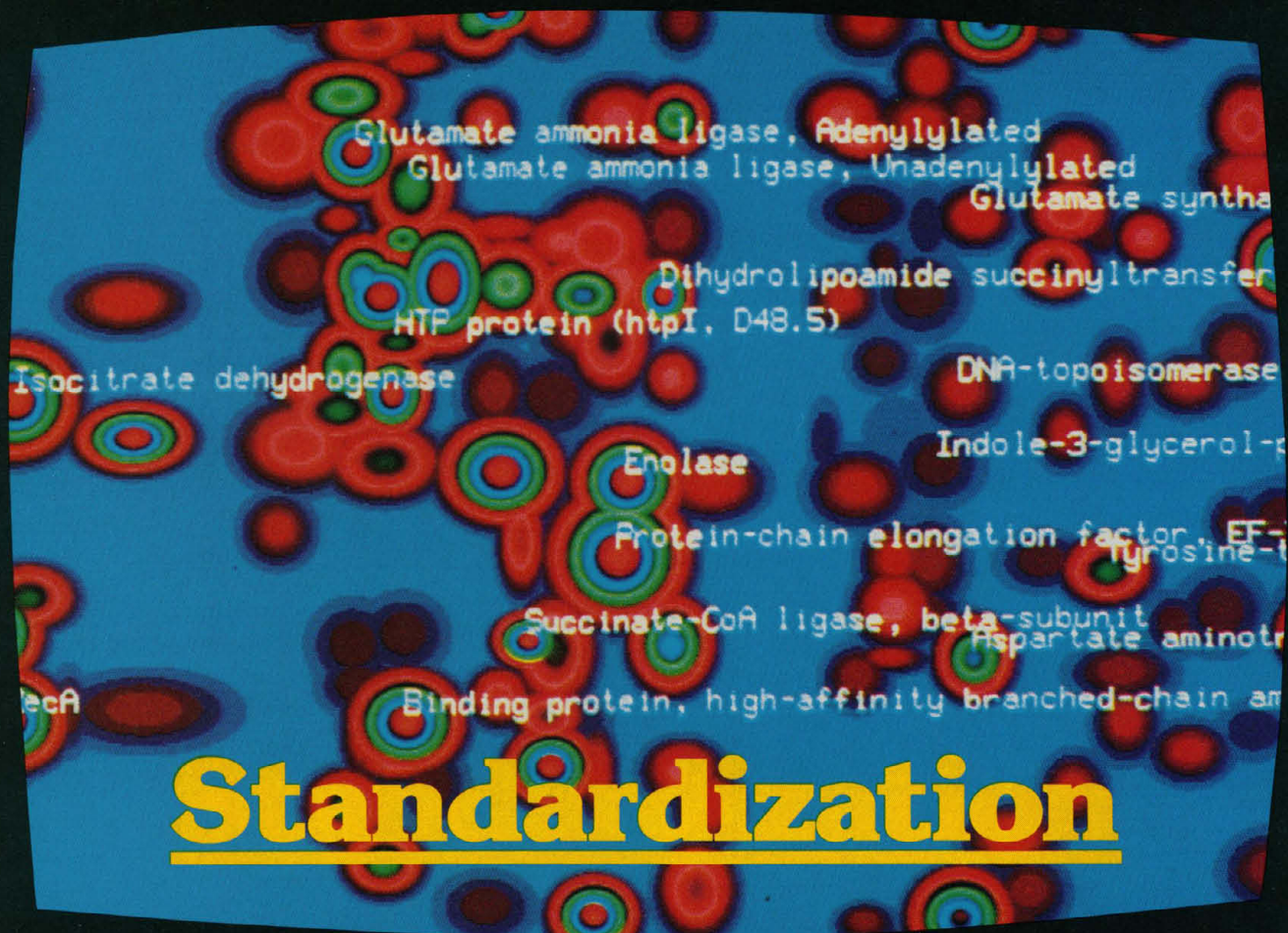
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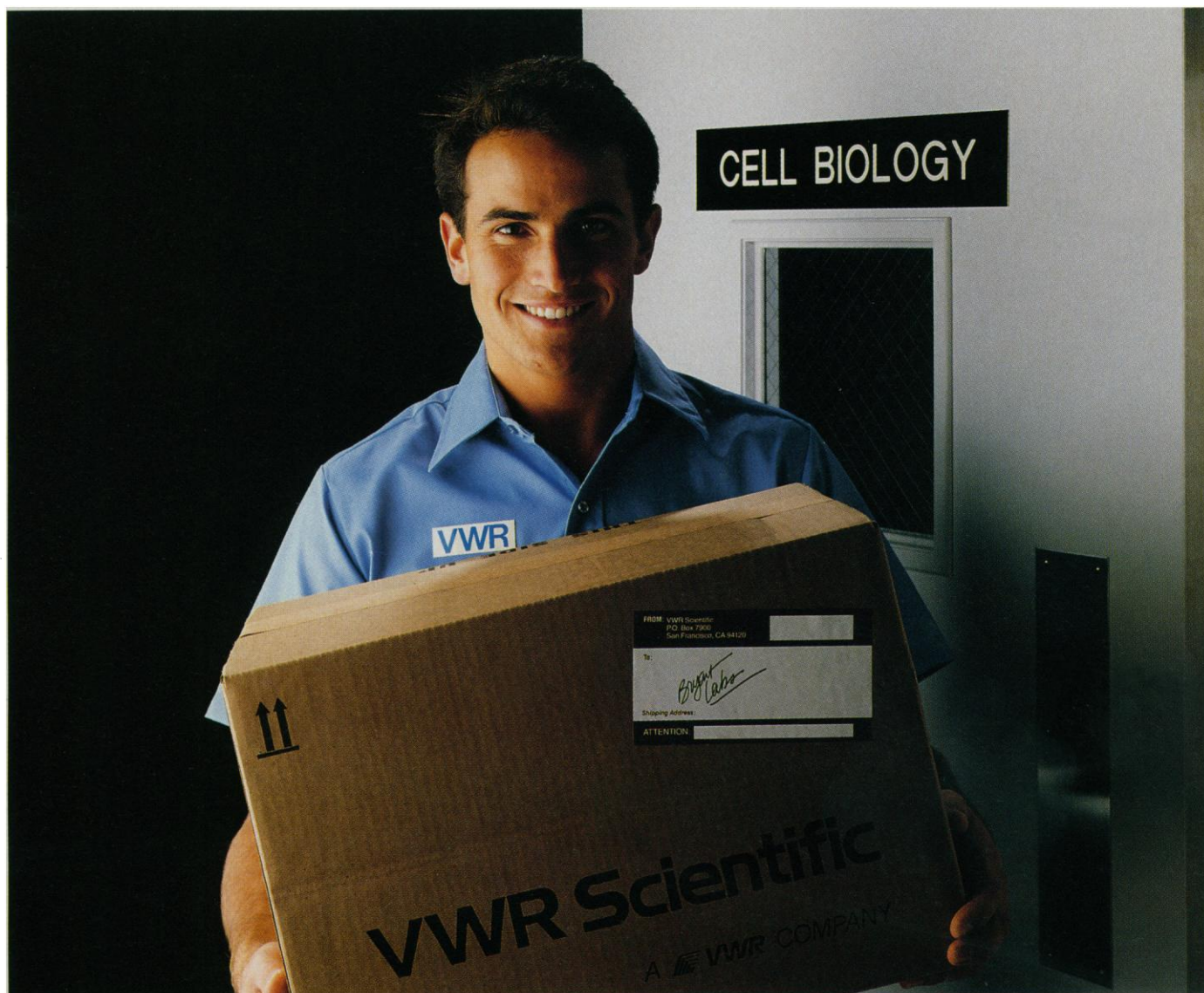
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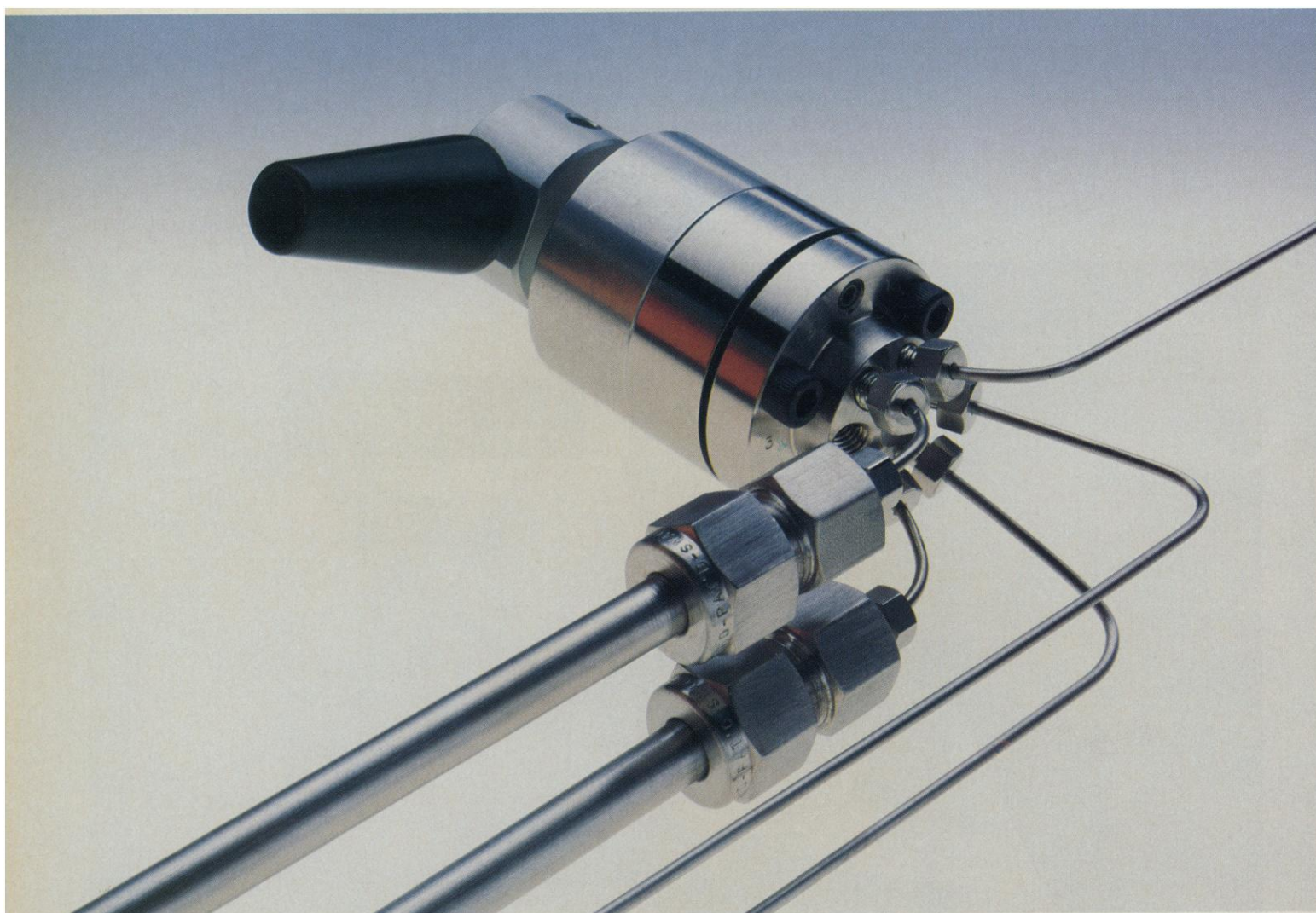
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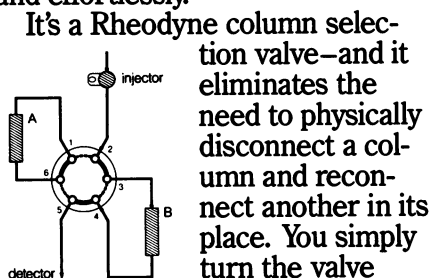
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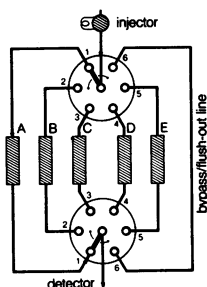
