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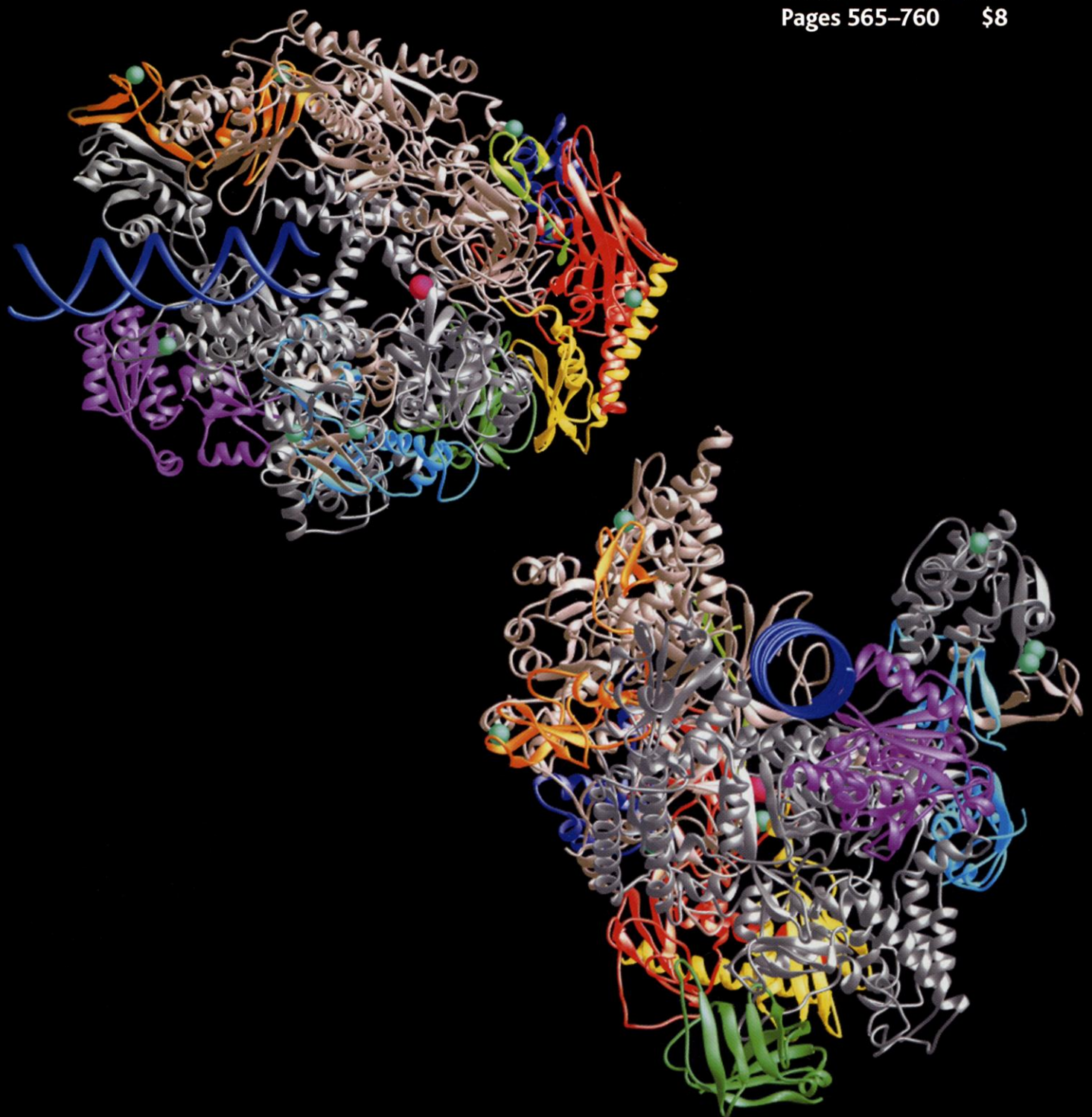

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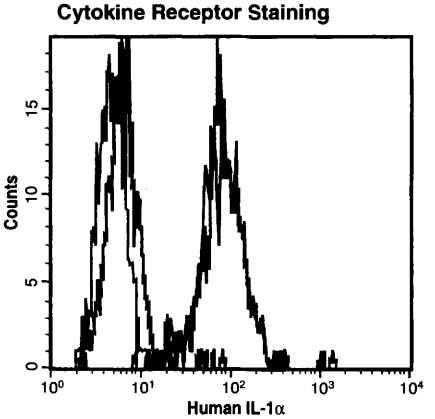
Cytokine Receptor Staining



TF-1 cells stained with the human IL-1α Fluorokine Kit (pink, Cat # NFLA0) or with a negative staining control (green). Reaction specificity is demonstrated by effect that the blocking antibody (blue) and the negative blocking control (red) have on the staining reaction.

