American Association for the Advancement of Science

SCIENCE

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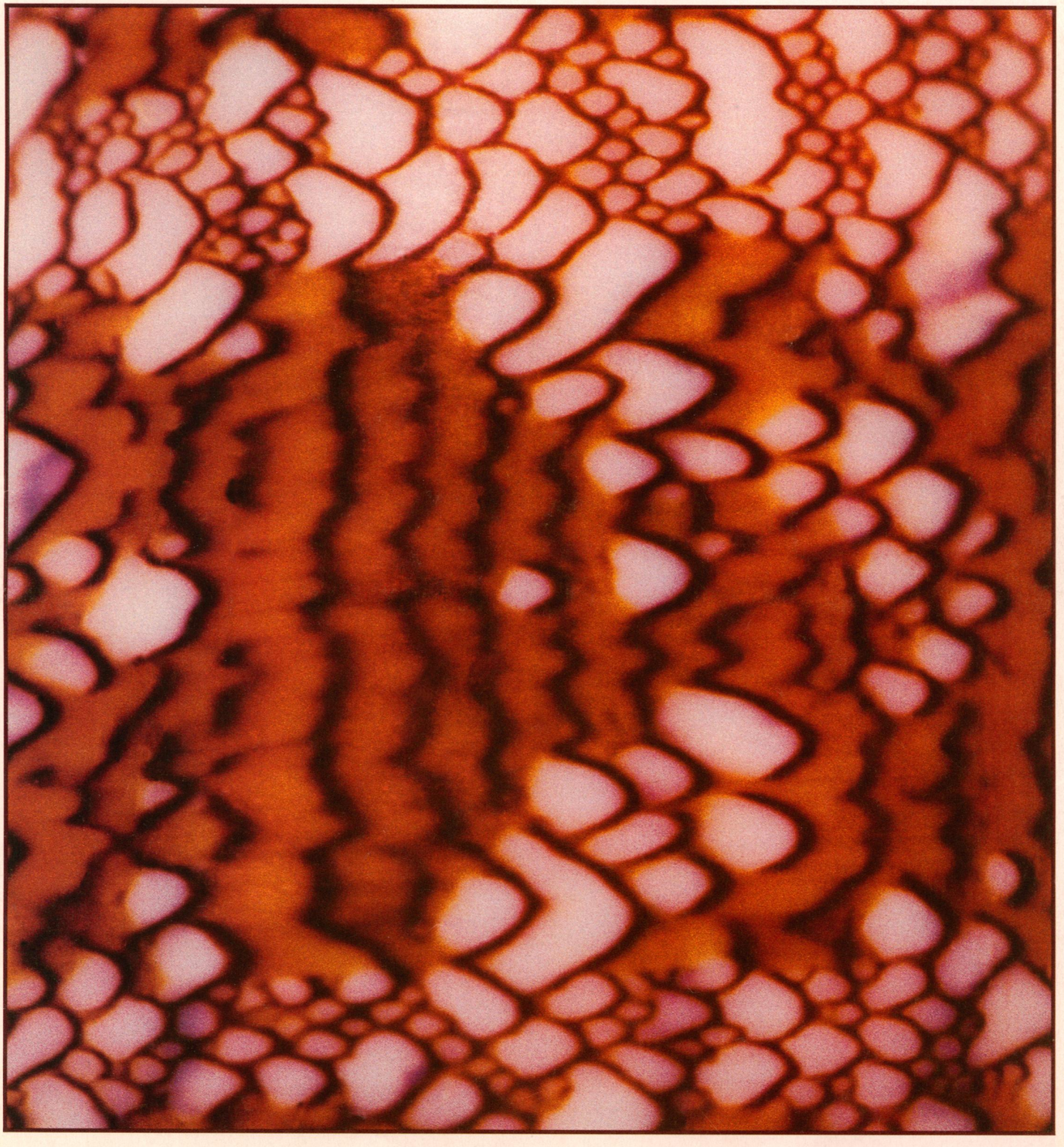

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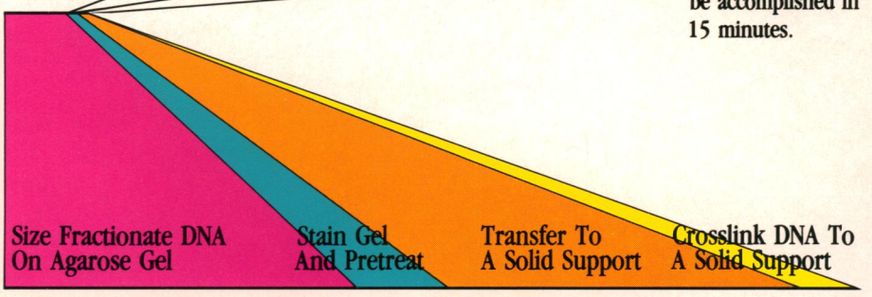


12 HOURS 4 HOURS 12 HOURS 2 HOURS

CONVENTIONAL METHOD—TOTAL TIME 30 HOURS

VAGE™ System

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.

