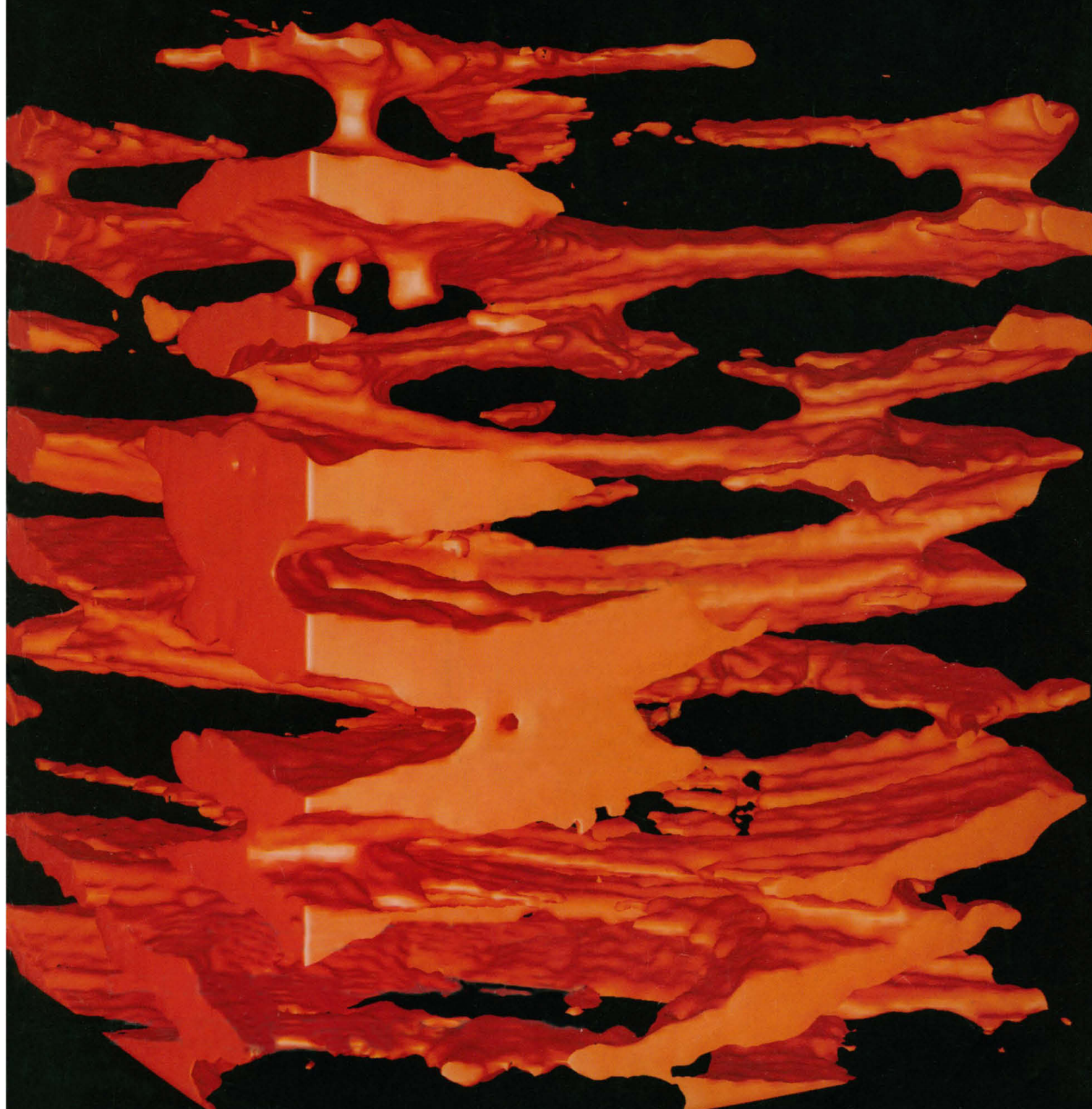


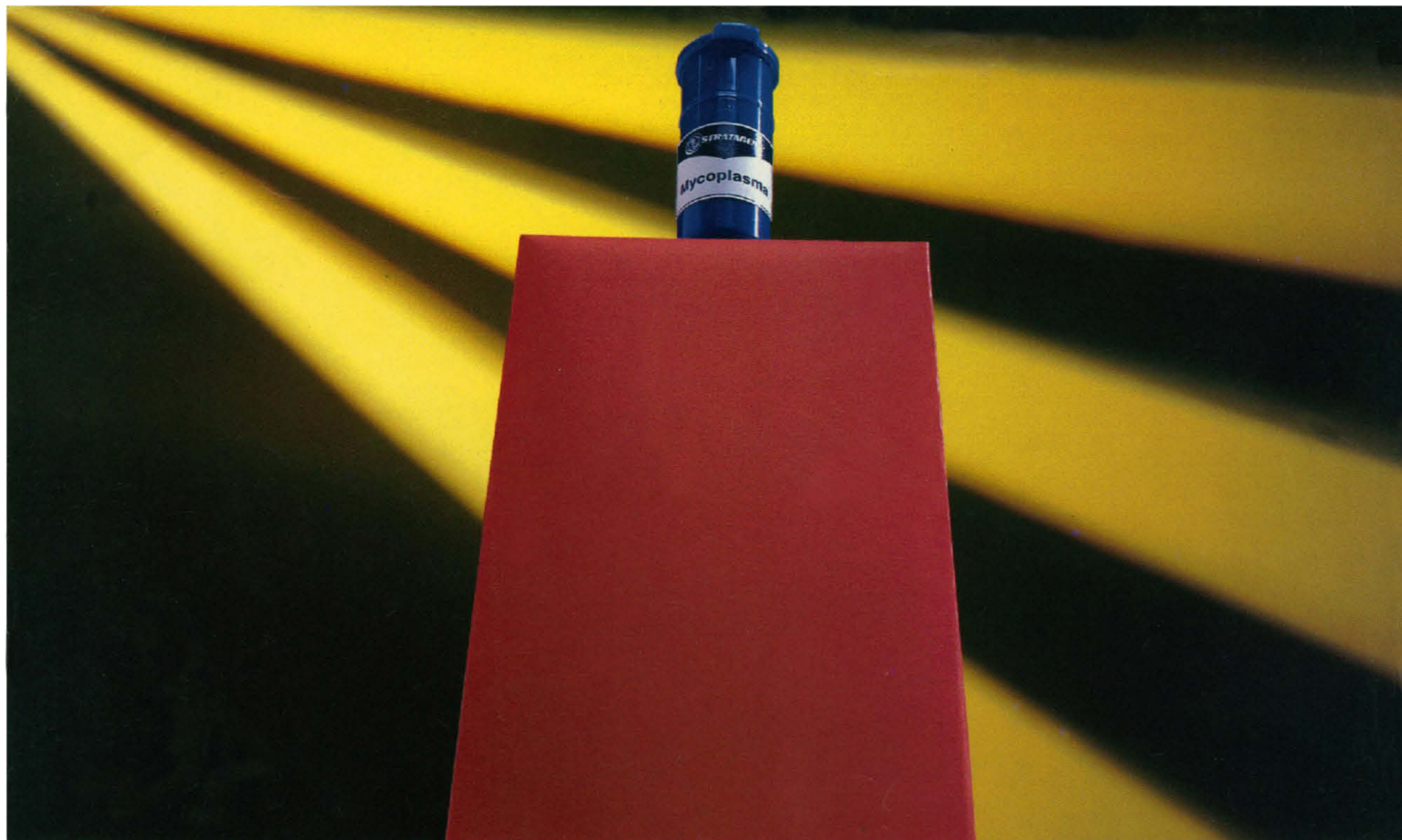
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