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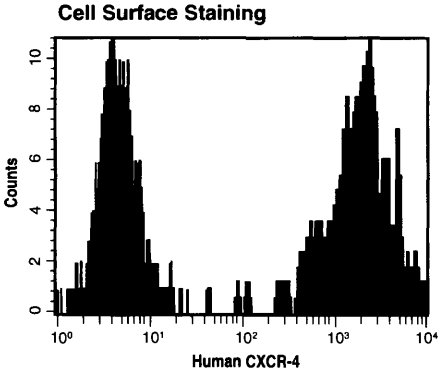
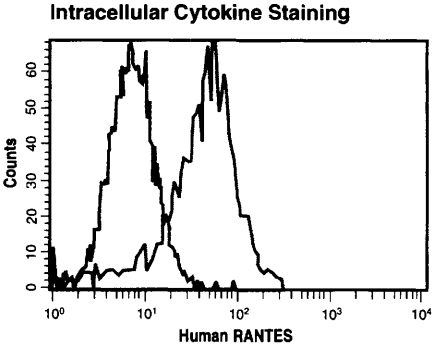
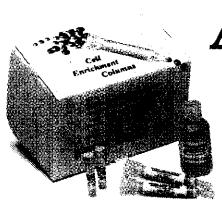


CXCR-4 transfected (red) and non-transfected NSO cells (green) stained with anti-human CXCR-4 monoclonal antibody (Cat # FAB173P) conjugated to phycoerythrin.

Intracellular Cytokine Staining



Permeabilized (green) vs. non-permeabilized (blue) staining of NSO cells transfected with human RANTES. Cells were stained with anti-human RANTES (Cat # IC278F) monoclonal antibody conjugated to fluorescein.



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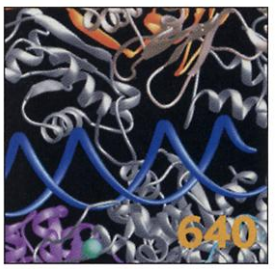

COVER Two views of a backbone model of RNA polymerase II, the central enzyme of gene expression, derived from x-ray crystallography. DNA, depicted as a blue helix, was placed in the structure on the basis of results from electron crystallography. The direction of transcription is from right to left in the view at the upper left and from back to front in the view at the lower right. A pink sphere identifies a metal ion at the active center. [Image: P. Cramer *et al.*]

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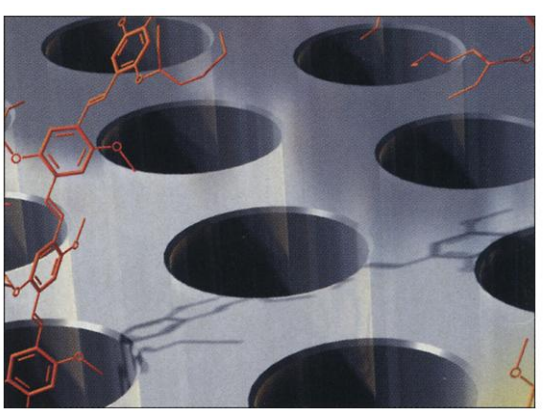

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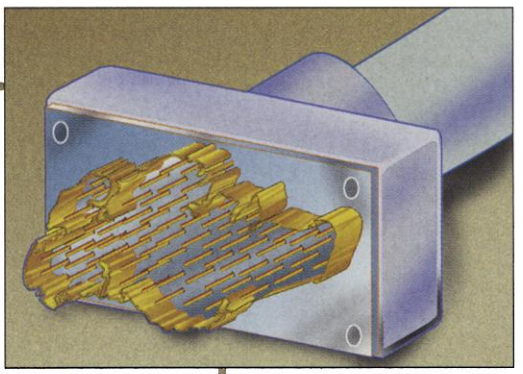

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Singapore gets plugged in

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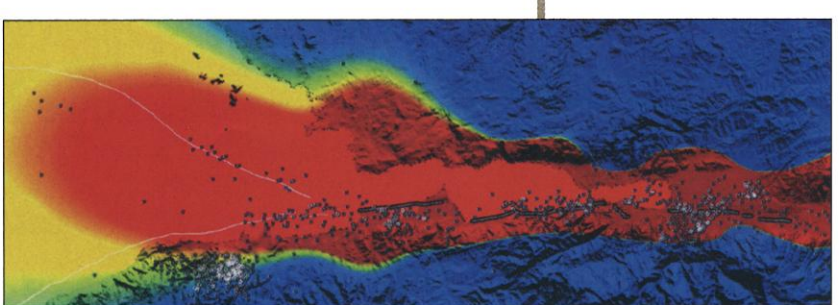

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Changing stress on faults near Istanbul

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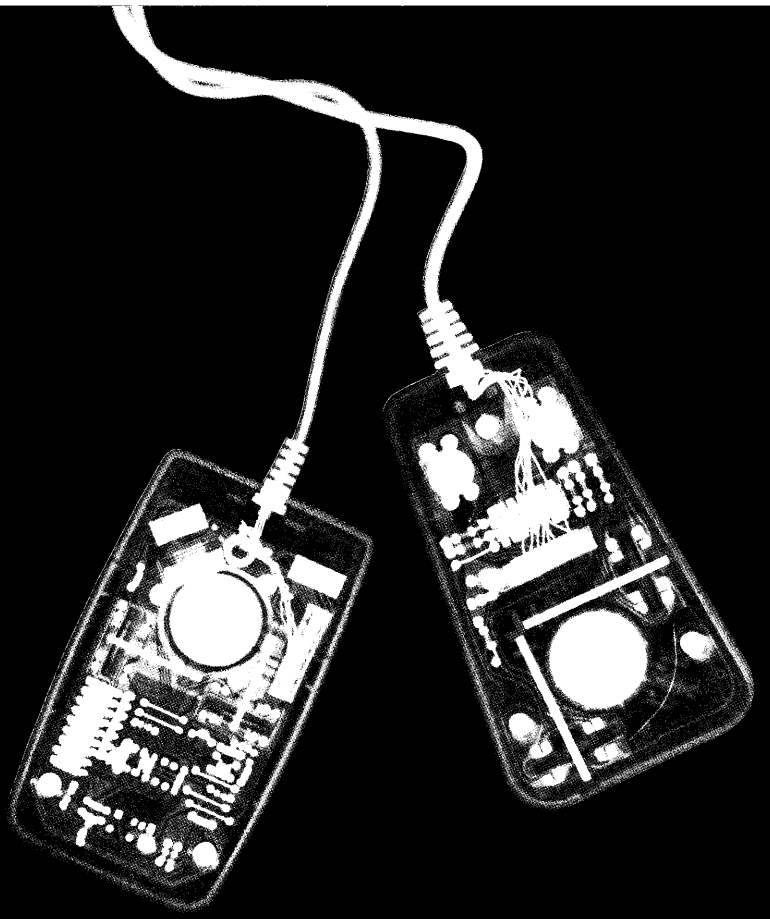