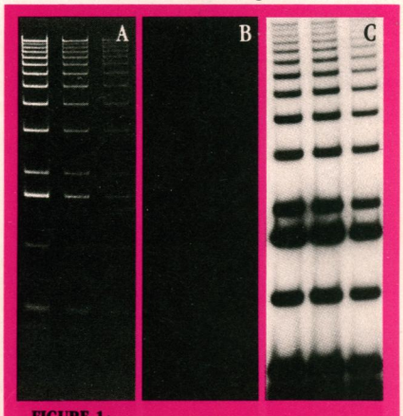
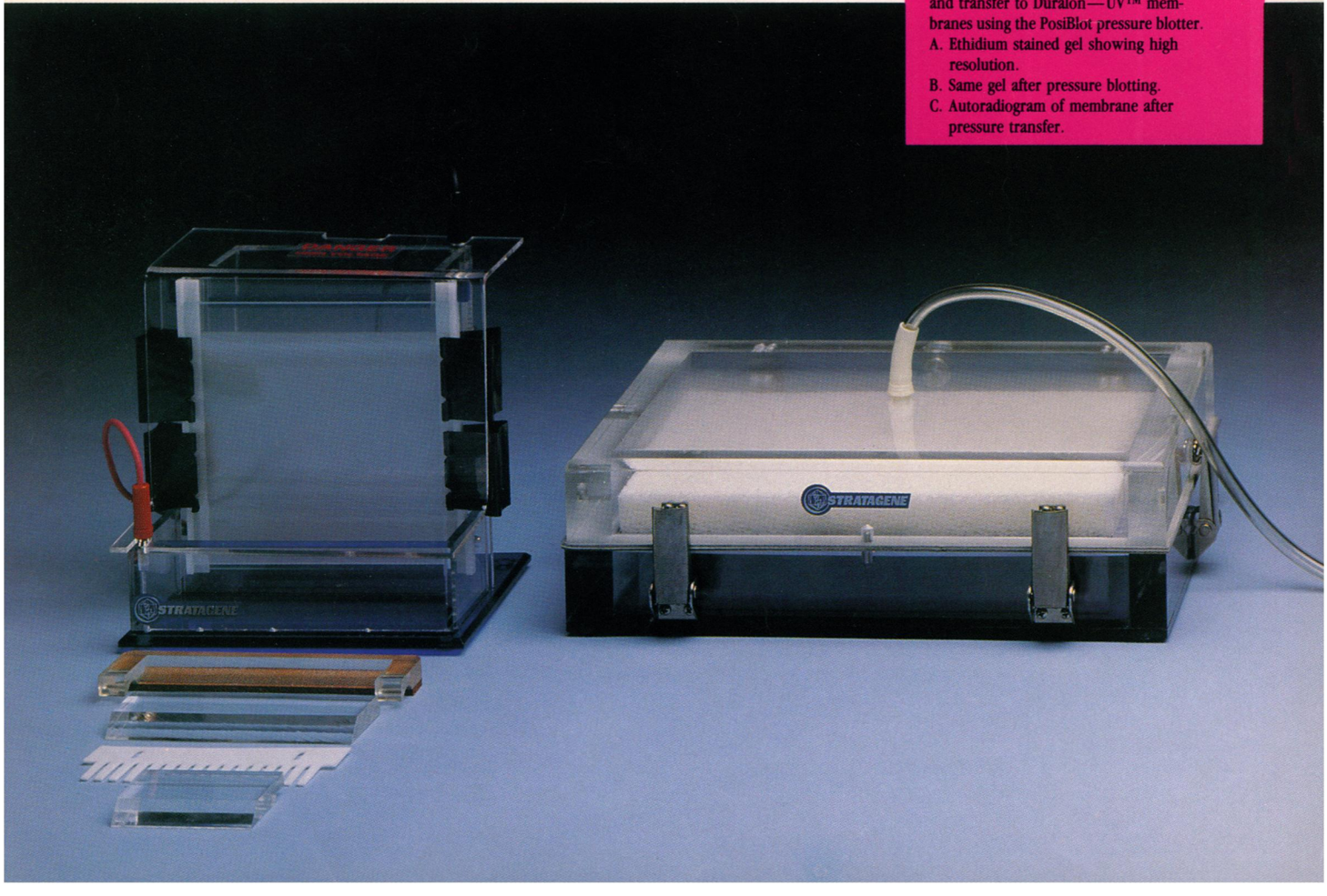