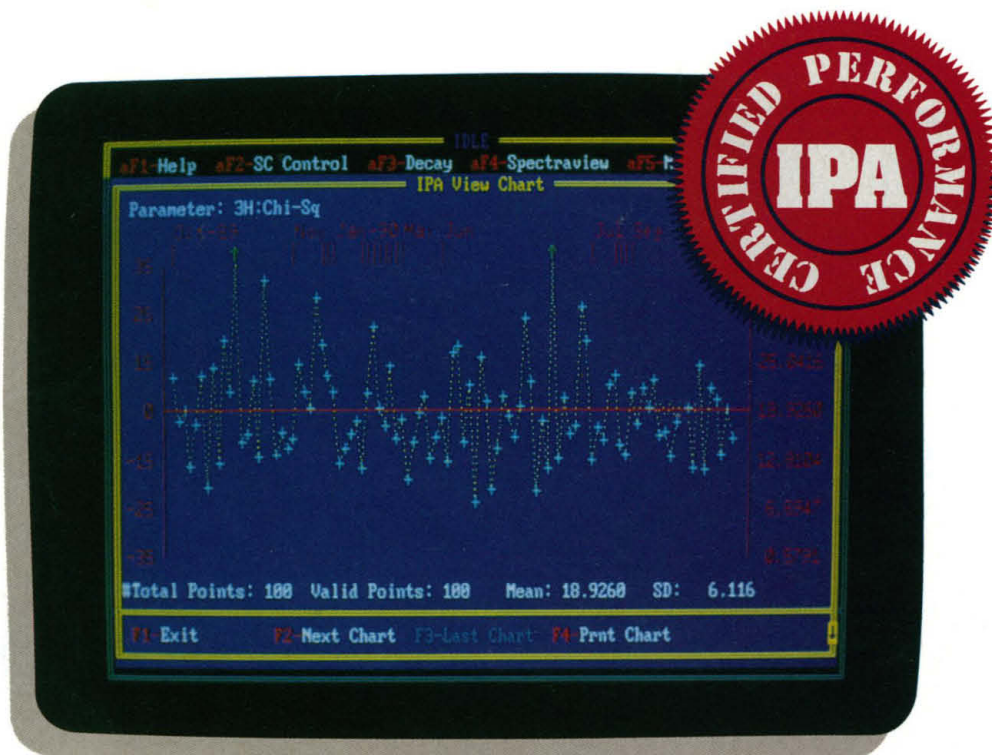
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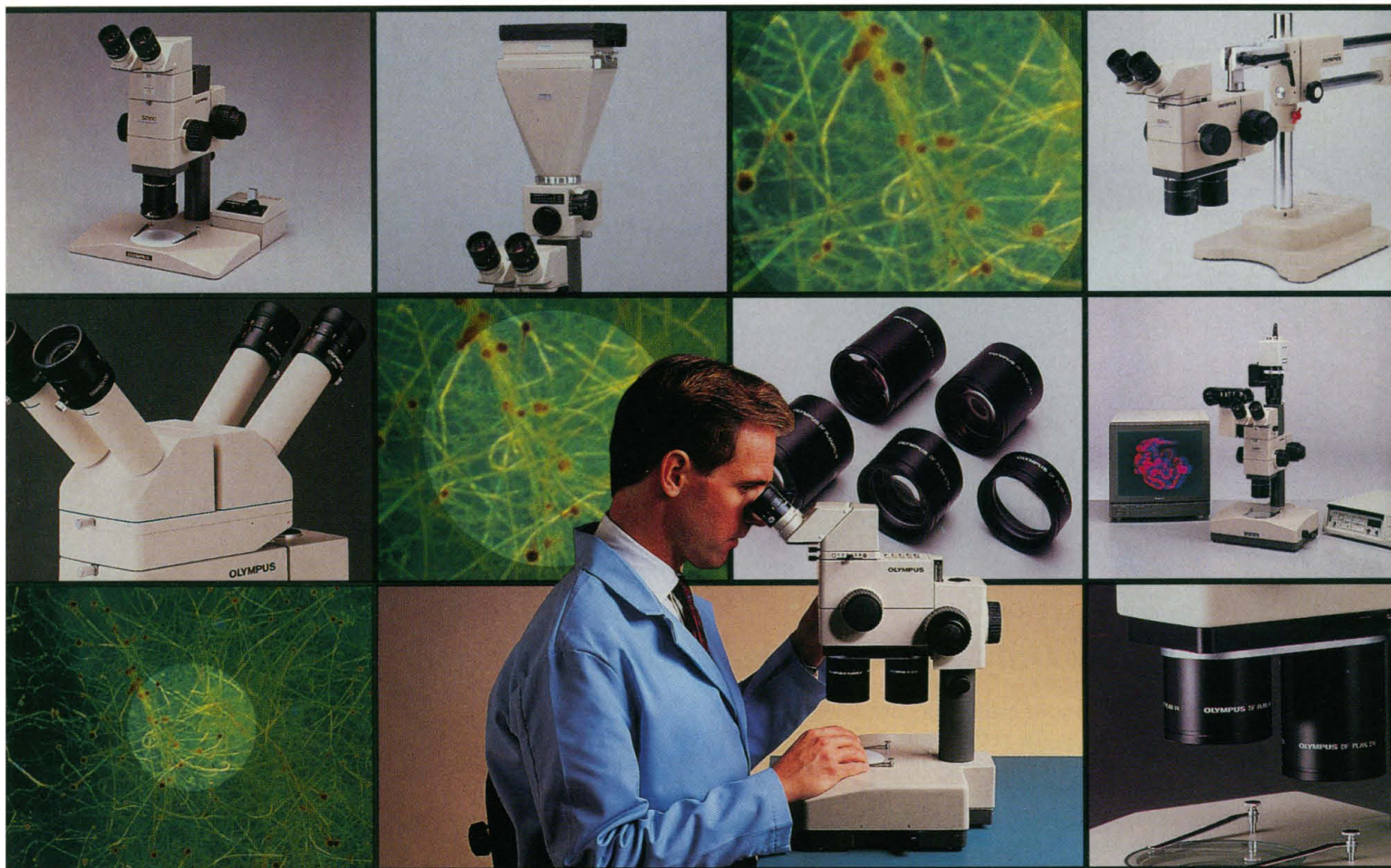