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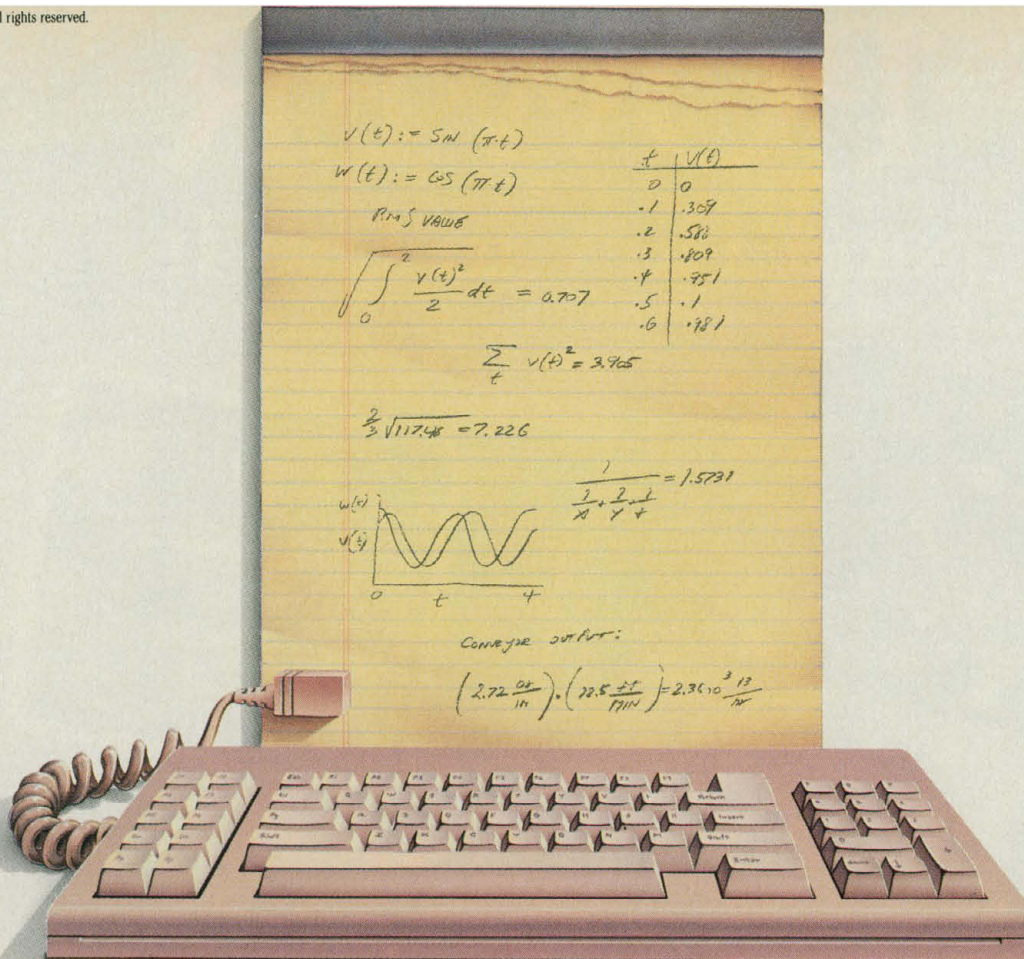
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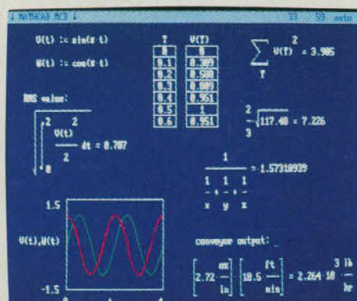
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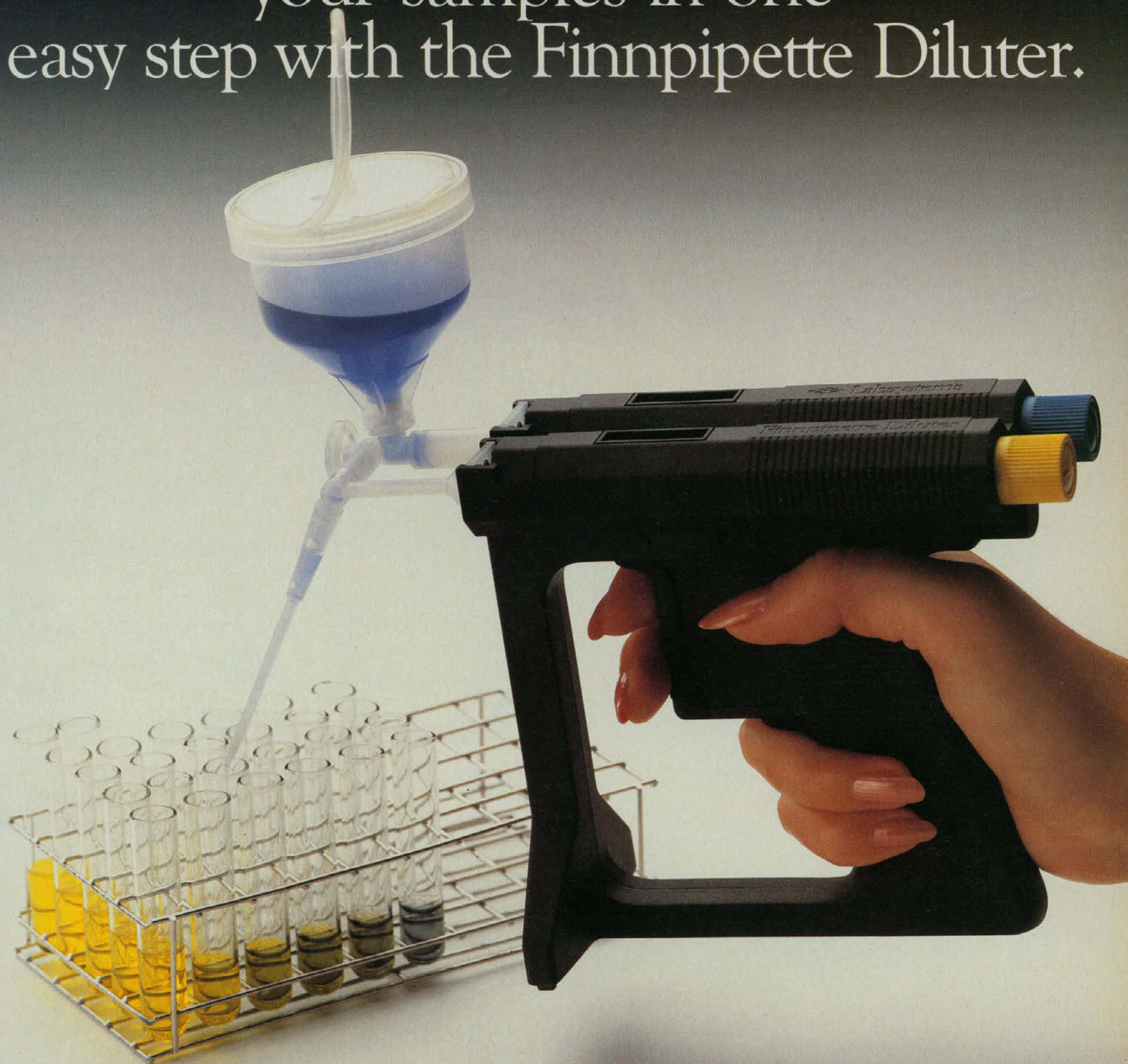
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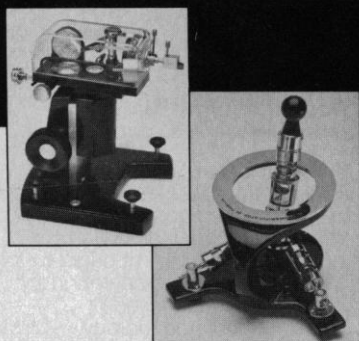