FIGURE 1:
Figure Legend: Fractionation of end labeled DNA markers on 3mm thick 0.8% agarose by the VAGE apparatus and transfer to Duralon—UV™ membranes using the PosiBlot pressure blotter.
A. Ethidium stained gel showing high resolution.
B. Same gel after pressure blotting.
C. Autoradiogram of membrane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



PosiBlot™ * Pressure Blotter

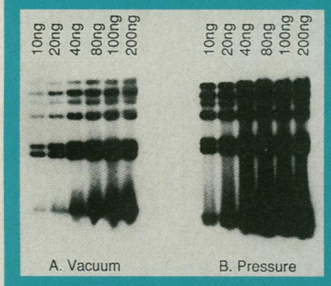


FIGURE 2:
Figure Lengend: ^{32}P end-labeled lambda Hind III markers were electrophoresed in 0.8% agarose. The DNA was then transferred to a nylon membrane with a vacuum blotter at 30mm Hg below atmospheric or with the PosiBlot pressure blotter at 100mm Hg above atmospheric. Both transfers were carried 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.

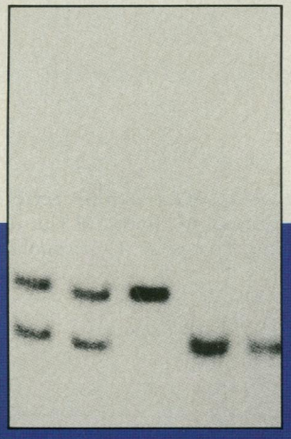


FIGURE 3:
Figure Legend: Autoradiogram showing the resolution of 2.8 and 1.3 Kb Msp I RFLP alleles revealed by a cystic fibrosis human DNA probe using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

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.

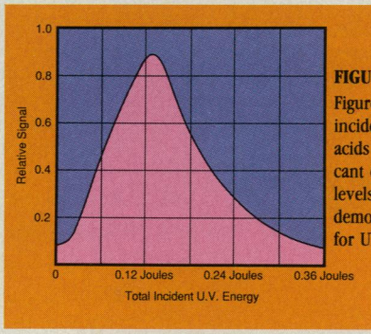
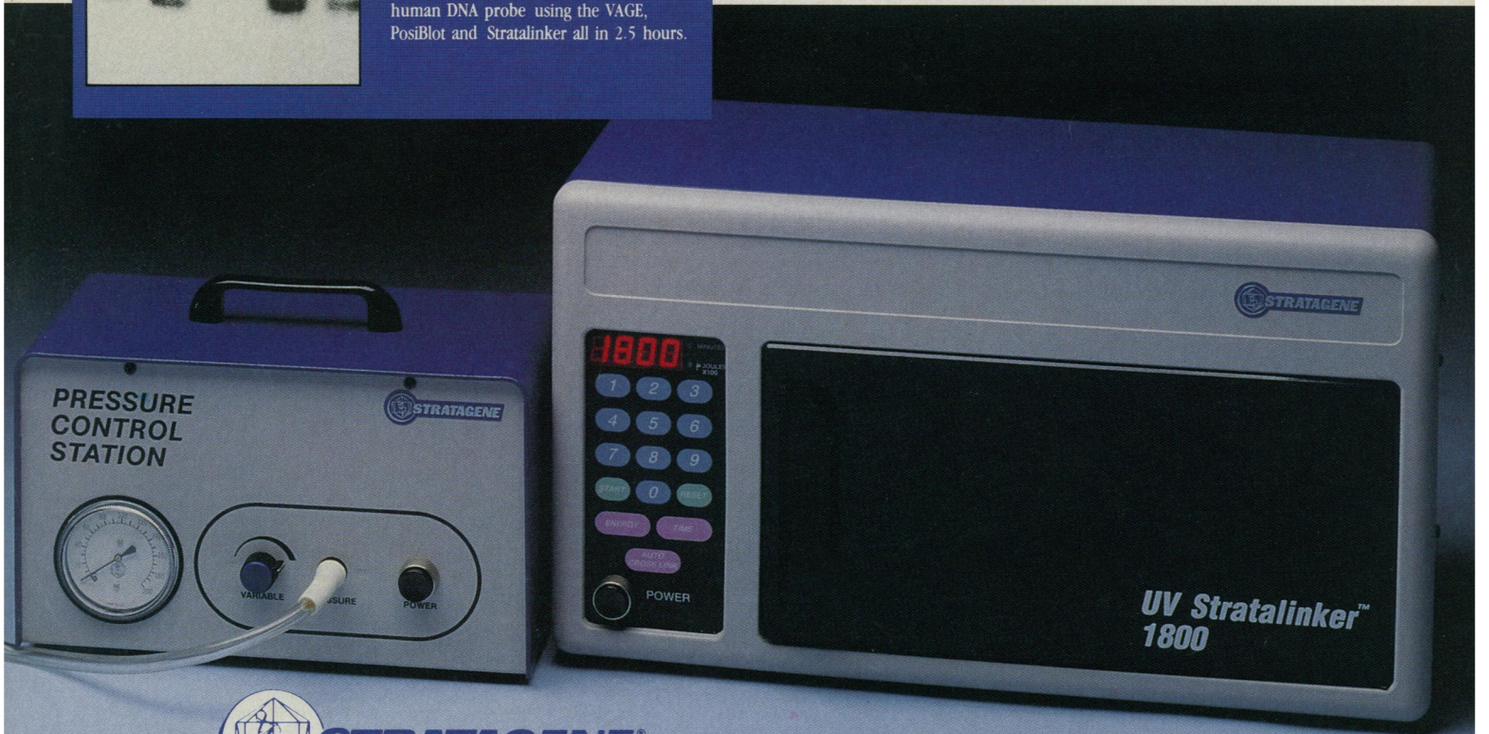