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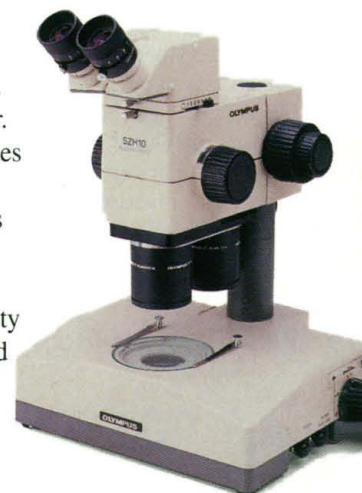
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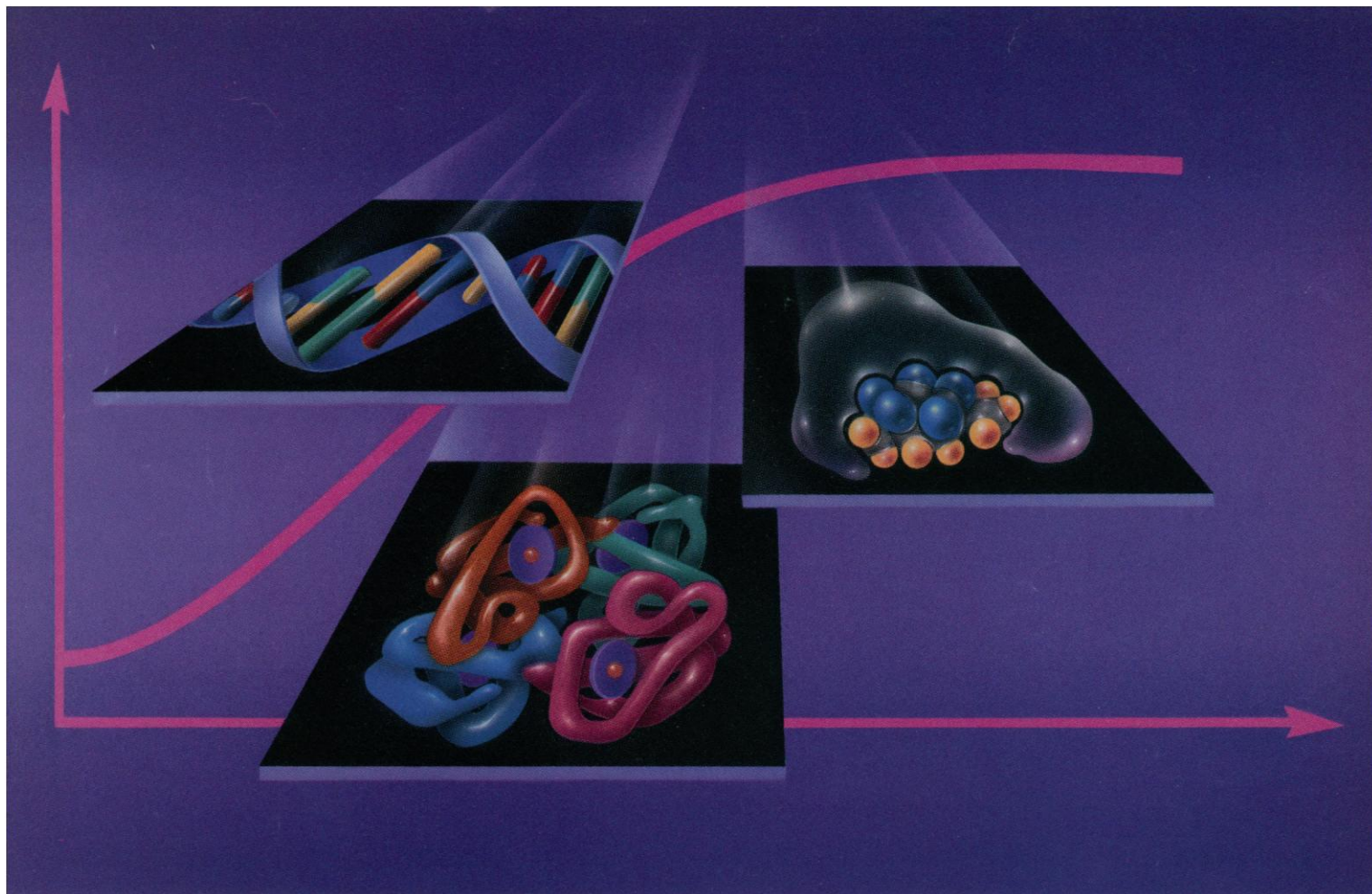
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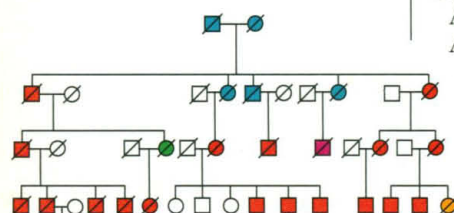
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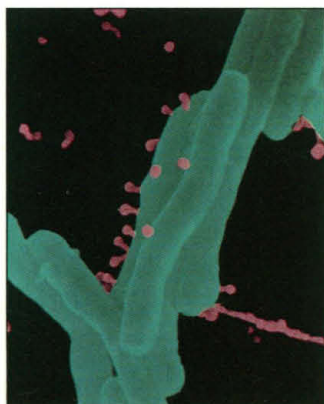
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Spatial orientation and interconnectedness of porosity in a silicon carbide composite reconstructed from data produced by high-resolution x-ray tomography. Such imaging can measure surface area changes during

chemical vapor infiltration, allowing validation of models of the composite microstructure. See page 789. [Image: Thomas Breunig and John Daniel, Sandia National Laboratories]



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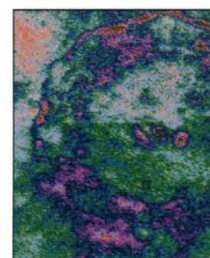
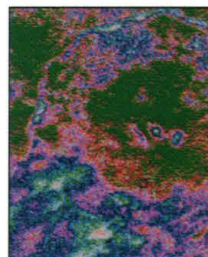
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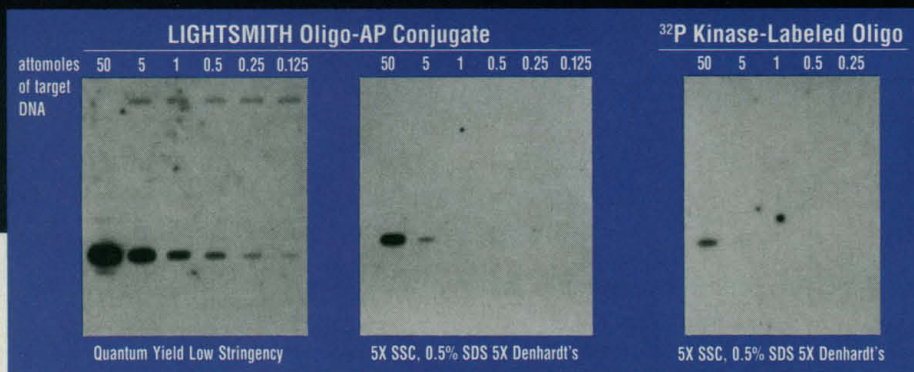
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The flow below