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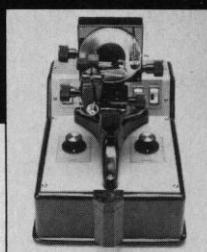
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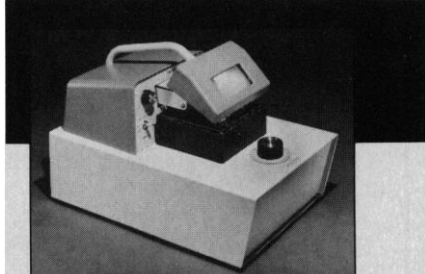


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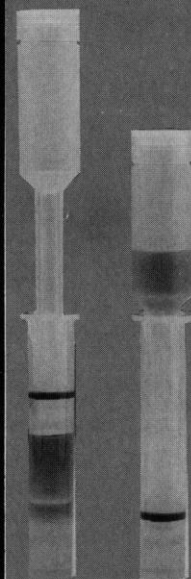
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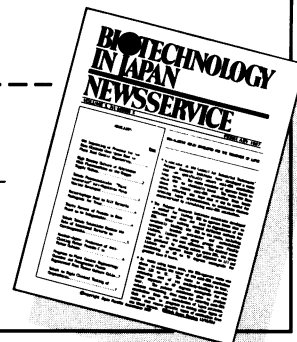