FIGURE 4:
Figure Legend: The effects of altering the incident energy for crosslinking nucleic acids to nylon membranes. The significant drop in signal intensity at energy levels below and above 0.12 Joules demonstrates the limited optimal range for UV treatment.

Stratagene offers a full selection of nitrocellulose, reinforced nitrocellulose and nylon membranes. Each membrane is stringently lot tested to ensure consistency when performing Northern and Southern blotting. Please call Technical Services for detailed information on Stratagene's time saving blotting systems and membranes.



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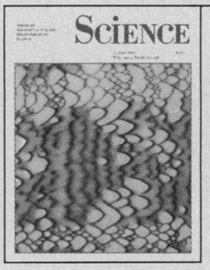

COVER Shell pattern of *Conus textile*, the cloth-of-gold cone. A close-up of the shell of the highly venomous marine snails. The 500 different cones each have a distinctive shell pattern and a specialized venom, loaded with diverse neuroactive peptides. See pages 250 and 257. [Photograph by Kerry Matz]

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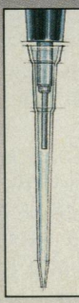

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This Week in
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Adaptive optics

ATMOSPHERIC turbulence significantly blurs the images that are made with ground-based telescopes. Thus, telescopic "seeing" is imperfect, but it can be corrected with adaptive optics, optics through which wavefront distortions are measured and then compensated for as the system operates. The components of adaptive optical systems and the physics of the process are described by Babcock, who was a pioneer in adaptive optics technology (page 253). This technology has been successful and is being integrated directly into the design of new telescopes. The performance of telescopes having adaptive optics is expected to be comparable to or better than space-based equipment in the visible region of the spectrum and may match or even exceed the resolution that the Hubble Space Telescope was designed to achieve.

Confirmed chemical reaction rates

EXPERIMENT and theory have jibed with regard to the rates of chemical reactions, providing a good ratification of both (page 269). This confirmation has become possible because of recent advances in methods for measuring reaction rates, new developments in computer technology, and new systems for formulating mathematical equations and algorithms that describe the kinetics of reactions. Michael *et al.* show that for the simplest chemical reactions, those involving a three-electron interaction ($H + H_2$), theory can adequately predict thermal rate behavior. For this reaction the potential energy surfaces, which describe interactions among all the atomic and molecular species involved, are known with higher accuracy than for any other reaction. Theoretical and actual rates were found to be comparable for two reactions involving isotopes of hydrogen—$H + D_2 \rightarrow HD + D$ and $H_2 + D \rightarrow HD + H$—over the temperature range from about 200 to 2000 K.

Blocking agent for AIDS infection

CAN the spread of the AIDS virus from cell to cell within a host be stopped? The virus, HIV-1, enters host cells by binding through its gp120 surface molecule to CD4 molecules on the surface of host cells. Therefore, soluble molecules that can bind to the gp120 molecule and interfere with its ability to bind to CD4 molecules are prime candidates for blocking agents. Finberg, Diamond, and co-workers prepared a series of small soluble peptides, called CPFs, containing a crucial phenylalanine that, in the CD4 molecule, is essential for proper interaction with the virus (page 287). In vitro, these peptides interfered with the interaction of the virus with the cell surface. Furthermore, one CPF that contained two amino acids in the unnatural D configuration effectively inhibited the spread of virus from infected to noninfected cells. CPF-like molecules might prove to be powerful antiviral agents in vivo if they can interfere with the virus-cell interaction and if they can also deliver toxic substances to the host cell. One advantage of small peptides for clinical use is that, as has been shown in other situations, they frequently can be successfully administered orally.