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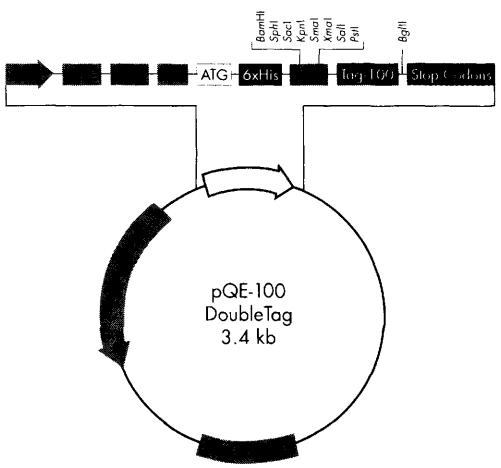

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EARTHQUAKE PROBABILITIES IN TURKEY

The large Izmit and Düzce earthquakes that occurred in Turkey in 1999 represent the latest in a series of westward-propagating large earthquakes on the North Anatolian fault since 1939. If the sequence continues to progress westward, then Istanbul, the largest urban population in Turkey, could experience severe shaking because the city lies just north of the western branching of the fault into the Marmara Sea. Parsons *et al.* (p. 661) have determined the probability of a large earthquake striking near Istanbul by creating a calibrated catalog of the historic earthquakes in the region during the last 500 years and by including the effect of stress transfer from the most recent events. They derived a 65% chance over the next 30 years and a 41% chance during the next 10 years of a large earthquake near Istanbul.

FEMTOSECOND PULSES IN LOCK STEP

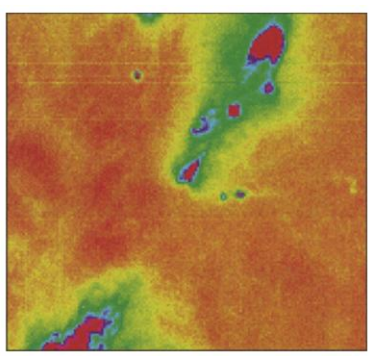
A femtosecond optical pulse represents only a few cycles of wave train, and these pulses normally are emitted with some relative phase shift between the pulses. Jones *et al.* (p. 635) describe the stabilization of the carrier phase of ultrashort pulses by utilizing a self-referencing technique. They broaden the laser pulse with a microstructure optical fiber into an "optical octave" so that lines on the high-frequency side are at least twice the frequency as those on the low side. They frequency-double the low-frequency lines and then compare them to the high-frequency lines to determine and adjust the phase difference between pulses through feedback. The demonstration represents a breakthrough in optical metrology and will be an invaluable asset for investigating ultrafast dynamical processes.

EXCITED AND HOPPING AROUND

In polymer light-emitting diodes (LEDs), charge carriers (electrons and holes) move along conducting conjugated polymers and can recombine to form an excited state, or exciton, that can emit light. Nguyen *et al.* (p. 652; see the Perspective by Mazumdar) have explored the relative rate of exciton movement along chains, versus hopping between chains, by studying a polymer that was adsorbed both on a mesoporous silicon host (forming a bulk structure with overlapping chains) and inside the pores (formed isolated individual chains). By studying the polarization of the emitted light on a femtosecond time scale, they established that exciton transfer between chains is about two orders of magnitude faster than movement along chains. This result is opposite that for the initial charge carriers—electrons and holes move much more rapidly along chains than between them, which suggests that device architectures in polymer LEDs could be further optimized.

SEEING STAR FORMATION

Protostars—dense, relatively compact sources of gas and dust—have been detected at radio wavelengths, but cannot be seen at optical or infrared wavelengths because the protocircumstellar disks surrounding these young sources absorb all the energy



at these wavelengths. Cernicharo *et al.* (p. 649) have taken advantage of small windows at three mid-infrared wavelengths to analyze spectra of protostar sources gathered with the Infrared Space Observatory (ISO). They characterized the size, temperature, and composition of some of the youngest protostars, including VLA1, in the Orion nebula and showed that the classes of protostars are more complex than previously assumed. In particular, they detected large concentrations of ices, such as H_2O, CH_3OH, and CO_2, as well as a previously undetected CH_4 ice absorption in the cores of some of the protostars.

SWITCHING ON SUPERCONDUCTIVITY

Superconductivity is usually achieved by lowering the temperature of a material below its transition temperature. It should be possible to induce superconductivity by accumulating enough charge at the interface of a field effect transistor (FET), and this approach would allow superconductivity to be switched on and off. However, previous attempts to realize such a switch have failed because the resistance did not decrease to zero. Using alkali-doped C_{60} as the active material in the FET, Schön *et al.* (p. 656) have induced three electrons per molecule into the conduction channel of the FET and show that the channel becomes superconducting, and remains so up to 11 kelvin.