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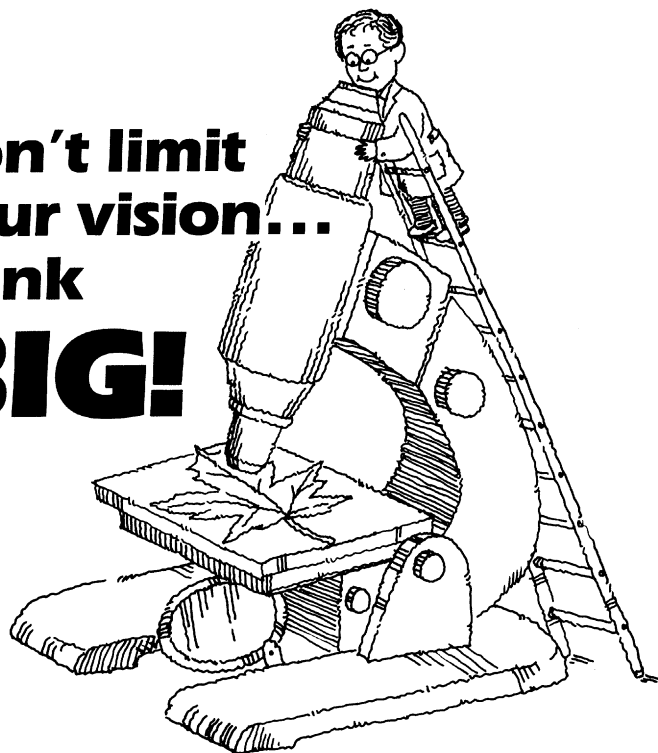
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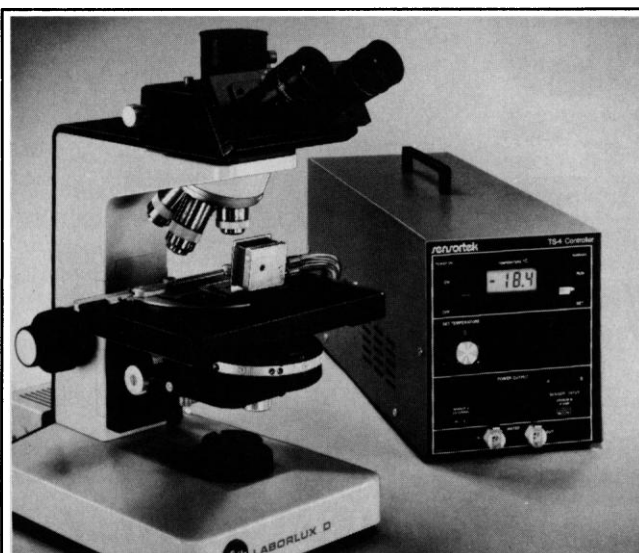
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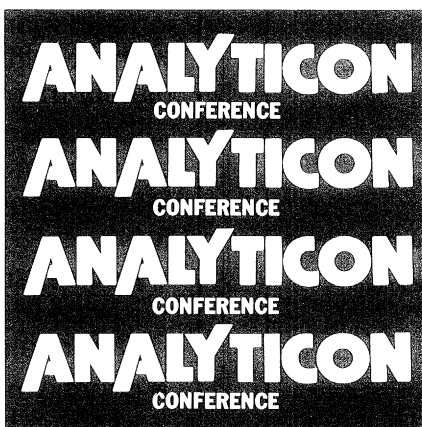
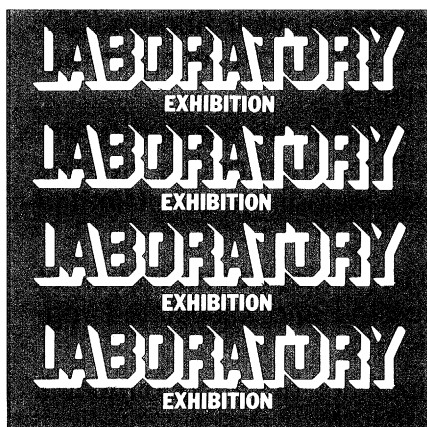
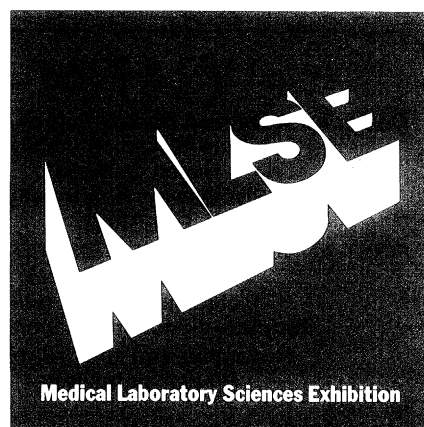
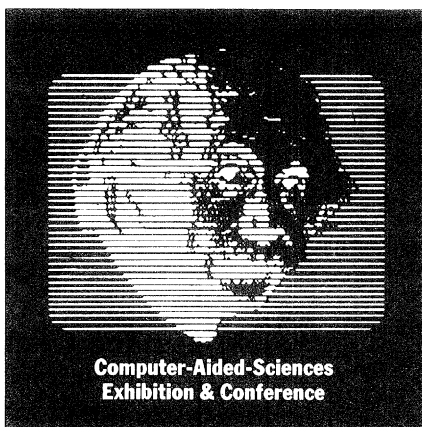
