



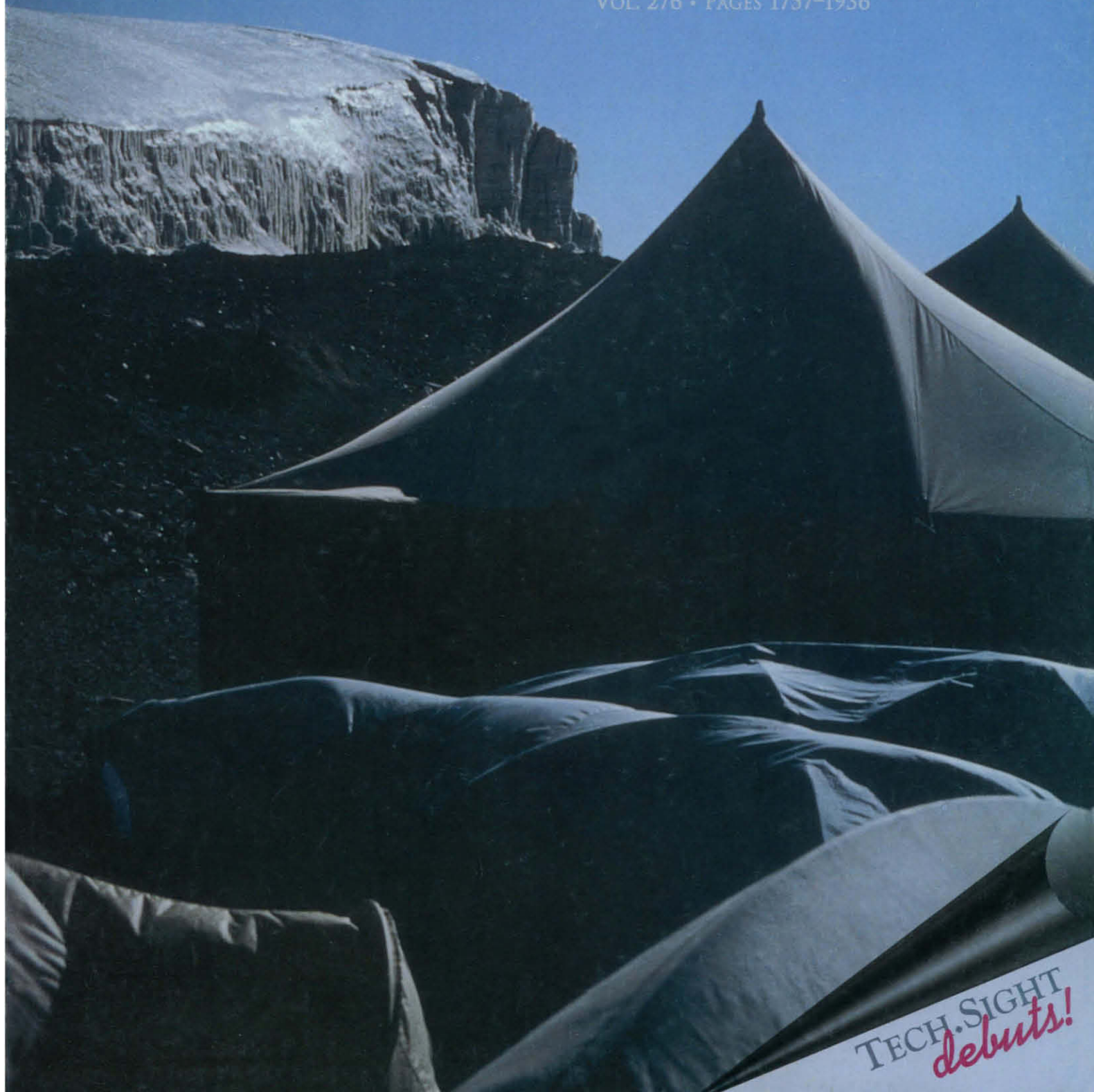
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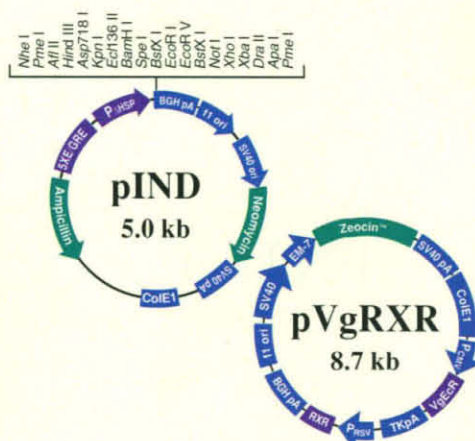
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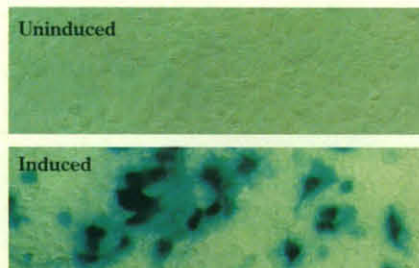
How it Works

For transient transfection and induction, simply clone your gene of interest into pIND, then cotransfect it into mammalian cells with the regulator vector, pVgRXR. Approximately six hours later, treat the transfected cells with the ecdysone analog, muristerone A and begin analysis. Depending on the sensitivity of the assay, you can begin detecting induced expression in as little as two hours. For stable transfection, use dual selection with Zeocin™ and G418.



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The slides below show a simple colorimetric assay of 293 cells cotransfected with pVgRXR and pIND/lacZ before and after muristerone treatment. This example vividly illustrates the Ecdysone System's tight control and capacity for high inducibility.



Uninduced and induced transiently transfected 293 cells stained with X-gal.