ARCHEAN AIR QUALITY

Earth's atmosphere is rich in oxygen, produced by the photosynthesis of plants and cyanobacteria. Determining when Earth's early atmosphere became enriched in oxygen is difficult because the atmosphere has changed with time. Canfield *et al.* (p. 658; see the Perspective by Paytan) used the isotopic fractionation of sulfur in ancient marine sulfides to determine the concentration of oxygen in the early Archean atmosphere. High concentrations of oxygen produced abundant sulfates, and these sulfates underwent fractionation of the sulfur isotopes that occurred during bacterial reduction to sulfides. Sulfide samples from the early Archean (3.4 to 2.8 billion years ago) show low levels of fractionation, whereas sulfide samples from the Proterozoic (2.5 to 0.5 billion years ago) show higher levels of fractionation. Thus, the early Archean may have had an oxygen-poor atmosphere due to a lack of bacteria, and it was not until the Proterozoic that the atmosphere became enriched in oxygen and organisms began to thrive.

A VIEW OF RNA POLYMERASE II

Bacterial and eukaryotic transcription is controlled by complex molecular machinery that has at its core the multisubunit RNA polymerases. Cramer *et al.* (p. 640; see the cover and the Perspective by Conaway and Conaway) have determined the crystal structure at 3.5 angstrom resolution of a 10-subunit yeast RNA polymerase II. Probable positions of the downstream DNA, the DNA-RNA hybrid, and the nascent RNA transcript can be mapped onto the structure and provide insights into how RNA is polymerized with high processivity while

CONTINUED ON PAGE 575

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THIS WEEK IN *SCIENCE*

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allowing for pausing and proofreading. The structure opens the door to investigate how transcription factors interact with RNA polymerase II and control initiation and elongation.

YOUNGER AND BETTER

Amid the excitement surrounding recent cloning of animals from adult somatic cells was the lingering doubt that the cloned offspring would not be able to live out their normal life-span. Because cells can divide only a finite number of times in their lives, the progeny of the adult nucleus used for cloning might be limited in their ability to divide. Lanza *et al.* (p. 665; see the news story by Vogel) show that they are not. Even when senescent cells are used as nuclear donors, the cells of cloned calves can divide more times than cells of normal animals of the same age. Another putative index of cell aging, telomere length, is increased, rather than decreased, above normal in cells from the cloned animals. Exactly how the cloning process reprograms the donor nucleus to a more youthful state is not clear, nor are the implications of these findings for the cloned organisms' life-spans. Nevertheless, cloning from adult cells now seems a more realistic possibility.

GENE THERAPY TRIALS

Cavazzana-Calvo *et al.* (p. 669; see the Perspective by Anderson) describe the results of a gene therapy trial involving two children with severe combined immunodeficiency-X1. These patients suffered from defects in T and natural killer (NK) cell development, which resulted in a constellation of symptoms, including *Pneumocystis carinii* infection, diarrhea, graft-versus-host disease, and abnormal growth. They were treated with a retroviral vector containing sequences for the γc cytokine receptor subunit. During a 10-month follow-up period, increases in the number and function of T and NK cells containing the transgene were observed, as well as clear clinical improvement.

WHERE THE SCENT WENT

The fruit fly *Drosophila* has an excellent memory system for discrimination between different smells. Unlike earlier studies, Zars *et al.* (p. 672) tried to identify which brain structures were sufficient, rather than necessary, for olfactory learning. They provided the wild-type form of adenylate cyclase to specific brain regions in *rutabaga* mutants that lacked the functional form of this protein. They found that the Kenyon cells in the mushroom bodies are sufficient for short-term olfactory memory formation.

KEEPING THE MEMORY ALIVE

Eating a bit of inactivated poliovirus as a child generates a population of memory immune cells that can inactivate poliovirus that you are exposed to as an adult, even if there has been no exposure in the intervening years. What keeps these cells alive? Ku *et al.* (p. 675) show that these memory cells are sustained by a delicate balance among several cytokines. Interleukin-15 (IL-15) and IL-7 keep the cells dividing slowly, while IL-2 acts as a brake on this process to keep cell division under control.

LINKS TO SCHIZOPHRENIA

The genetics of psychiatric and behavioral disorders is a field that has been hampered by inconclusive or irreproducible findings. Brzustowicz *et al.* (p. 678) carried out a genome-wide scan for loci that could be linked to susceptibility for schizophrenia and found highly significant linkage to chromosome 1q21-22. The magnitude of the association was much higher than has been seen in previous studies; this linkage study may have succeeded because of the use of large, multigenerational families.

MIND BEFORE BODY

The main pacemaker of mammals—centrally located in the hypothalamus of the brain—is augmented by oscillators in other tissues of the body that can run independently for a short time when removed. By constructing transgenic rats in which the light-producing enzyme luciferase was regulated by the promoter of *Per1*, an intrinsic clock gene, Yamazaki *et al.* (p. 682) investigated the effects of advancing or delaying the light cycle (in essence, subjecting the rats to a halfway-around-the-globe plane trip) on the brain oscillator and on those of the liver, lung, and skeletal muscle. The clock in the brain was able to reset readily to the new time, but the clocks in the peripheral tissues got over their jet lag much more slowly.