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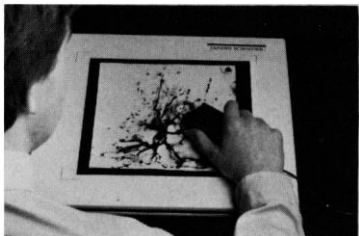


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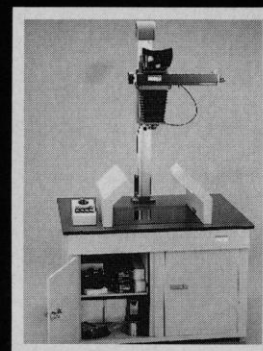
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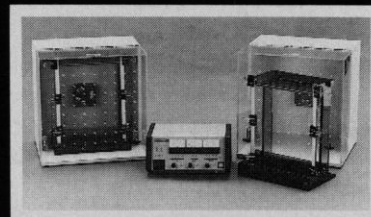
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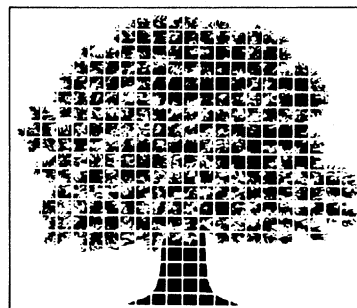
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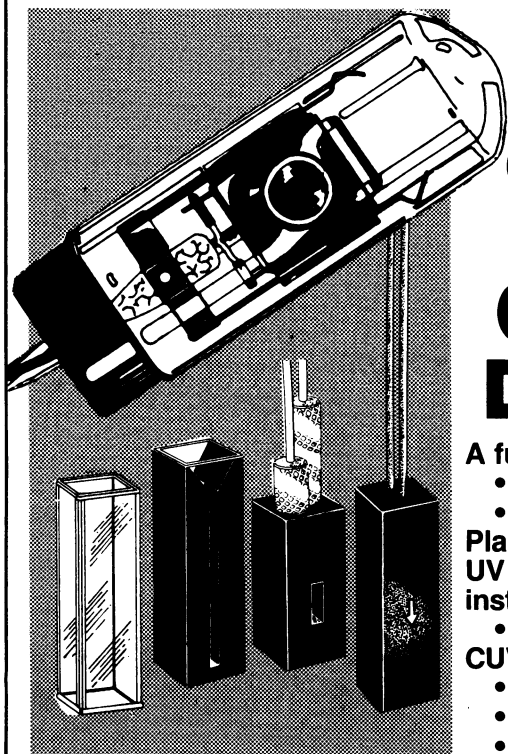