The flow in the Earth's mantle, which drives plate tectonics, is concentrated in the weakest areas. Deformation of the mantle, which can occur by mass diffusion or by movement of dislocations, is affected by pressure, temperature, composition (the grain size and type of minerals present), and the imposed stress. Karato and Wu (p. 771) discuss how laboratory studies, examination of processes associated with mantle deformation (such as postglacial rebound), and seismic and theoretical studies can contribute to our understanding of how the mantle deforms. They propose that there is a key transition in rheologic behavior in the upper mantle that may focus deformation.

Moon mantle

Large impact events can excavate and expose material from deep beneath the surface. These events provide a means to investigate the internal composition of the moon and planets. Pinet *et al.* (p. 797) used spectral imaging techniques, which provide information on mineral compositions and abundances, to study the large crater Copernicus (93 kilometers across) on the moon. The analysis suggests that the lower crust and lunar mantle were excavated by the impact that formed the crater and that an extensive impact melt sheet formed.

Large carbon rings

Positively charged C_{60}^+ ions can isomerize into polycyclic ring compounds and into a monocyclic form. Hunter *et al.* (p. 784) identified various isomers by using ion chromatography, in which gas-phase ions are sepa-

Genetic insights into human colorectal cancer

Although colorectal cancers often occur in familial patterns, it has been difficult to prove the existence of a hereditary component because the disease is so prevalent and is strongly subject to environmental influences (see news story by Marx, p. 751). Peltomäki *et al.* (p. 810) used genetic linkage analysis to show that a predisposition to colorectal cancer is linked to a locus on human chromosome 2. This locus, which remains to be precisely mapped, will be a valuable tool for presymptomatic identification of individuals at risk. In related work, Aaltonen *et al.* (p. 812) show that familial colorectal cancers often display widespread alterations in short DNA repeat sequences—a molecular signature that distinguishes them from most sporadic cancers. Thibodeau *et al.* (p. 816) independently detect similar DNA repeat alterations in a subset of colorectal cancers that display lower than average chromosomal loss of heterozygosity and that are located in the proximal colon. Together, these results provide early clues to a possible new mechanism of tumorigenesis.

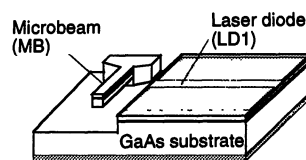
rated by injecting them in a drift tube filled with helium gas. The arrival time of the monocyclic form agrees well with that found previously by Bowers and co-workers for smaller rings. Formation of the monocyclic ring does not appear to be a highly activated process, and this form may play a role in the synthesis of fullerenes.

Inside view

Ceramic composites made from silicon carbide are ideal materials for harsh environments, but they are expensive to fabricate. As more is learned about growth variables and composite microstructure, costs should decrease. Kinney *et al.* (p. 789) report on the use of x-ray microtomography for investigating the in situ growth of silicon carbide in a woven fiber composite. This noninvasive probe allows imaging of the internal structure of the material as the channels and pores fill up (cover). These direct measurements test models that describe how the surface area available for deposition changes during growth.

Micromechanical photonics

Integrated micromechanical-microoptical systems may be of use as sensors, but established fabrication techniques are lacking. Because of the greater experience with large-scale integration methods, most microdevices have been wrought from silicon, a poor material for optical applications. Ukita *et al.* (p. 786) report on an integrated structure that combines mechanical structures with optical de-



vices on a gallium arsenide substrate, which is more suitable for photonics. The authors have constructed a resonant sensor that is driven and monitored by optical excitation: the absorbed optical energy heats a tiny cantilever, producing vibrations that are in turn observed by a photodetector on the same substrate. Applications could include accelerometers and mechanical filters to synchronize communication systems.

Rapid screening for tuberculosis infection

Identification of drug-resistant strains of *Mycobacterium tuberculosis* is difficult because this organism grows very slowly, which leads to two important problems. Individuals infected with resistant strains, who cannot be treated effectively with conventional antibiotics, may not be identified for months, and the testing of new drug therapies is also slowed. Jacobs *et al.* (p. 819; see news story by Barinaga, p. 750) report that a firefly luciferase gene can be introduced into *M. tuberculosis* with bacterial phage reporters. Light production, which can be detected within minutes photometrically, is extinguished in conventional strains when cultured with antibiotic drugs. However, drug-resistant strains continue to produce light after drug exposure. Such methodology could be adapted for use in developing countries, where the incidence of tuberculosis, especially in HIV-infected individuals, continues to increase.

Oncogenes and T cell function

Proteins in the Ras family can be converted from their inactive form, in which they are bound to guanosine diphosphate, to their active, guanosine triphosphate-bound form by proteins called guanine-nucleotide releasing factors (GRFs). Gulbins *et al.* (p. 822) show that the protein Vav, a proto-oncogene product expressed in hematopoietic cells, appears to be a GRF whose activity is stimulated by T cell receptor triggering and that is regulated by a protein tyrosine kinase. In a Perspective, Feig (p. 767) discusses the role of the Ras proteins in normal cell functions.