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Dose-dependent β -galactosidase induction. 293 cells stably transfected with pVgRXR and pIND/lacZ treated with increasing amounts of muristerone A. Equal amounts of isolated protein were separated by SDS-PAGE, blotted and detected by antibody and chemiluminescence.

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1. No, D. et al. (1996) *Proc. Natl. Acad. Sci. USA* 93: 3346-3351.

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4. Transform

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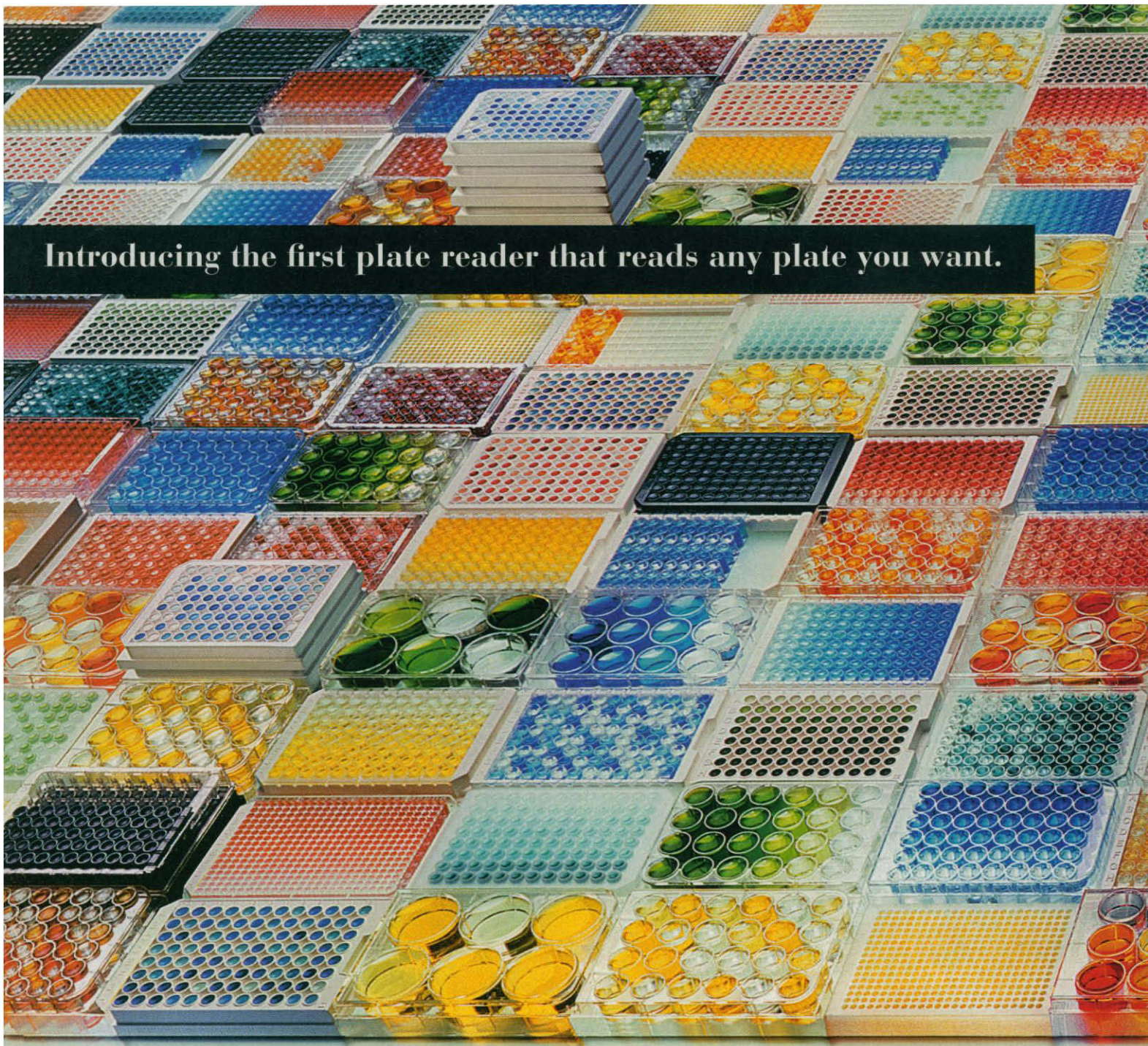
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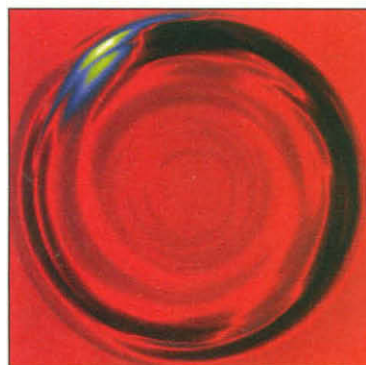


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1791 & 1855

Flying toward
speciation



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Spiraling into planets

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COVER

This 40-meter-high margin, viewed from the base camp, characterizes much of the edge of the Guliya ice cap in the Western Kunlun Mountains on the Qinghai-Tibetan Plateau. Horizontal dust layers show the stratigraphic record, and the terminal moraine (in front) marks Guliya's

greatest lateral extent at the Last Glacial Maximum. The Guliya ice core to bedrock contains a regional climate history for the entire last glacial cycle, and the basal ice may exceed 500,000 years in age. See page 1821. [Photo: Lonnie G. Thompson]



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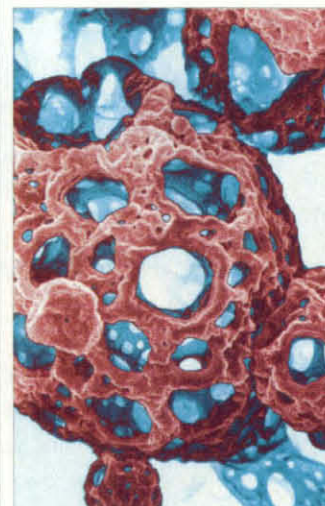
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1868

Particles to carry drugs to the lungs

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THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Metal-free phosphors

Most white phosphors, such as those used in fluorescent lighting, contain heavy metals and are excited by mercury emission, all of which pose potential environmental problems. In a search for new materials, Green *et al.* (p. 1826) report that highly emissive broadband phosphors can be synthesized by incorporating small amounts of carboxylic acids into silicates through sol-gel methods. The luminescent species may arise from a defect substitution of carbon into the silicate lattice.