Alcohol and brain receptors

GENETIC factors underlie individual differences in sensitivity to alcohol and other drugs. In two strains of mice, LS and SS, the difference in sensitivity to alcohol is seen in the "righting reflex": LS mice are much more intoxicated by alcohol and sleep longer when exposed to it than do SS mice. To understand the molecular basis of the difference, Wafford *et al.* studied the effects of alcohol on the functioning of $GABA_A$ receptors in an oocyte expression system (page 291). The molecules of the GABA receptor–chloride channel complex are the major inhibitory neurotransmitter system of the brain. In the test system, the receptors from LS and SS mice responded similarly to exposure to GABA. However, when ethanol was given along with GABA, there were marked differences in the channel currents: ethanol enhanced the current in LS receptors and lowered the current in SS receptors, effects that were in keeping with the different physiologic responses of the two strains of mice to alcohol. Thus the genes that encode either the $GABA_A$ receptors or some associated proteins appear to be directly involved in the determination of an individual's sensitivity to alcohol's effects.

Diabetes-associated gene

A disease much like human diabetes develops in NOD mice. In both species, the host's pancreatic cells are destroyed by invading T cells (making this an autoimmune disease), and immunosuppressive agents have been shown to be effective at slowing or halting the destruction. Susceptibility to diabetes in both species is affected by genes of the major histocompatibility complex. NOD mice normally do not express an E_α histocompatibility gene, which encodes cell surface I-E molecules. However, these mice have now been bred with transgenic mice that carry E_α genes and the role of the E_α gene in the development of disease in the progeny assessed (page 293). When NOD mice received a normal E_α gene they did not develop insulitis or diabetes. When they received any of several defective E_α genes (where the defect led to gene expression in some but not all cells of the immune system) disease did develop. On the basis of their findings, Böhme *et al.* speculate that the role of the E_α gene in conferring protection involves the display of I-E on cell surfaces and subsequent proliferation of certain T cell clones. This contrasts with an earlier interpretation of the role of the E_α gene in which expression of I-E was thought to be associated with the destruction of clones of T cells that would otherwise have brought on autoimmune diabetes.

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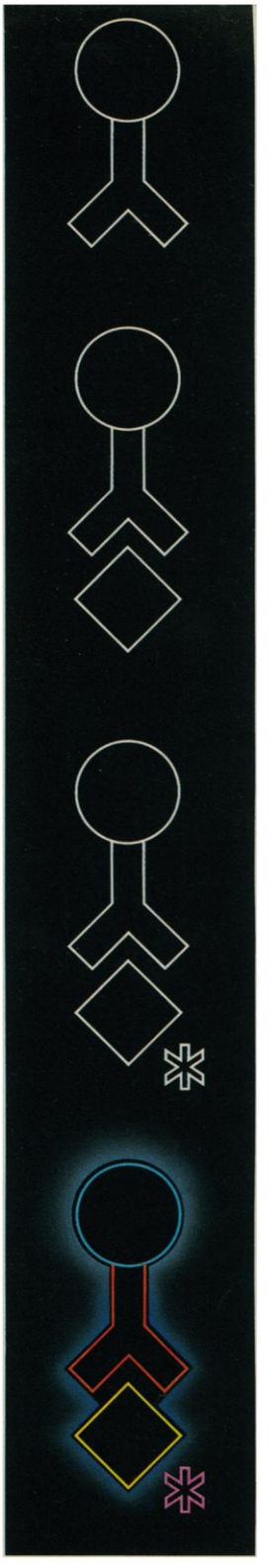