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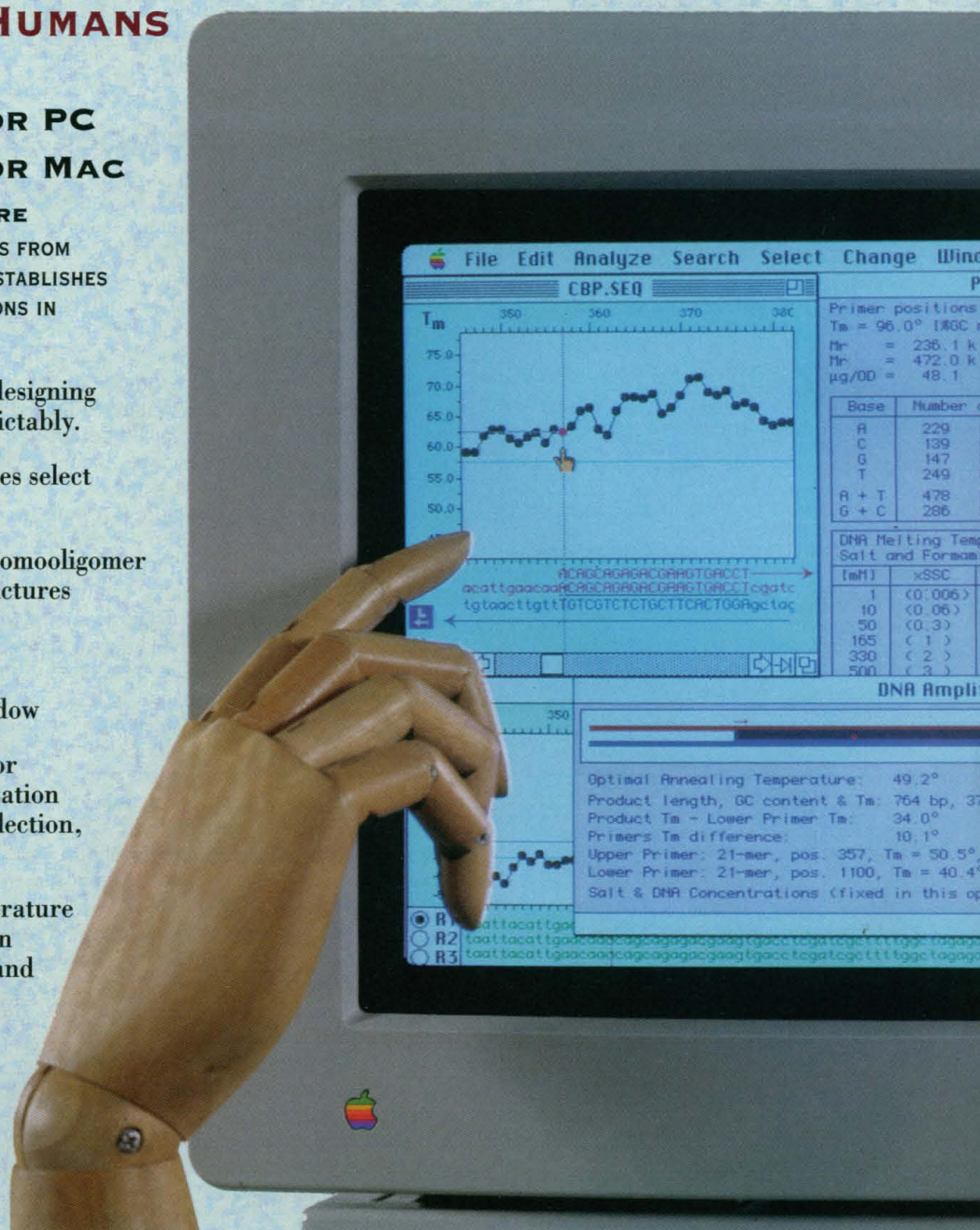
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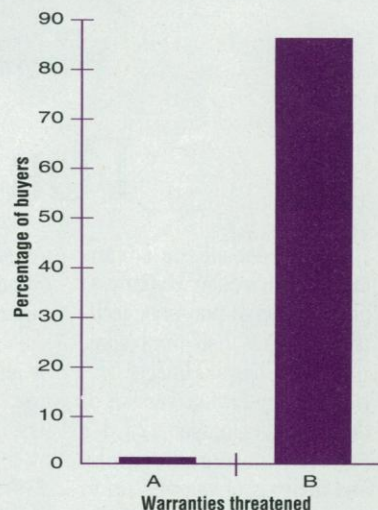