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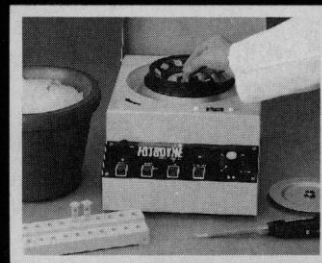
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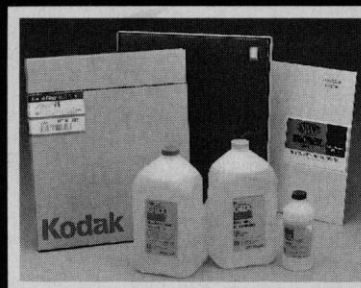
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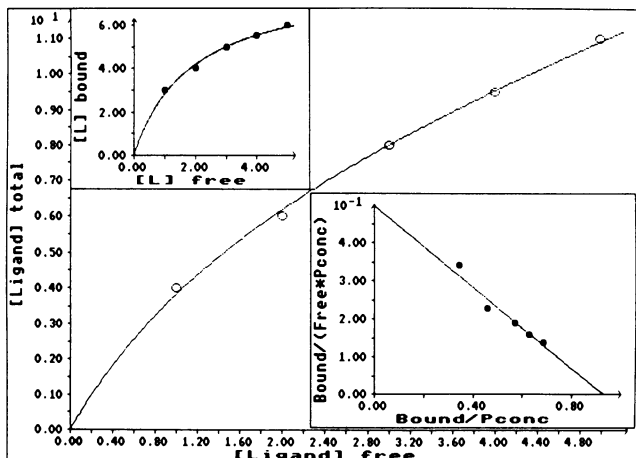


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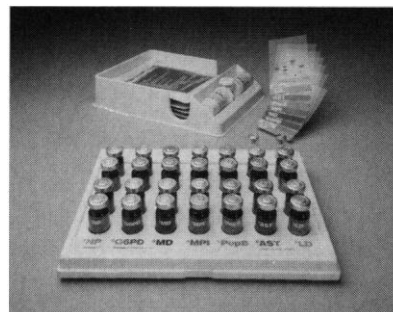