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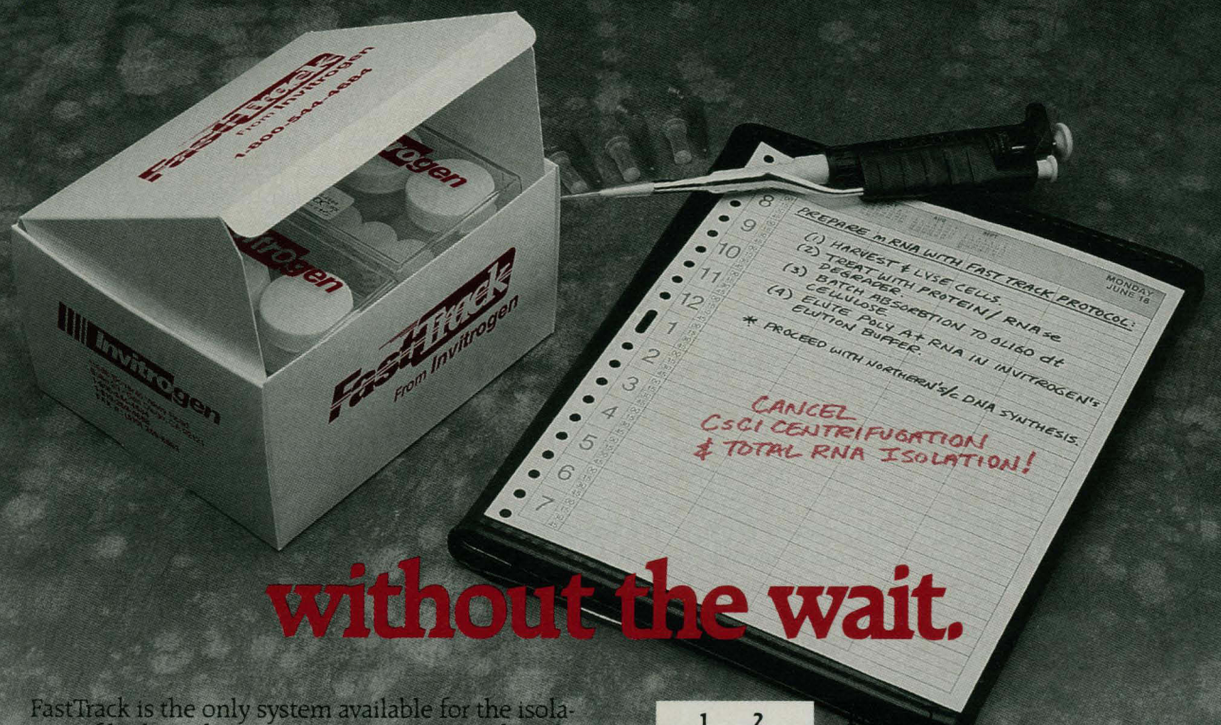

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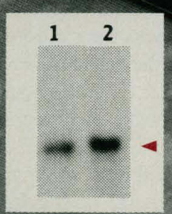

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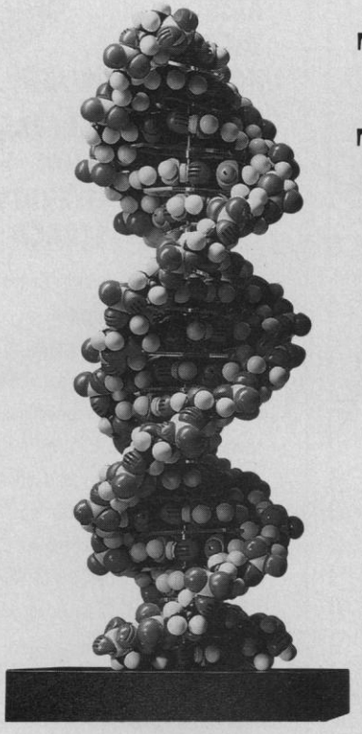

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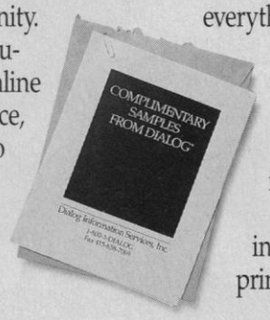

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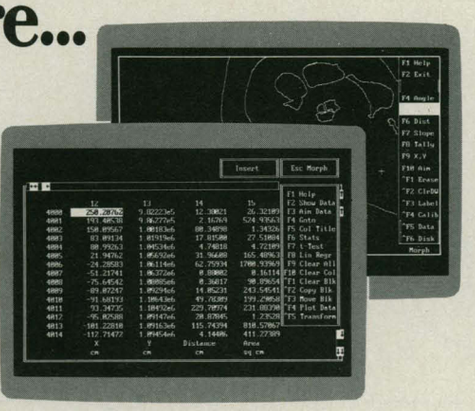