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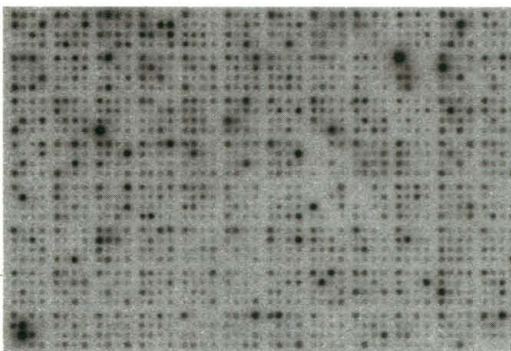
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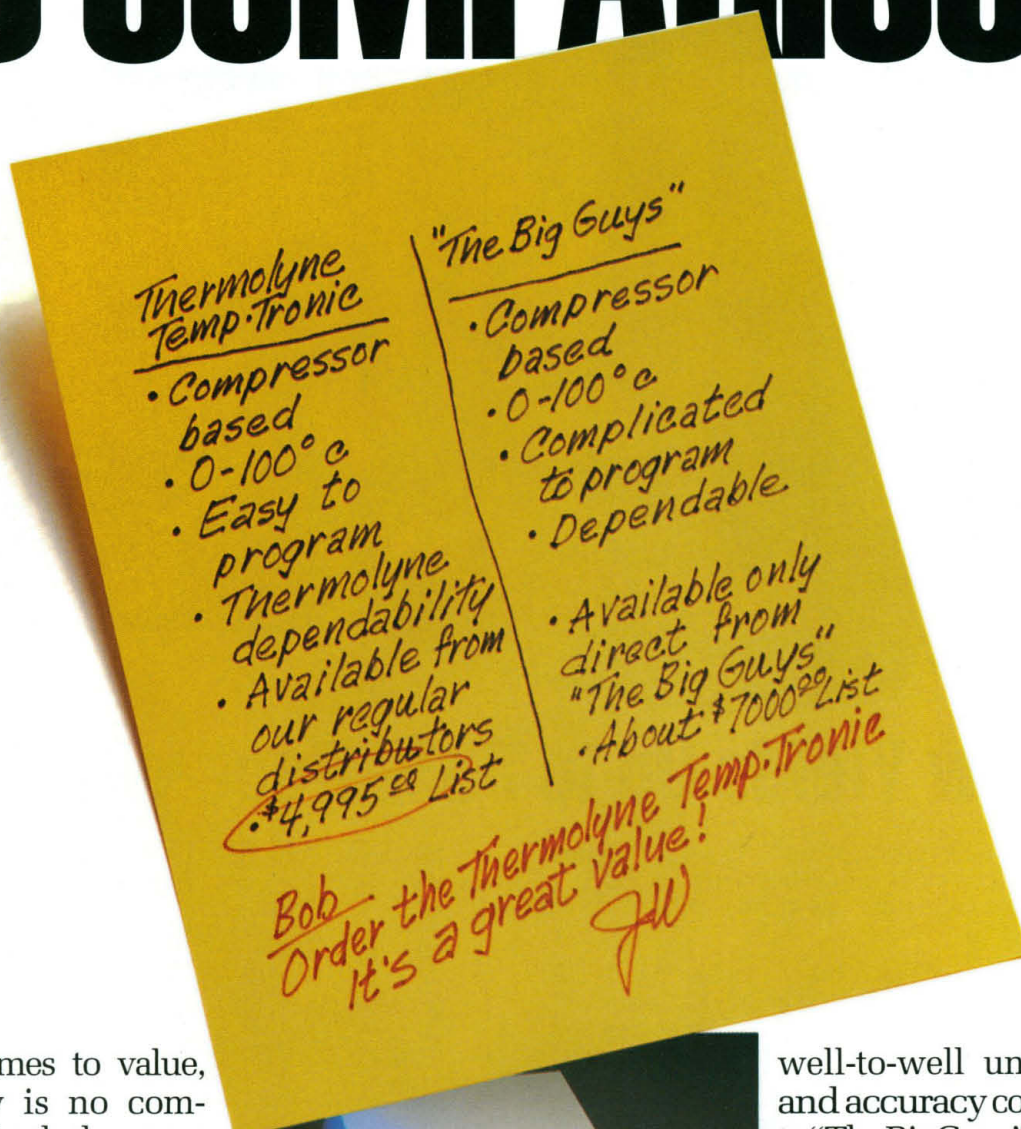
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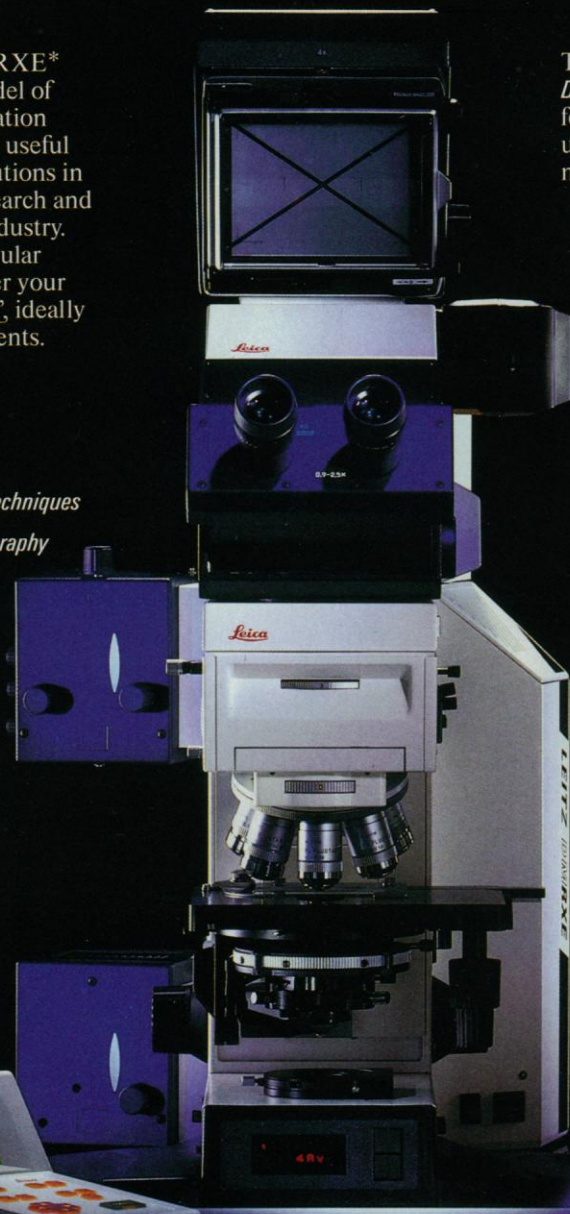
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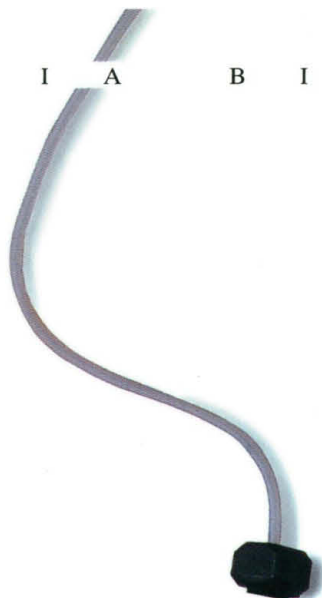
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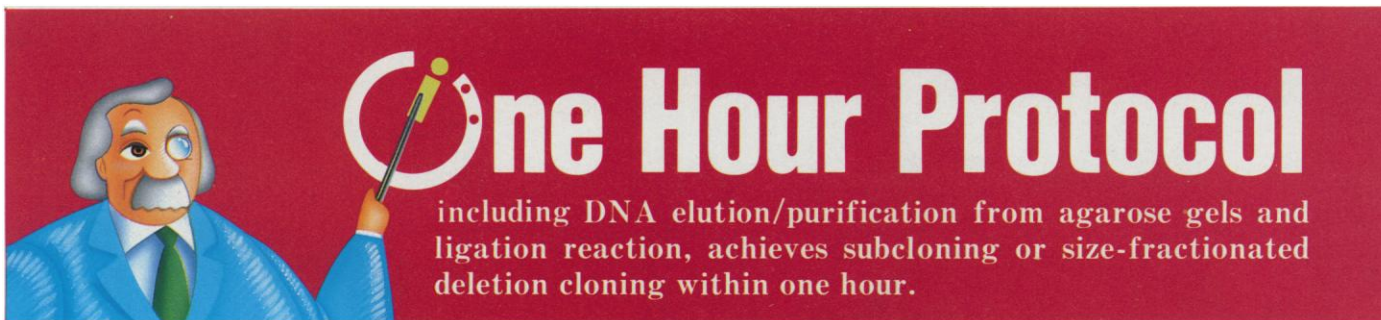
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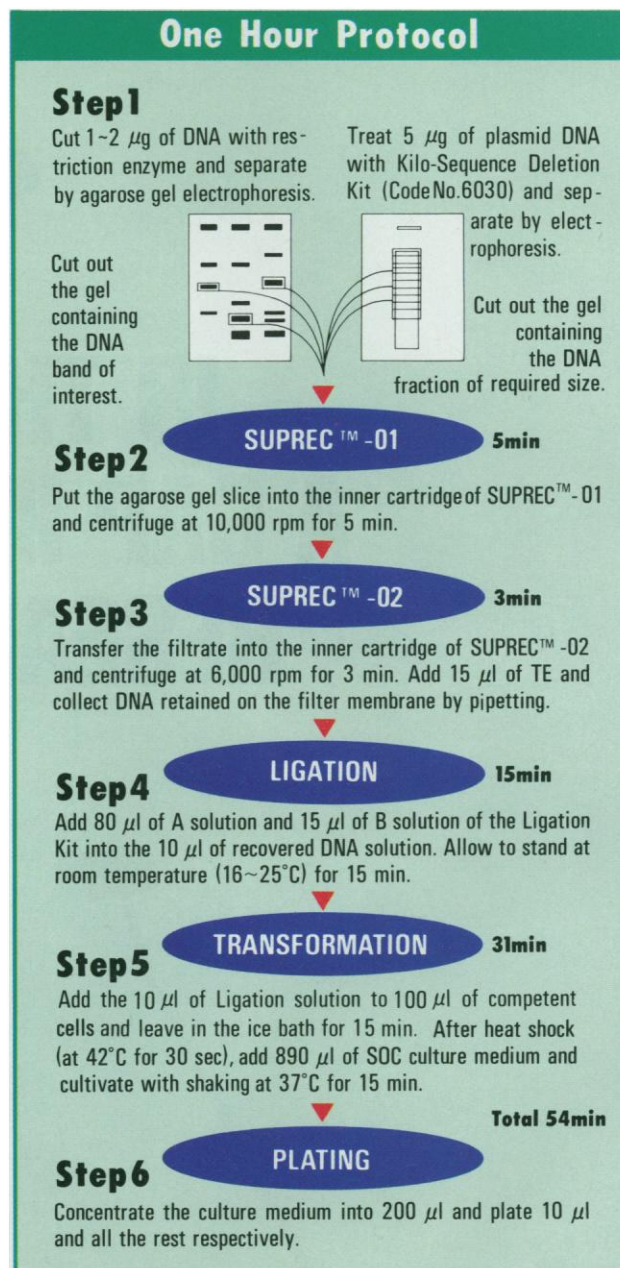
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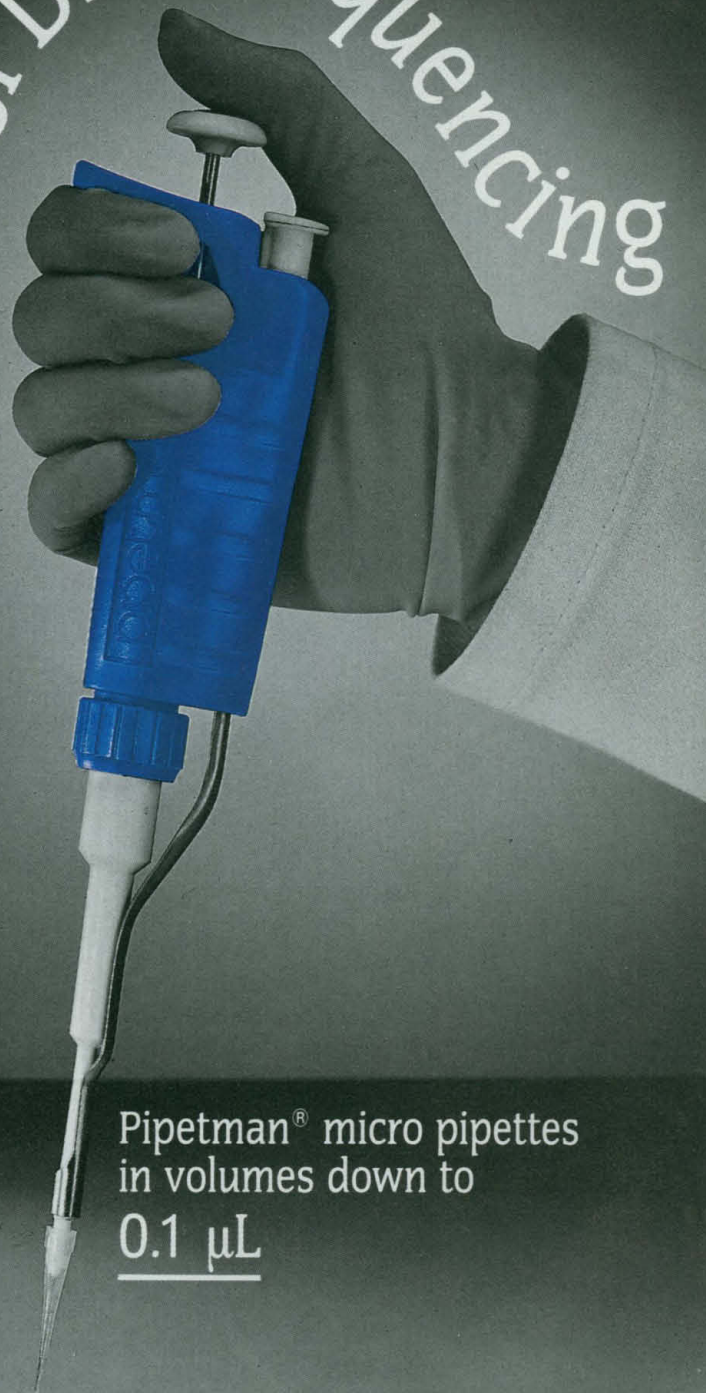
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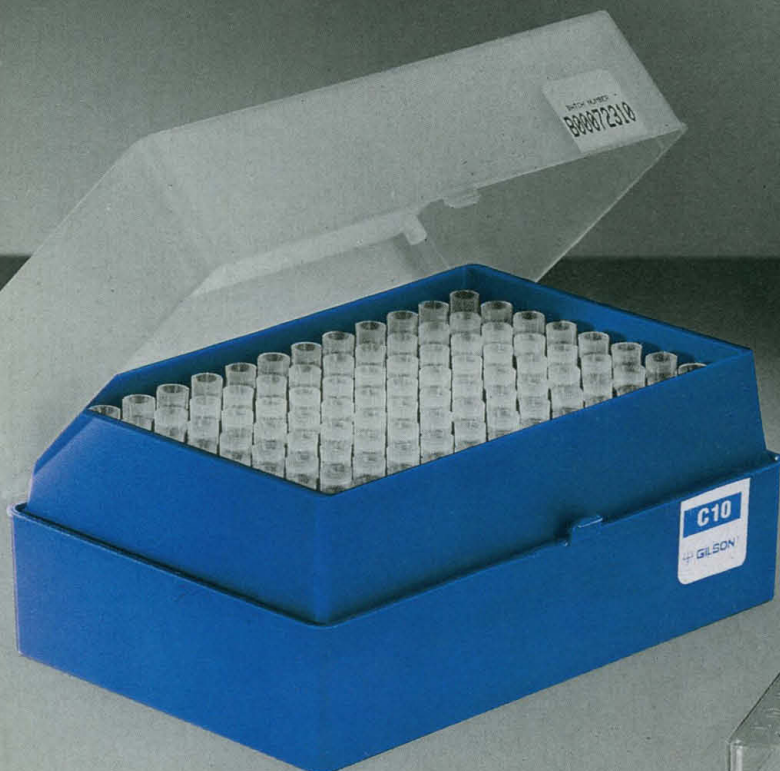