Disk drives

It takes about a million years for a Jupiter-mass planet to form by accretion in a disk. This time scale presents a problem for explaining the formation of Jupiter and Saturn and extrasolar giant gas planets (one to several Jupiter masses) because the gas in the disk is predicted to dissipate on the same time scale. Boss (p. 1836) used a three-dimensional hydrodynamic code to show that giant gas planets can form by gravitational instability. An isothermal or adiabatic instability produces spiral arms of material spinning toward the edge of the disk, which eventually break off into clumps of giant gas protoplanets. These structures can then form planets more rapidly.

Ganymede's oxygen origin

Optical reflectance spectra indicate that oxygen is present on Ganymede, Jupiter's largest satellite, but the source and nature of this oxygen has not been well understood. Vidal *et al.* (p. 1839) attempted to match the

Old low-latitude ice

The most detailed continental paleoclimate records are available from ice cores. These are concentrated in Greenland and Antarctica; those that have been obtained from low-latitude ice caps have extended perhaps back to the Last Glacial Maximum, about 18,000 years ago, and generally just through the Holocene. Thompson *et al.* (p. 1821; see cover) present an ice core record from the Guliya ice cap (Qinghai-Tibetan Plateau) that extends in detail back past 100,000 years ago and may contain ice deposited 500,000 or more years ago. Oxygen isotope data and comparison with methane data from the polar ice cores imply that the hydrologic and global methane cycles are linked.

Ganymede spectra in the lab using solid oxygen, condensed water-oxygen mixtures, and irradiated ice. The spectra of solid oxygen and water-oxygen mixtures at 26 kelvin matched best and suggests that oxygen exists as ice on Ganymede. It is either protected somehow from the daily surface warming by the sun or it may float in a thin haze above the surface.

Don't shoot

Inhaled therapies can be valuable for treatment of respiratory disorders and for the benefit of patients who can have an alternative to more invasive forms of therapy, such as injections. Edwards *et al.* (p. 1868) have developed an inhalation aerosol that is characterized by particles of small mass density and large size. These particles were able to avoid the lungs' normal clearance mechanisms. High levels of insulin or testosterone were delivered over relatively long periods of time in rats.

Macrophage factories

At a time during the course of human immunodeficiency virus (HIV) disease when the prime viral targets, CD4⁺ T cells, are

decreasing in number, what is responsible for the increased levels of virus? Orenstein *et al.* (p. 1857) studied biopsies of infected human lymph nodes and concluded that macrophages can be very productive sources of HIV. Their ability to act as factories for HIV production was dramatically increased if the tissues showed signs of infection by opportunistic pathogens such as *Mycobacterium* or *Pneumocystis*. Thus, therapies to control opportunistic infections may also serve to control HIV production.

Shocking structure

An antimicrobial protein, the bactericidal-permeability-increasing protein (BPI), helps protect us against certain kinds of septic shock induced by the lipopolysaccharide (LPS) from the outer membrane of bacteria by binding this lipid, which kills the bacteria. Beamer *et al.* (p. 1861) found that the x-ray crystal structure of the recombinant human protein has an unexpected structure; BPI is a boomerang-shaped molecule with two lipid binding sites. The structure suggests how the LPS is bound and how related human proteins may bind and transport lipids.

Carotenoid cleavage

Vitamin A and other apocarotenoids have a variety of important functions, including regulating development in animals and serving as photosensory pigments. However, the pathways by which biomolecules are synthesized from carotenoids in vivo have re-



mained obscure. Schwartz *et al.* (p. 1872) have determined that the VP14 protein of maize catalyzes the cleavage of carotenoids to synthesize abscisic acid. Plants carrying a mutation in VP14 are deficient in abscisic acid hormone and defective in seed maturation.

CMV assisting HIV infection

A chemokine receptor encoded by the human cytomegalovirus (CMV) allows entry of human immunodeficiency virus-type 1 (HIV-1) into CD4⁺ cells. In order to infect human CD4⁺ T cells, different strains of HIV must use coreceptors. Pleskoff *et al.* (p. 1874; see the news story by Balter, p. 1794) found that human CMV encodes a chemokine receptor, US28, that can allow infection by macrophage-tropic HIV strains and fusion of CD4⁺ cells with cells expressing HIV-1 envelope proteins. Many HIV-infected individuals are infected by CMV, and it has been suspected that coinfection affects the progress of HIV disease.