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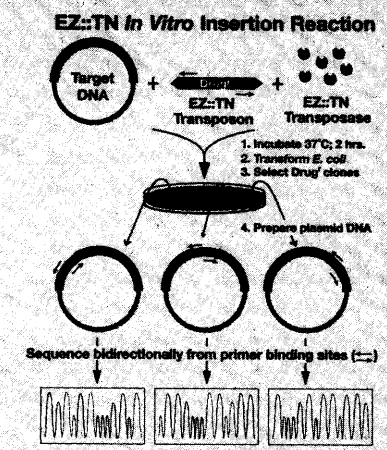

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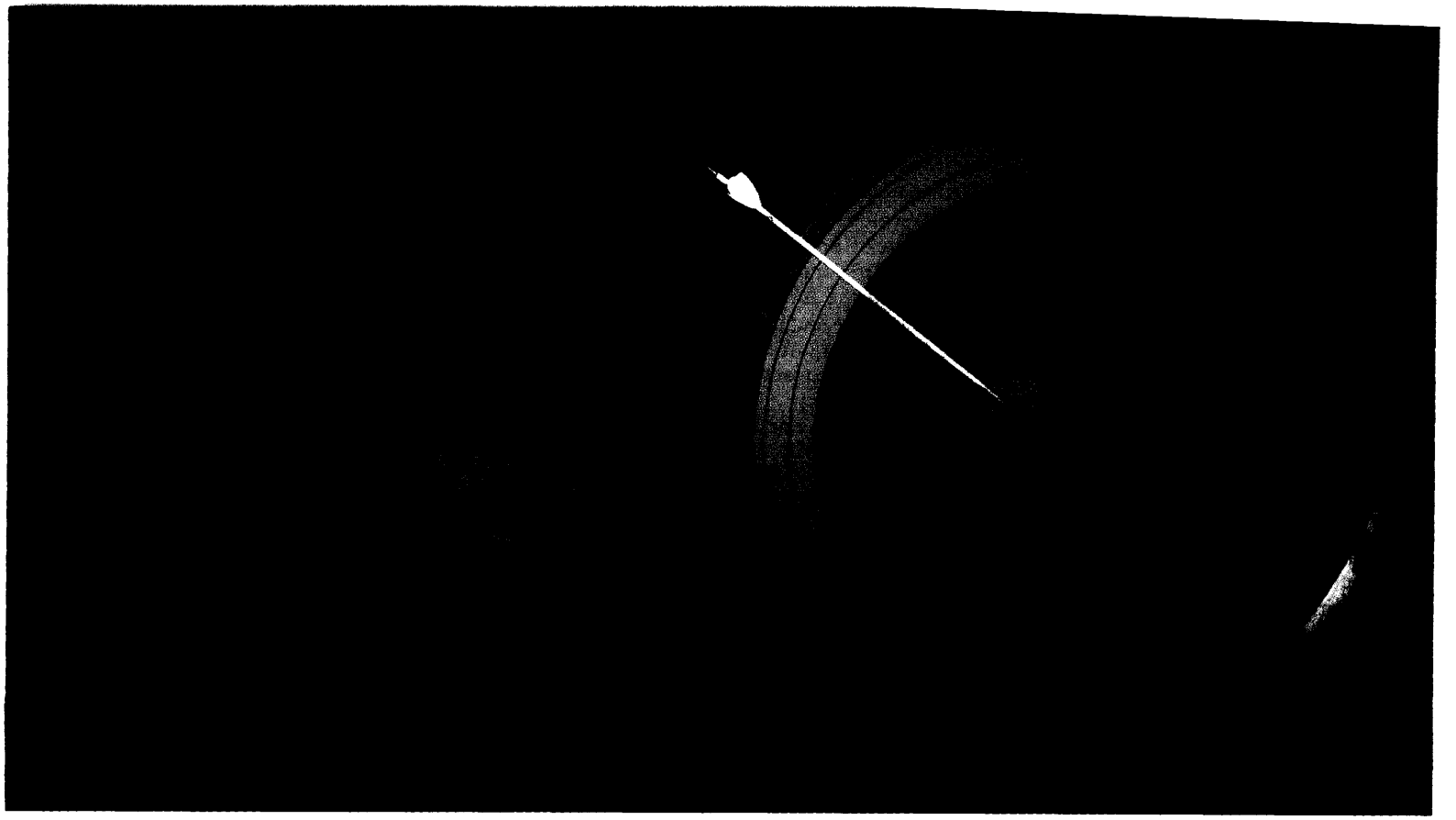

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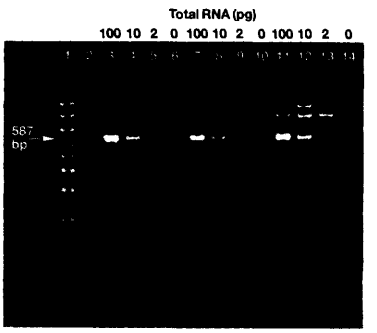