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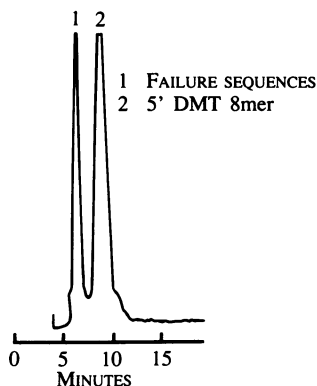
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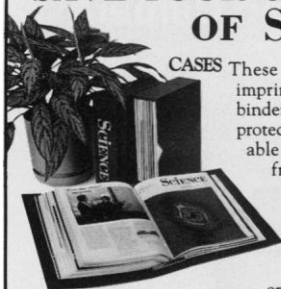
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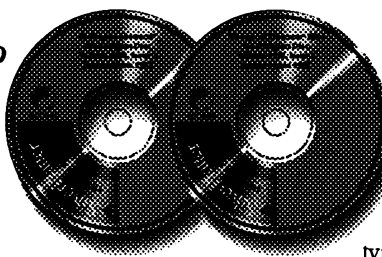
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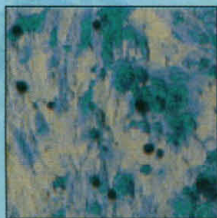
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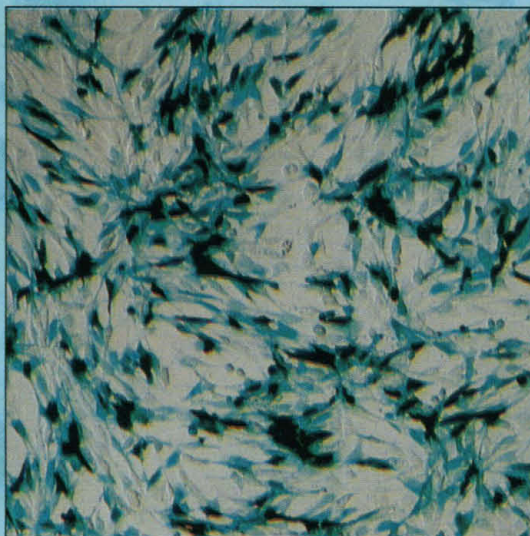
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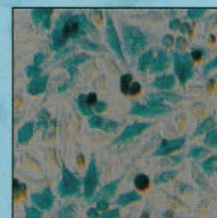
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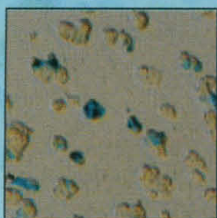
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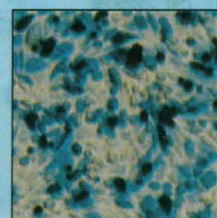
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CHO-K1 Cells