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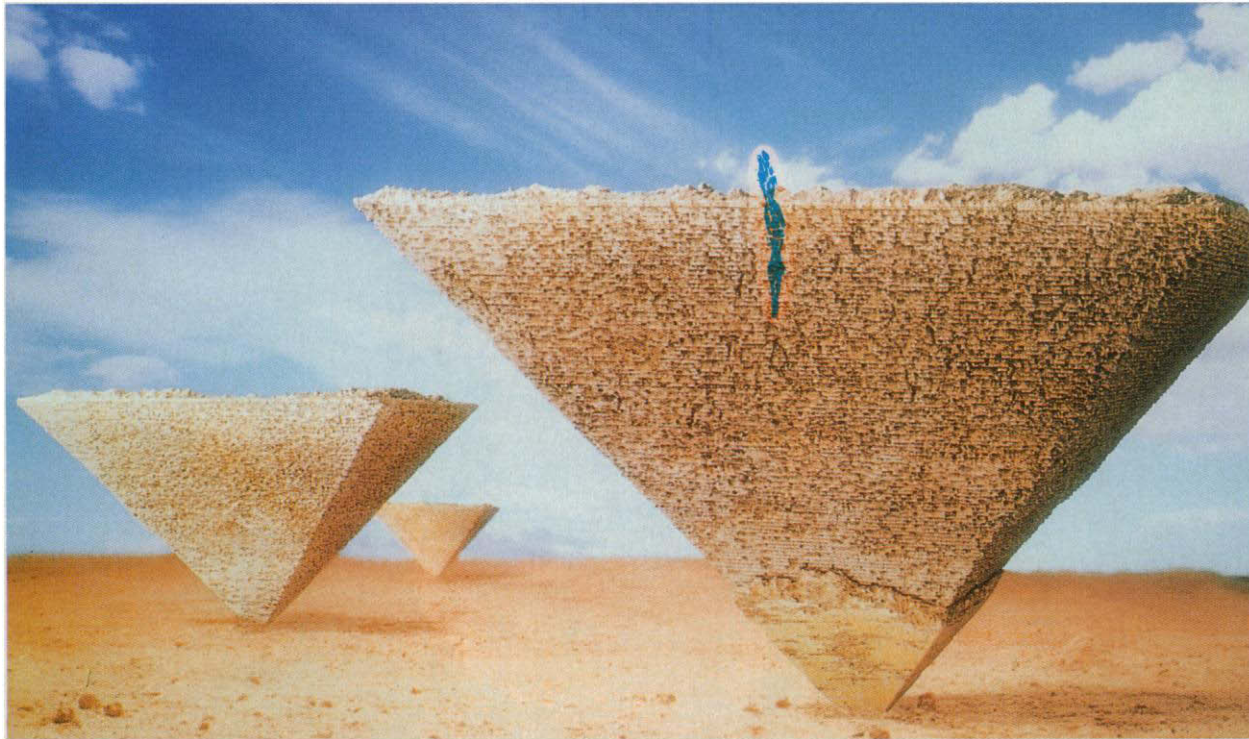
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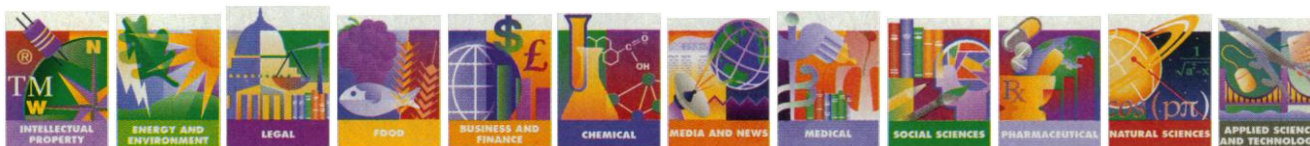
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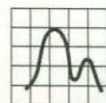
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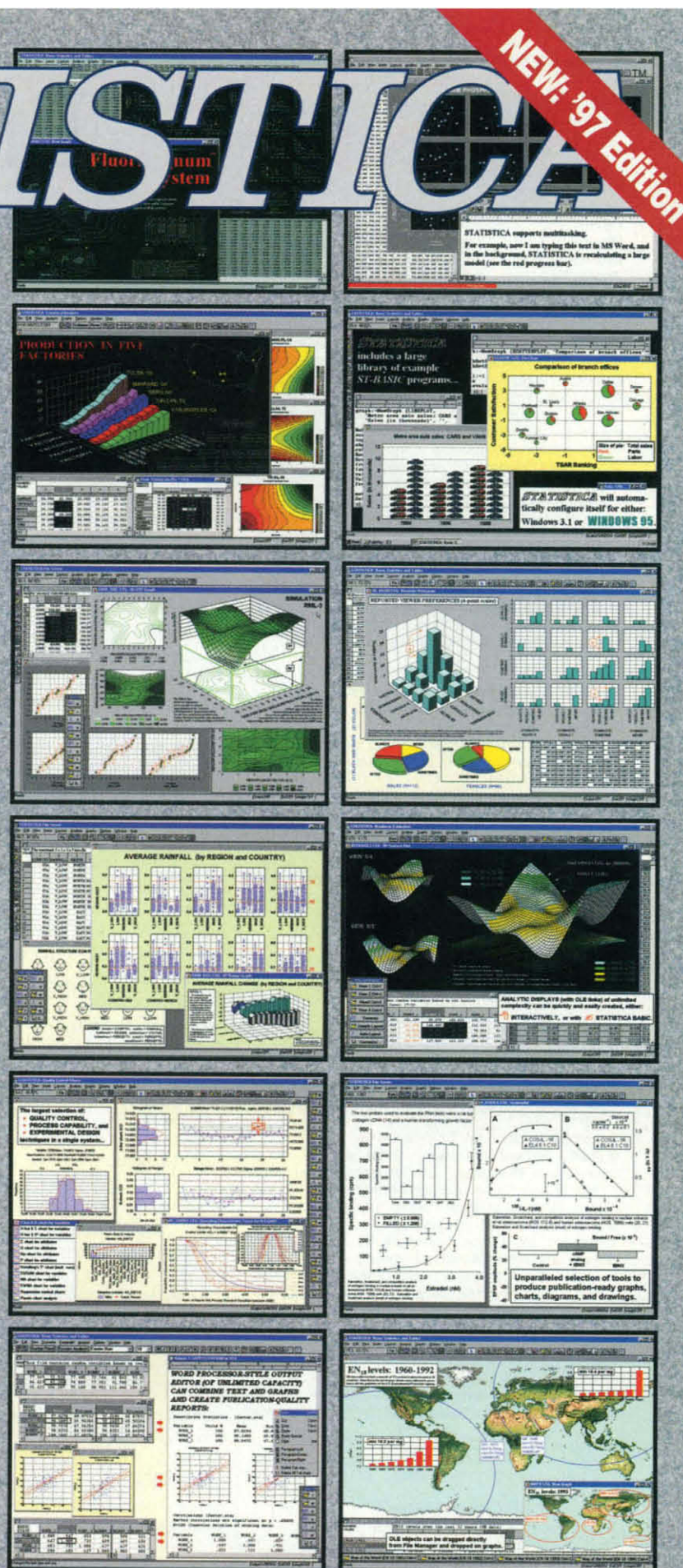
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The Mac OS Report