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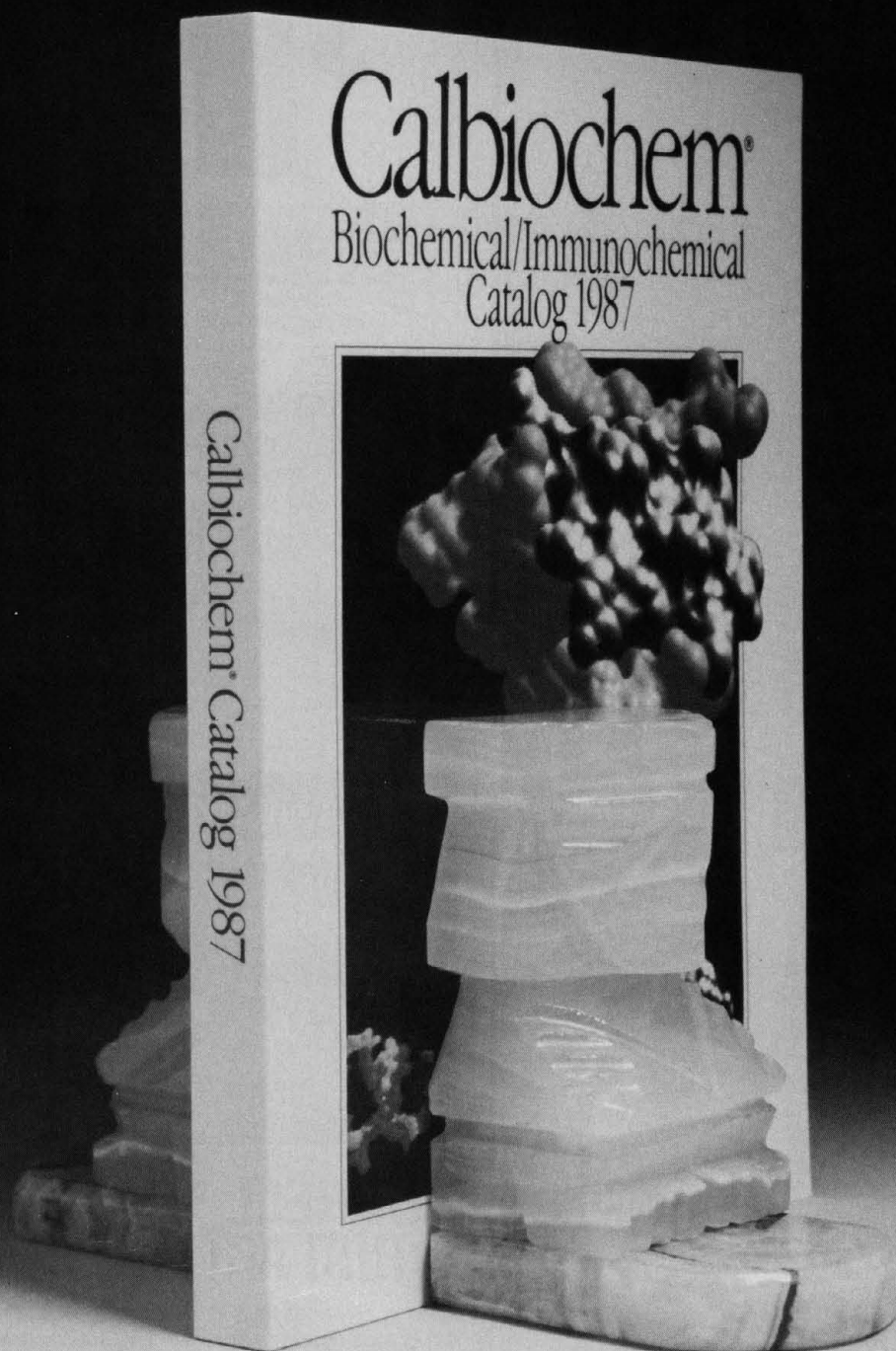
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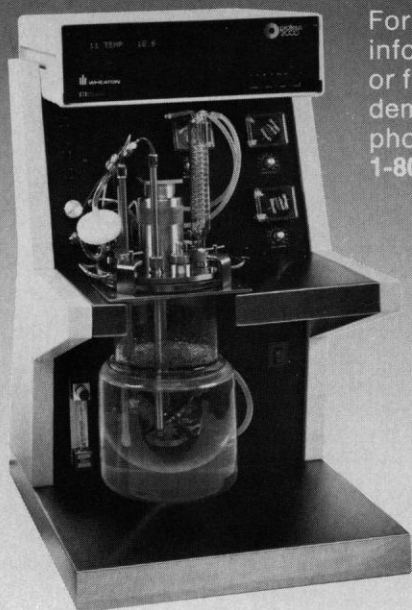
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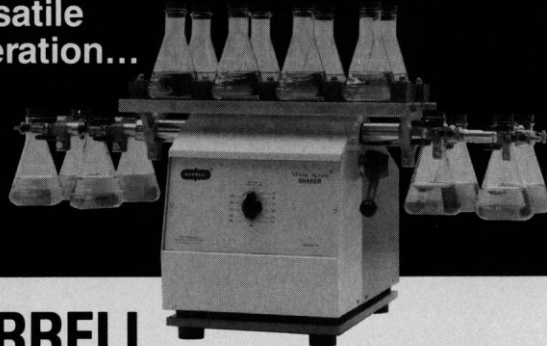
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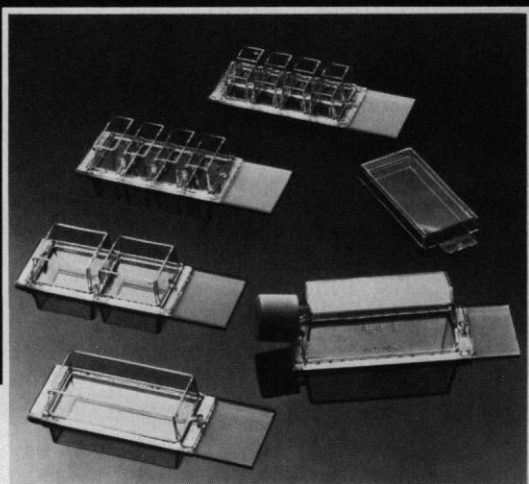