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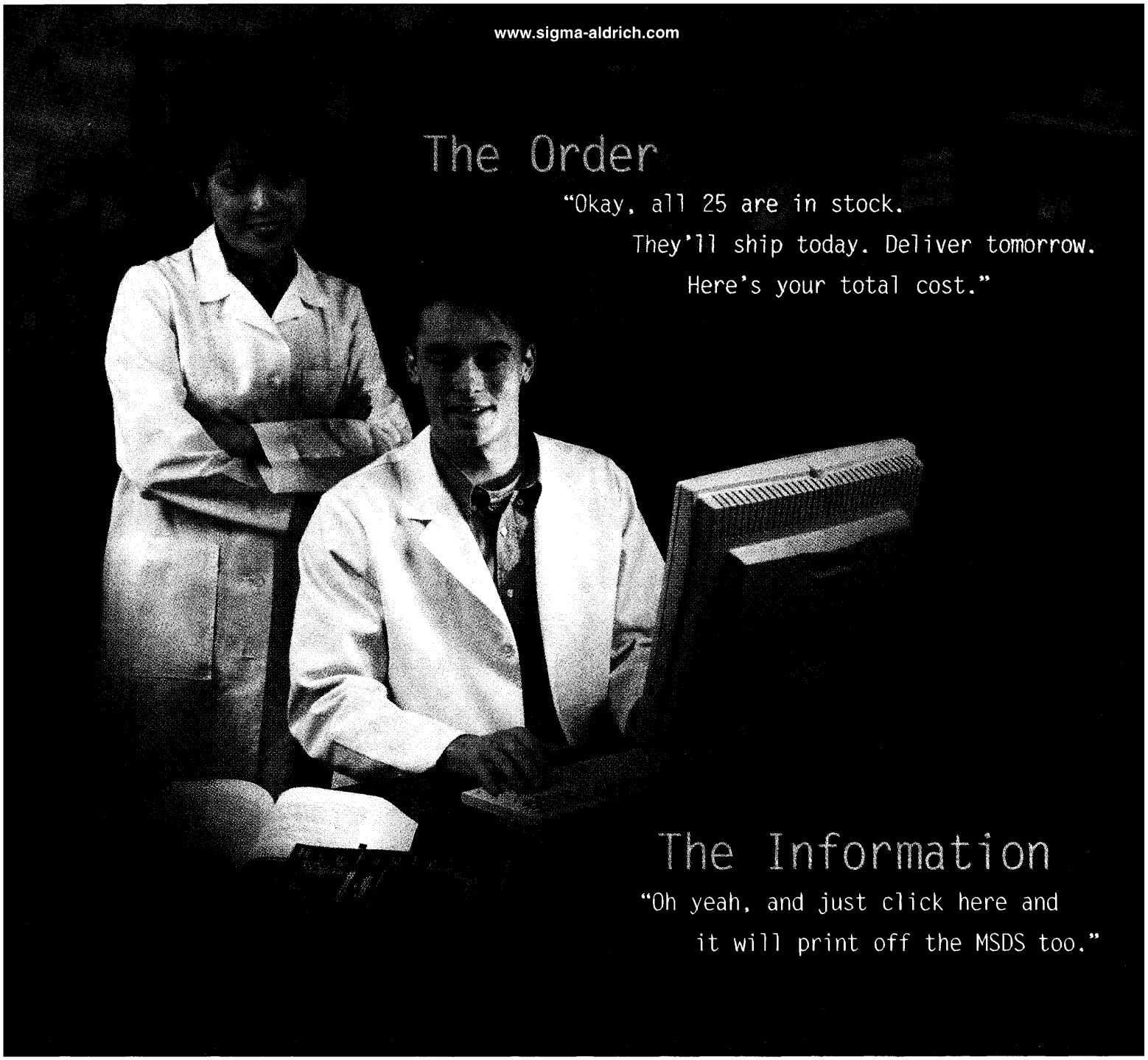

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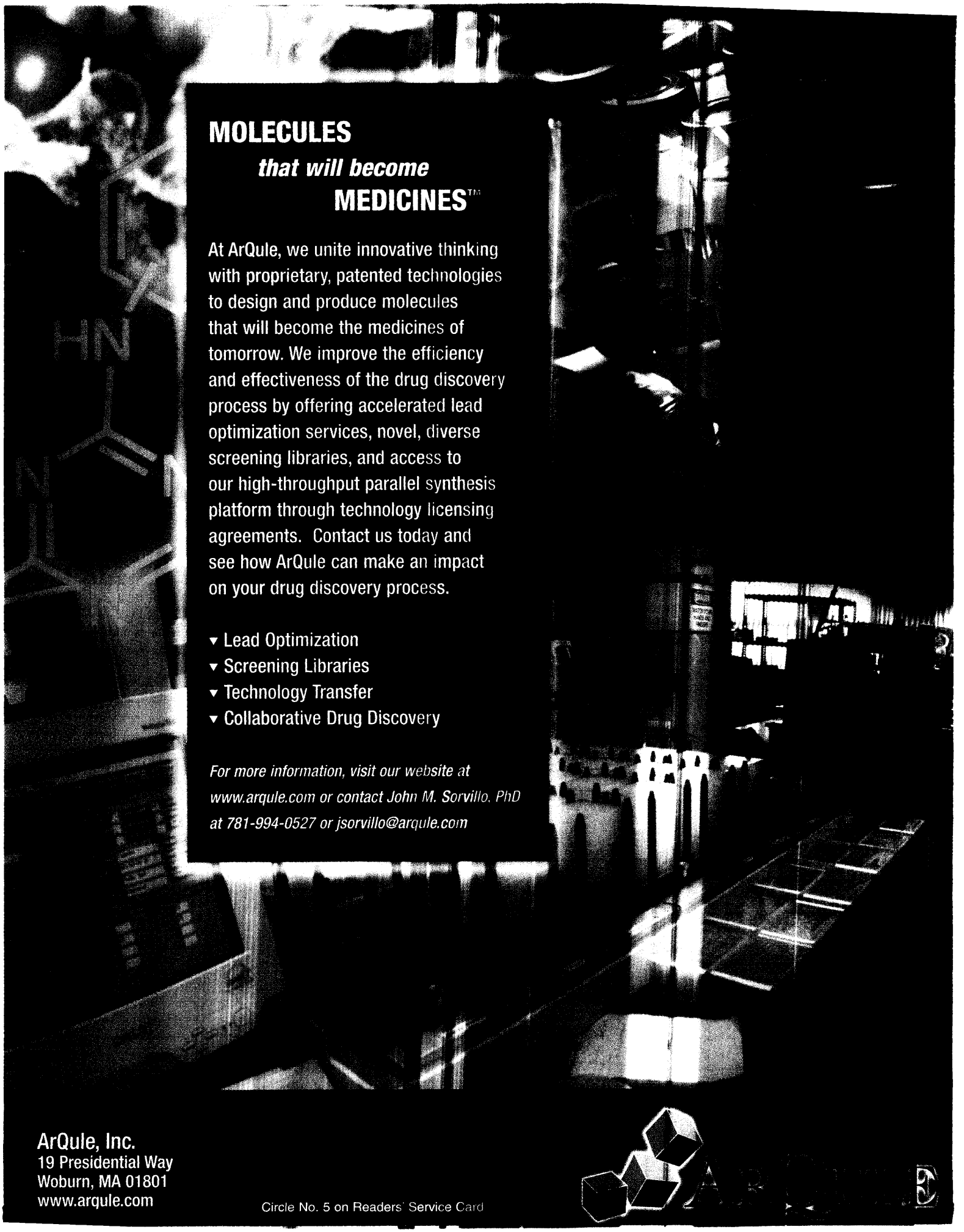