Number two in a series—the facts about Mac OS 8

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It will give your Apple® Macintosh computer (or, for that matter, any other Mac OS computer of your choice) a dramatic new look and feel, along with all kinds of enhanced capabilities for accessing the Internet.

It will also set an entirely new standard of powerful, intuitive computing—a standard the competition can try to catch up to. (Again.)

A new way of working

The moment you start using Mac OS 8, you'll feel the difference: you'll find yourself accomplishing more in less time. A multi-threaded Finder™ lets you execute multiple tasks simultaneously, such as launching applications and copying files. Mac OS 8 includes new information-management tools, such as contextual pop-up menus and spring-loaded folders, that give you quicker and easier access to all your information. A scalable environment lets you either limit your menu and window options, or expand them—whichever works better for you. A new, dimensional look makes the interface more dynamic and engaging than ever. And Mac OS 8 also includes the latest versions of QuickTime® with its MPEG support,



QuickTime VR and QuickDraw® 3D.

How easy is it to get going with all these new technologies and features?

Very. Because our new installer and setup assistants take you through each step of configuring your new system

software. Once you're up and running, PowerPC™-native code improves your performance. Mac OS 8 is also completely compatible with all PowerPC and 68040-based hardware and software.

A new way of accessing the Internet

Mac OS 8 includes TCP/IP and PPP for easy network or modem access direct from the Finder. You get Netscape Navigator™, Microsoft® Internet Explorer™ and the PointCast Network™. And a new Internet Setup Assistant makes it easier than ever to get on the Net, whether you're doing it from home with a modem or from work with a high-speed connection. Personal web sharing is standard, so you can turn any Mac into an Internet web server. And Java™ support is built in, so you can run Java applications just as though they were any other desktop applications. (If you were wondering, Windows® 95 can't do this.)

And more advancements are on the way

Mac OS 8 is one of the most significant advances in OS technology ever. And it's just the beginning—additional upgrades are planned. And our support for the Mac OS will continue for years.

At the same time, we're also working on an industrial-strength OS, code-named Rhapsody, that will offer features such as protected memory, preemptive multitasking and symmetric multiprocessing. Rhapsody will also provide backwards compatibility, so you can be sure that the vast majority of your Mac OS apps will run on Rhapsody, too.

In other words: Apple is still developing the most innovative, user-friendly and consistently superior products on the market. That's one part of our system that won't change. To learn more, visit www.macos.apple.com.



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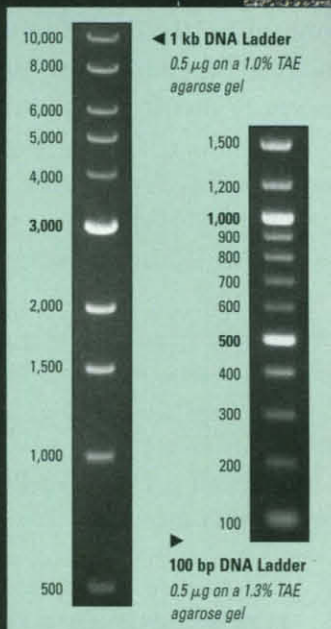
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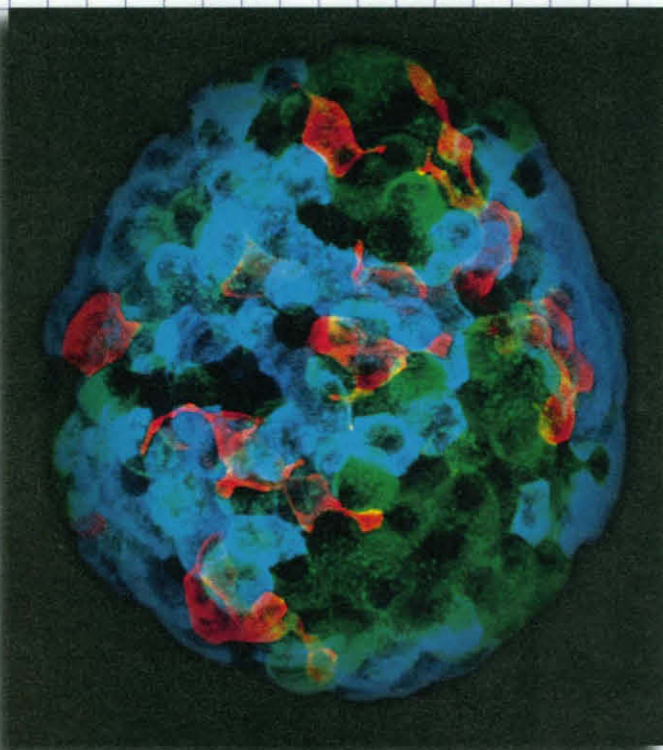
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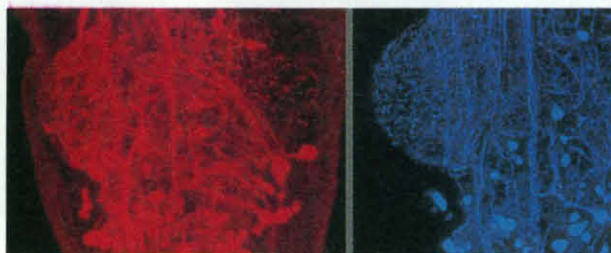
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FISH image of DNA probes binding to centromeric α -satellite repeat sequences in interphase nuclei. Chromosome Y (green), chromosome X (yellow), and chromosome 17 (red). DAPI counterstain.