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Edited by Dr. Kenneth Sherman, *Director, Narragansett Laboratory, National Oceanic and Atmospheric Administration*, and  
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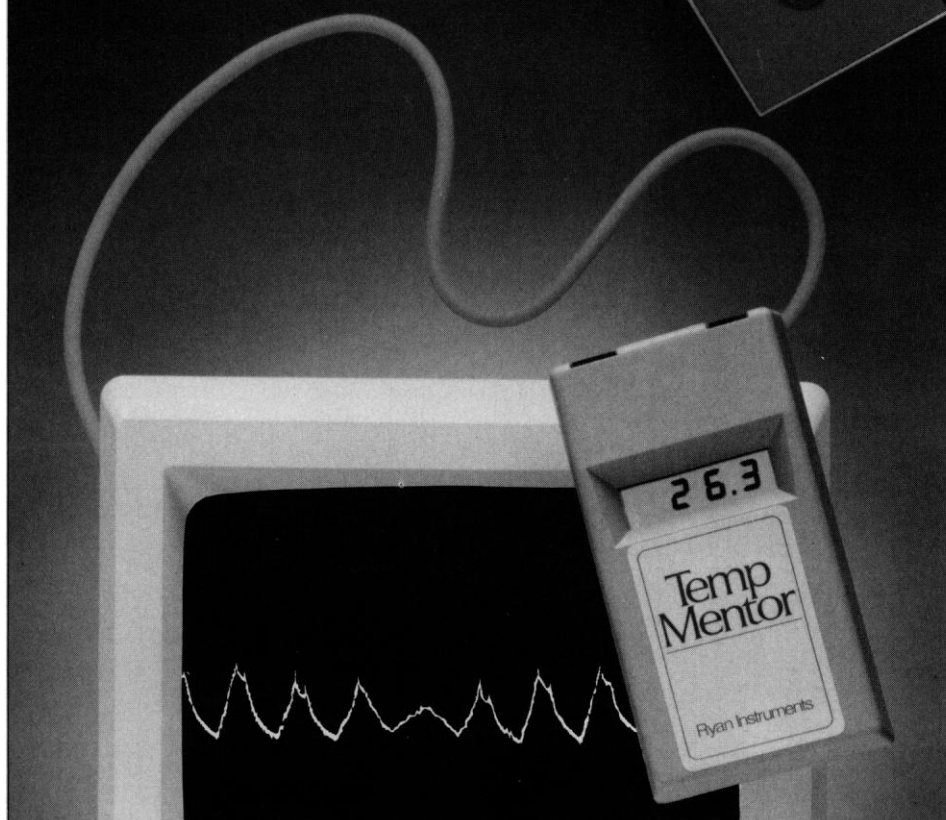
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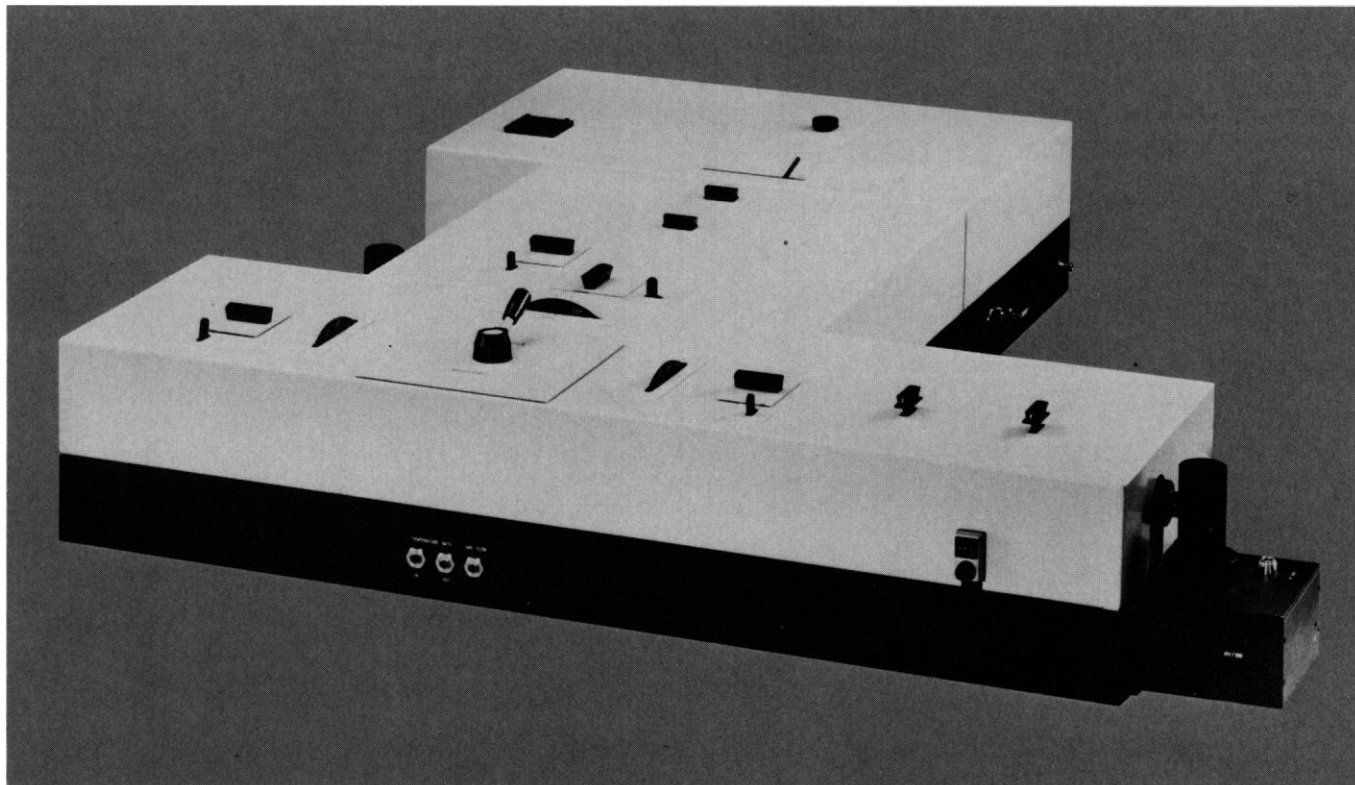
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