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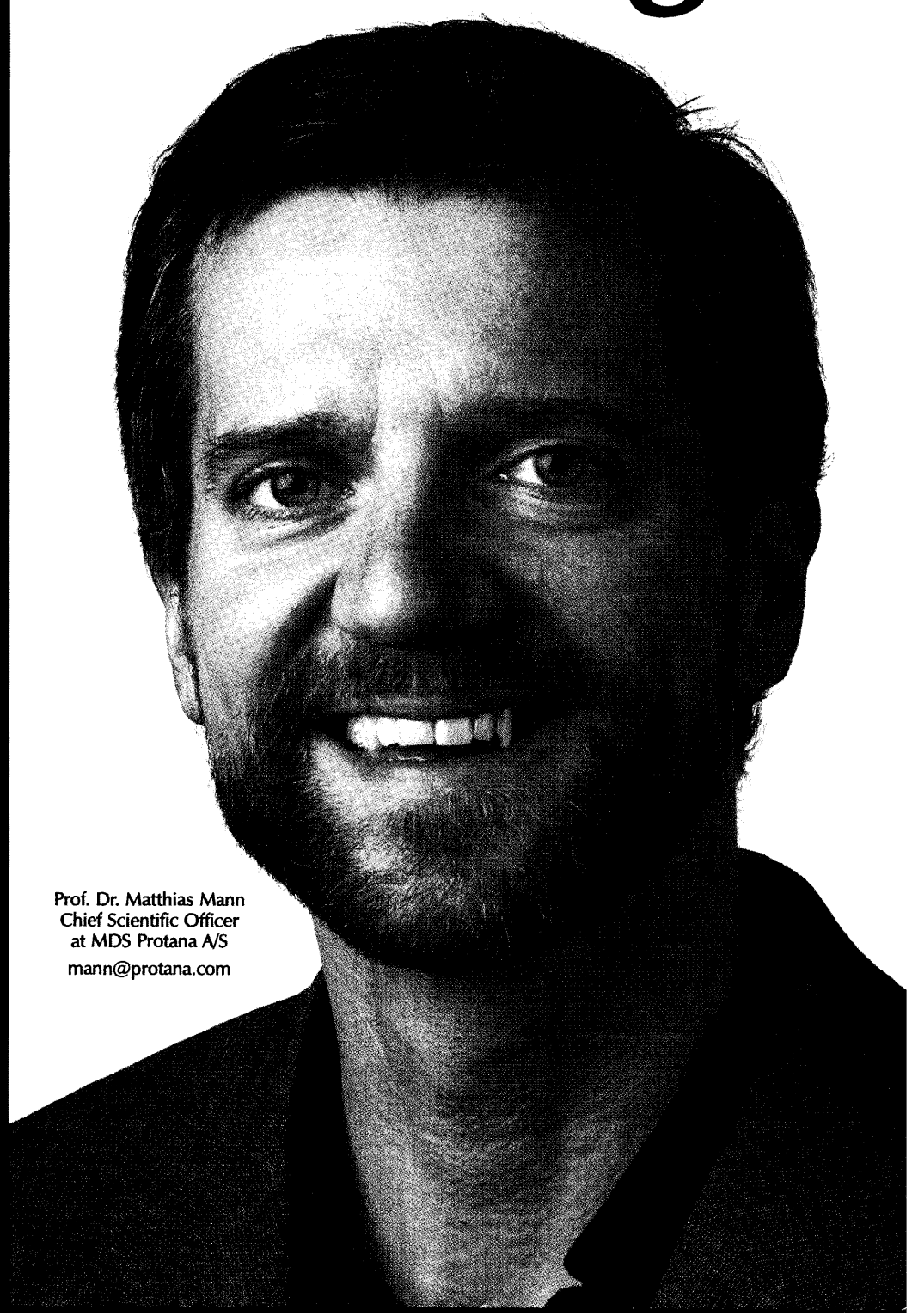