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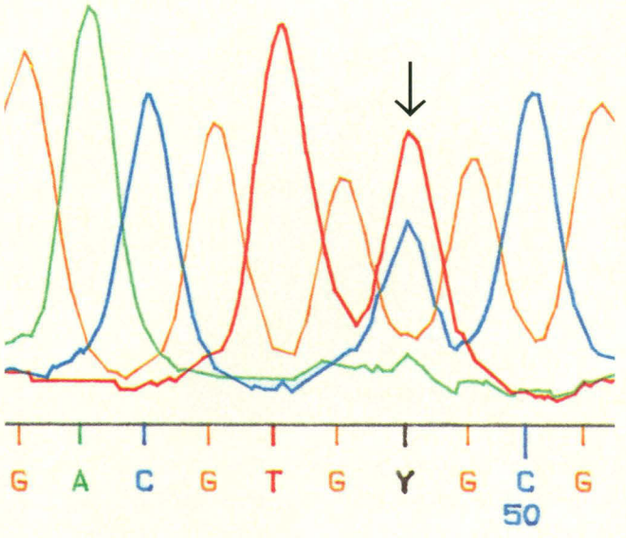
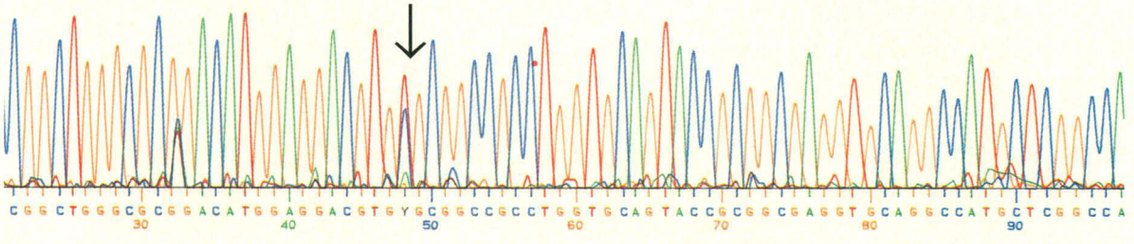


Direct genomic solid phase sequencing of the human apolipoprotein E gene for diagnosis of a heterozygotic point mutation, Hultman and Uhlén (1990) submitted for publication.

Raw DNA sequencing data



Processed DNA sequencing data

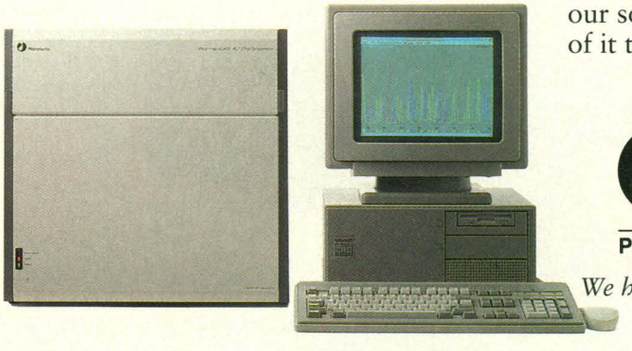
Processed data is only as accurate as the raw data.

When you're looking at automated DNA sequencing systems, you should be sure to take a good look at the raw data. That's because raw data is the basis for the processed data. Raw data should be easy to read and to interpret.

Sophisticated software may be able to manipulate, evaluate and present raw data in a lucid format, but it can never eliminate inherent ambiguities.

The Automated Laser Fluorescent A.L.F. DNA Sequencer™ produces accurate and easily interpreted raw data. That's because it relies on simplicity. When the reaction chemistry is proven and the electrophoresis technology is efficient and the hardware has no moving parts, it's easy to obtain raw data that you can rely on.

Contact your Pharmacia representative today. And when you do, don't forget to ask to see our software. We're very proud of it too.



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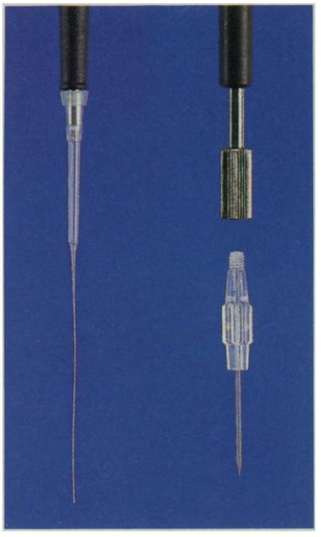

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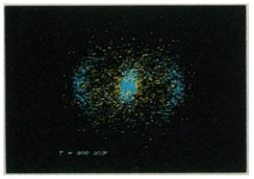
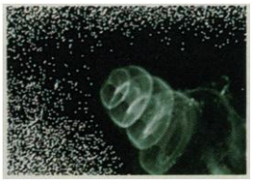
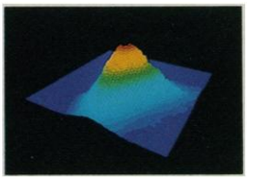
Last Year, This Is How They Won The IBM Supercomputing Competition.



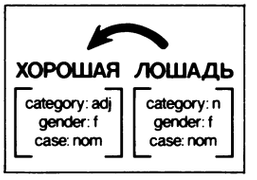
1st Place: Gas dynamics and star formation in merging galaxies.
Kevin M. Olson,
University of Massachusetts.



1st Place: 3-D reconstruction of cochlea structure.
Carl S. Brown and
Alan C. Nelson,
University of Washington.