Hit a High Note with LIPOFECTAMINE,TM the New Standard in High Efficiency Transfection Reagents from the Makers of LIPOFECTIN[®]

You'll feel like singing about your transfections when you use LIPOFECTAMINE Reagent because you'll see previously unattainable transfection efficiencies—up to 90% positive β -galactosidase-expressing cells!

A polycationic lipid reagent that introduces nucleic acids into eukaryotic cells, LIPOFECTAMINE works well with a wide variety of cell lines (1). These include popular *and* hard-to-transfect cell lines such as: CHO-K1, BHK-21, HeLa, COS-7, NIH/3T3, PC12, and Jurkat. Passaged primary cultures such as human fibroblasts can also be transfected with high efficiency.

LIPOFECTAMINE is an innovative product (patent pending) which may be used for

stable or transient transfections and can be used in the presence of fetal bovine serum. It is pre-formulated so it is easy to use, and it has a long shelf life at 4°C. Best of all, LIPOFECTAMINE is from Life Technologies, the makers of LIPOFECTIN and the pioneers in transfection technology. So try LIPOFECTAMINE and watch your transfection efficiencies scale new heights. You'll even feel good about getting the blues!

To Order/TECH-LINESM: (800) 828-6686
Cat. No. 8324SA



Photographs depict β -galactosidase expression of cells transfected with pCMV β -gal DNA and LIPOFECTAMINE Reagent.

GIBCO BRL

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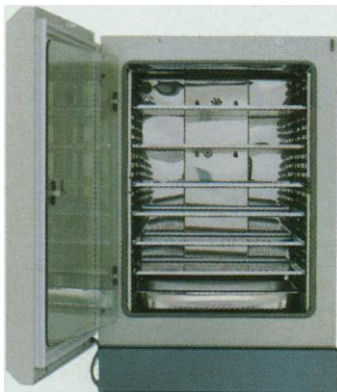


1. Hawley-Nelson, P., Ciccarone, V., Gebeyehu, G., Jessee, J. and Felgner, P., (1993) *Focus* 15, in press.
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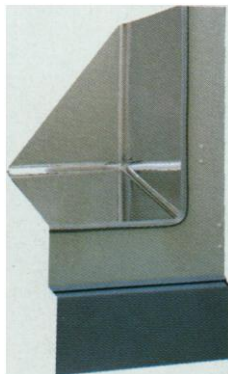
Functional Features

of the Forma 3250 Cell Culture Incubator



Optimum Culturing Chamber

Chamber design provides optimum culturing environment. Ultra-flat electropolished shelves are square for convenience and perforated for uniform air movement. A stainless steel humidity pan is provided standard to prevent desiccation and facilitate cleaning. Unit interior is comprised of three components which are easily removable without the use of tools.



Cleanability

A crevice-free, stainless steel interior with mirrored finish features 100 percent 1/2" radius coved corners. No harsh finish to harbor contaminants. Construction of the chamber promotes aseptic culturing conditions.



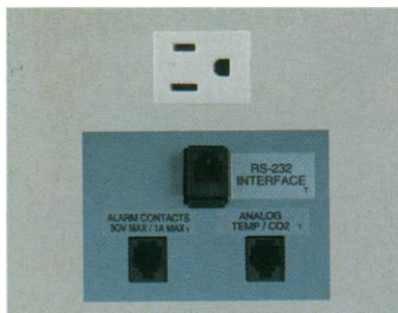
Precision Control

A door-mounted control panel features a microcomputer with vacuum fluorescent alpha/numeric display. Programming is easy with the touch key pad. Self-prompting messages allow you to control and monitor the critical performance parameters of the incubator. Proportional and integral (PI) algorithms combine with fuzzy logic characteristics to provide a stable culturing environment. A patented interactive dual temperature probe system provides precise balance of chamber air for ultimate temperature control and uniformity.



Functional Design

The 3250 water jacketed incubator gives you the flexibility to address any lab space requirements. Set on a countertop or stack them for maximum utilization of space. The incubator door swing can be reversed to accommodate lab layout or for side-by-side operation.



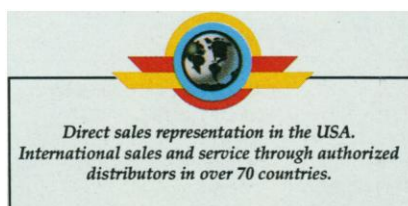
Interface Protection

Remote monitoring of temperature and CO₂ can be achieved through remote alarm contacts, millivolt output signal and optional RS232 interface. Standard electrical outlet is provided for connection to accessory items, such as temperature recorder, gas guard, etc.



Product Compliance

U.L. Listed and C.S.A. Certified, every 3250 incubator is manufactured to conform with the intense guidelines of these testing facilities. Copies of U.L. and C.S.A. documentation are available from Forma for compliance verification.



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