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Fig. 1. Multicolor detection using TSA-Direct.
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Fig. 1.

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Fig. 2

a. Standard fluorescent detection.

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Figs. 2 a-b. Fluorescent detection of chromosome centromere probes in metaphase spreads.
Figs. 2 c-d. *In situ* chromogenic detection of oxytocin in rat brain tissue sections.

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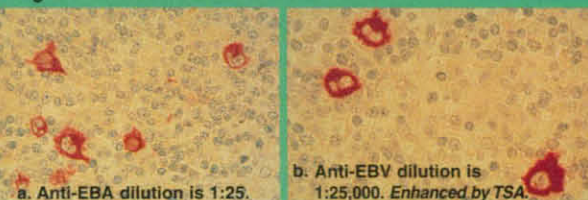
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Fig. 3



Figs. 3 a-b. IHC of EBV antigen in Hodgkin's Lymphoma of mixed cellularity.
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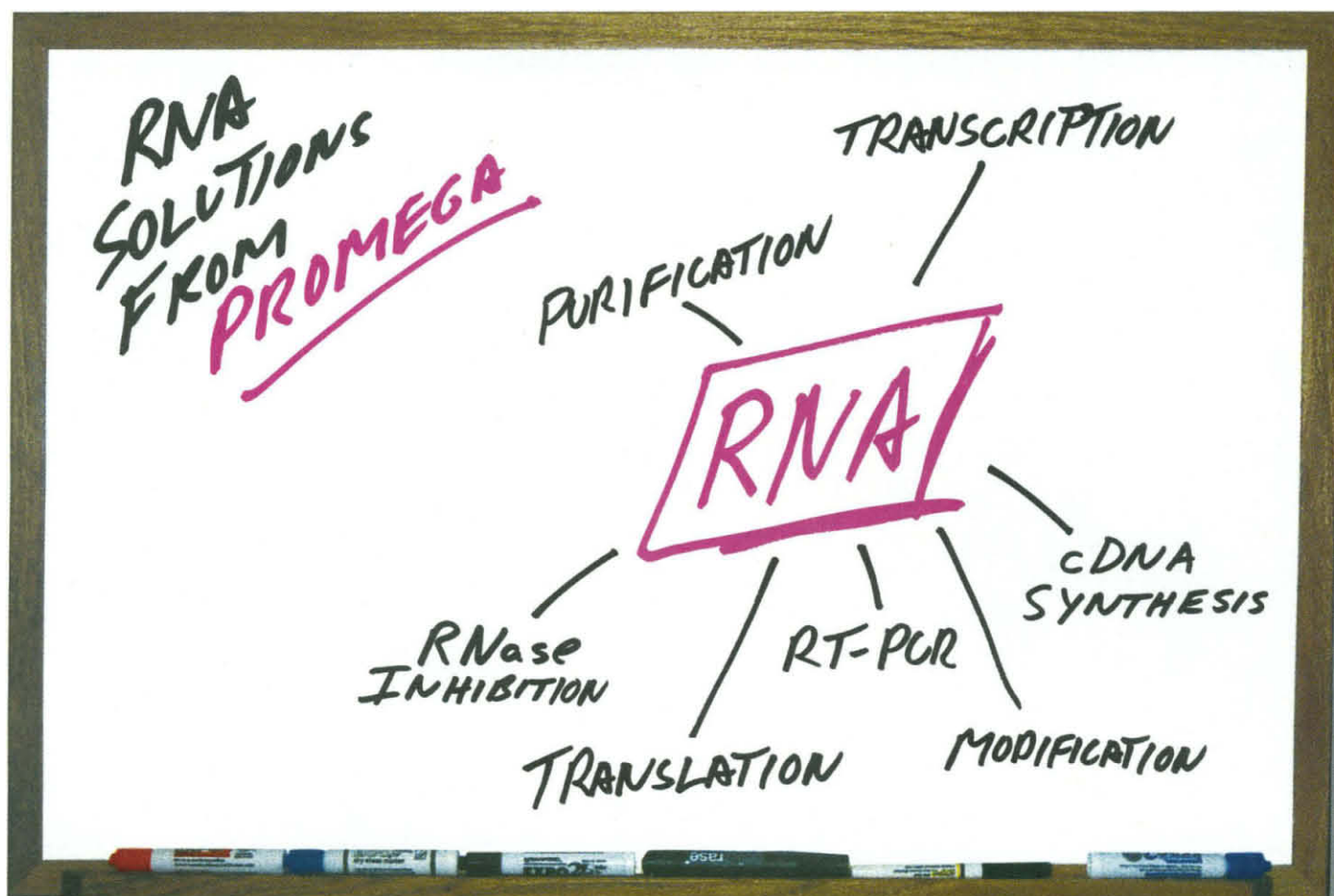
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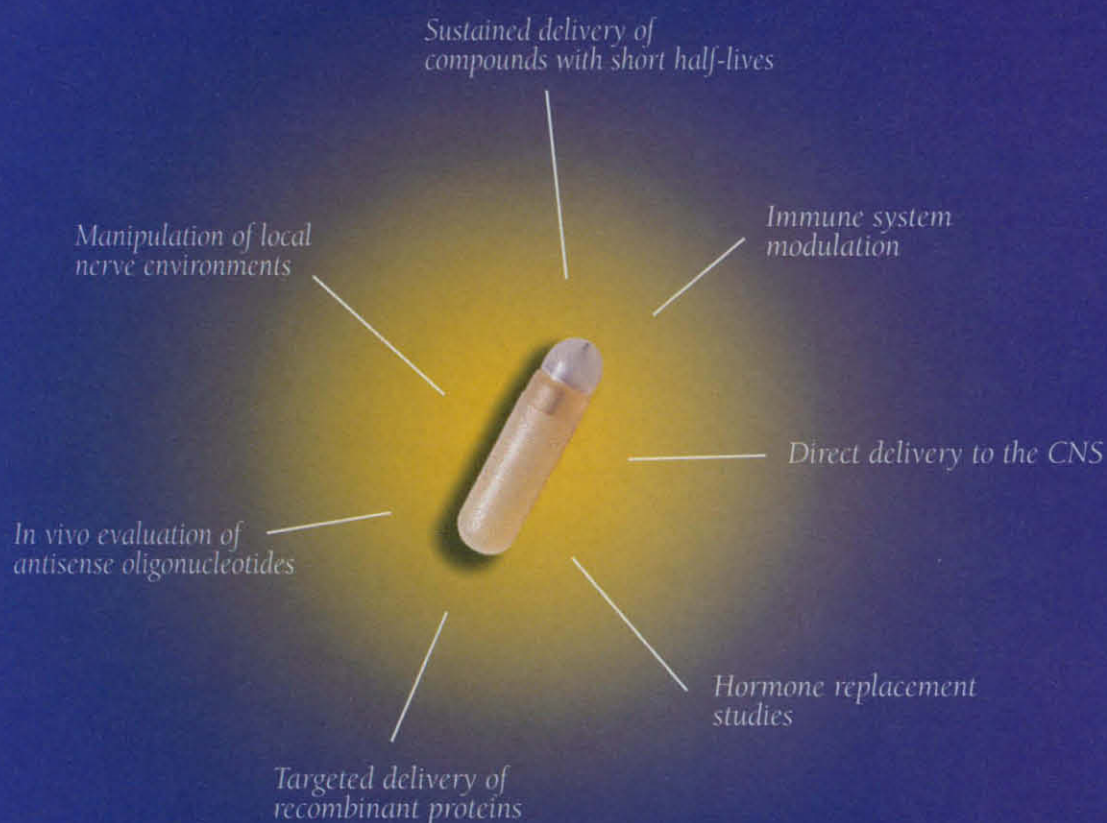
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References