1st Place: Stretching and bending of material surfaces in turbulence.
Stephen B. Pope and
Sharath Girimaji,
Cornell University;
Pui-Kuen Yeung,
Pennsylvania State University.



1st Place: A dependency parser for variable word order languages.
Michael A. Covington,
University of Georgia.

This Year, This Is How You Can.

For information and an entry form, write to:
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Created to discover, acknowledge and reward gifted American and Canadian scientists and engineers, this prestigious competition honors those whose papers describe innovative approaches to large-scale analysis and modeling.

Each paper must describe work using an IBM 3090™ Supercomputer and/or the paper must describe distributed or cooperative processing in which IBM technical workstations are linked to IBM mainframes.

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Contestants must register an abstract of their paper by October 16, 1990. Those who have registered their abstracts must forward their papers by January 15, 1991.

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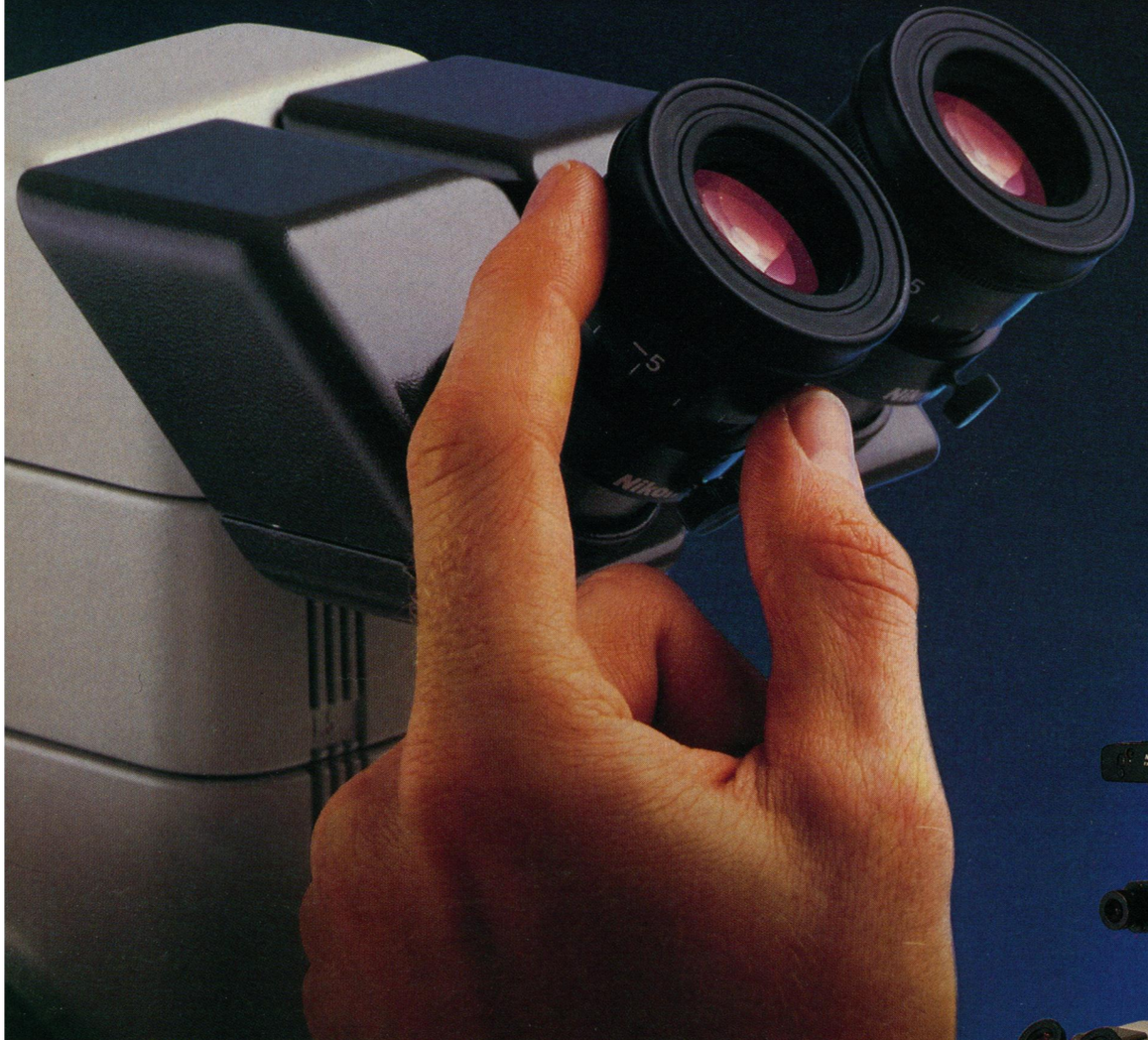

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