1. Brownstein, J.M., et al. (1996) *BioTechniques* **20**, 1004-1010.
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3. Novy, R.E., Yaeger, K.W., and Kolb, K.M. (1996) *InNovations* **6**, 7-11.

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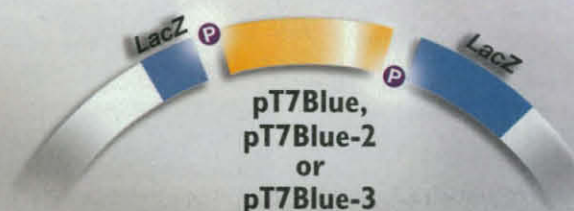
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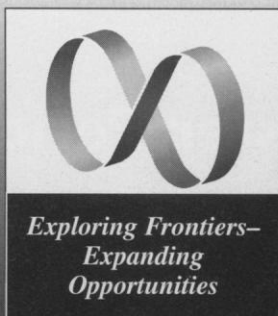
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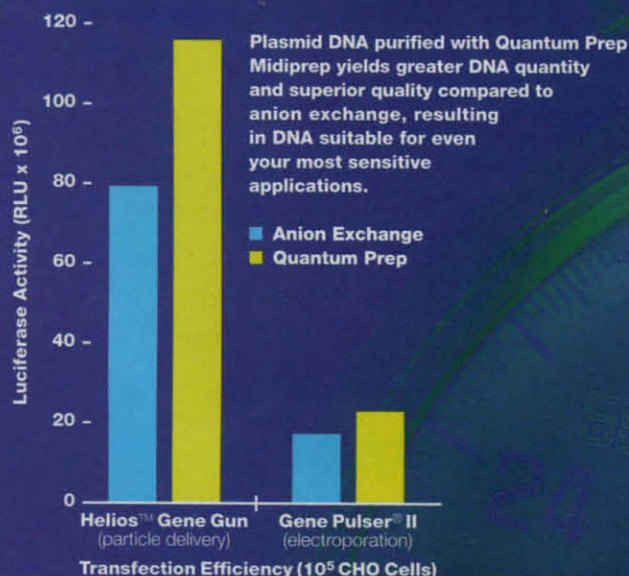


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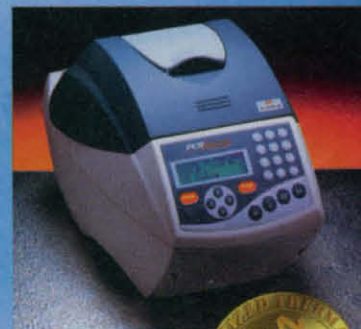
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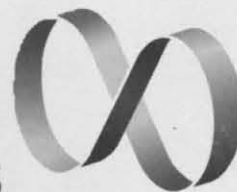
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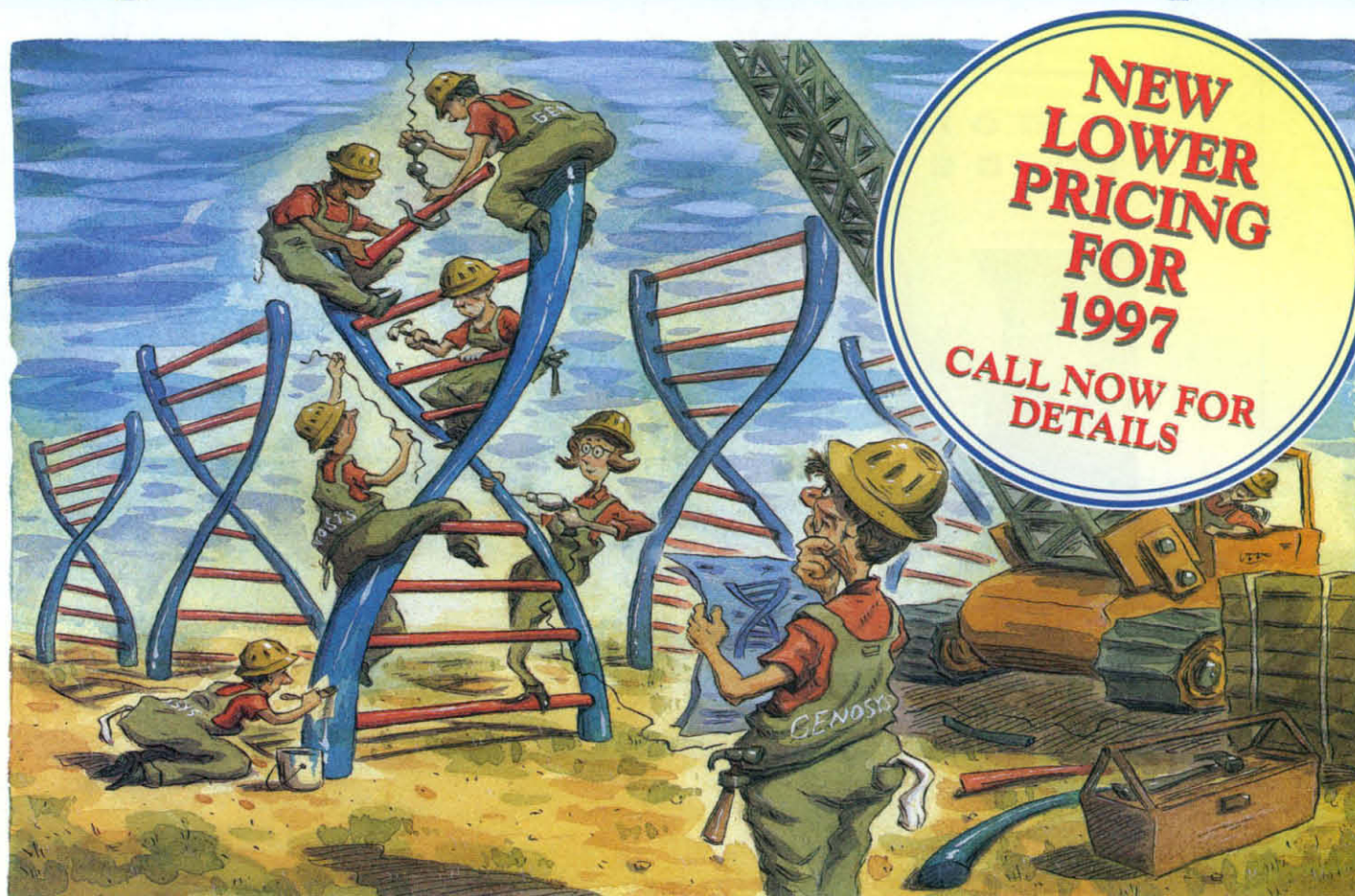
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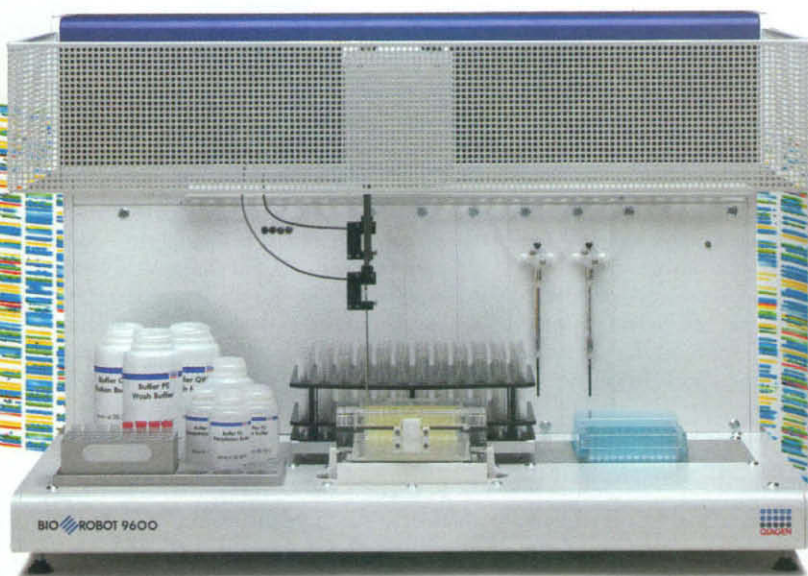
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