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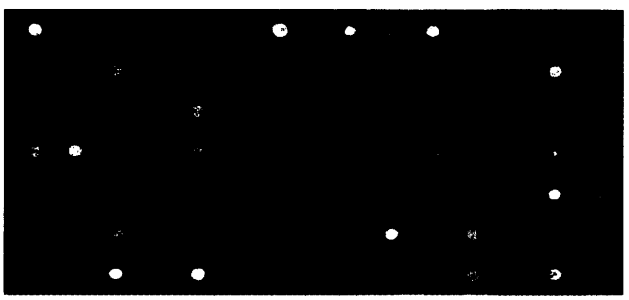

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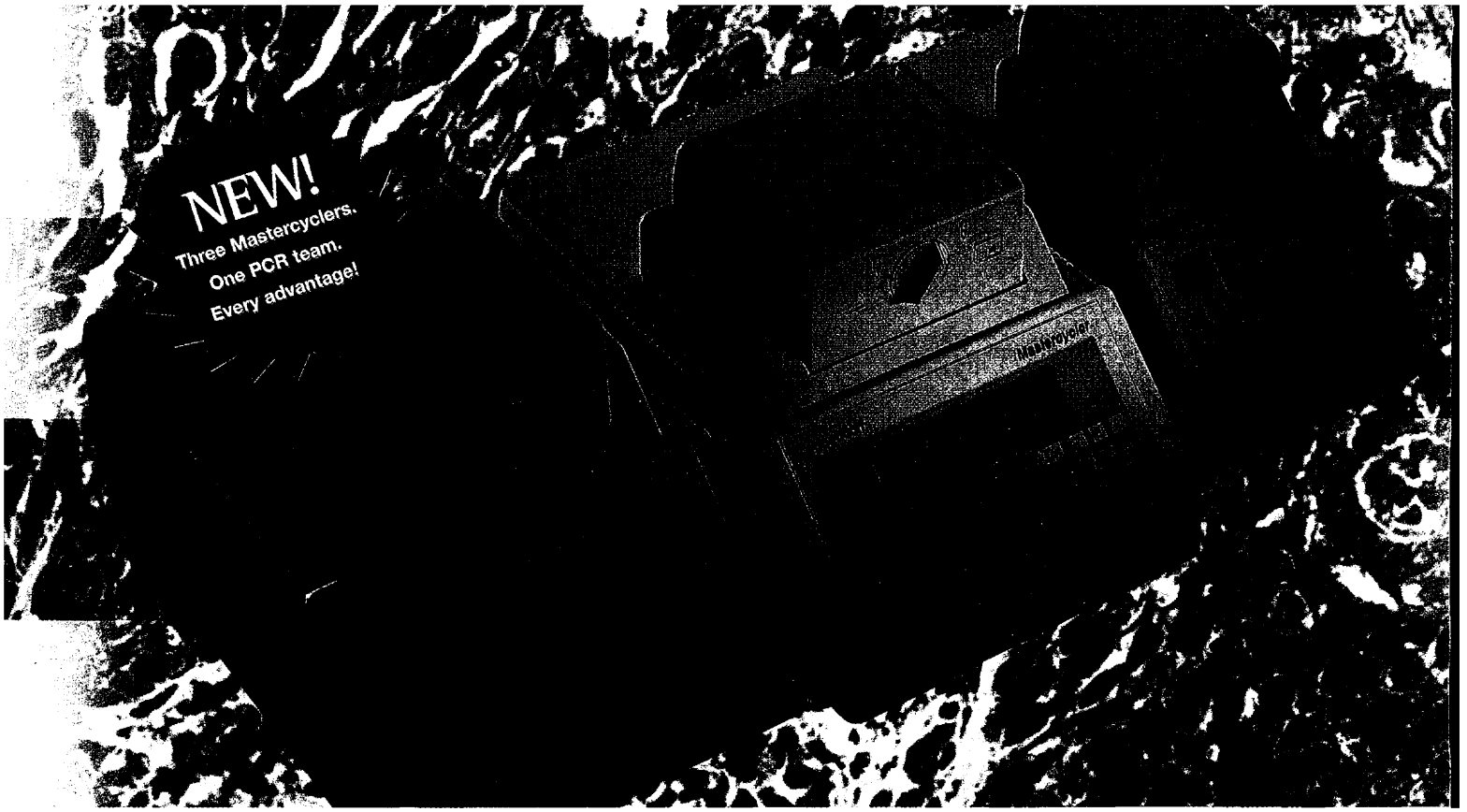

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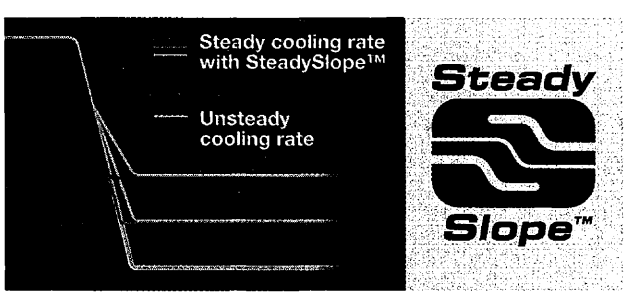

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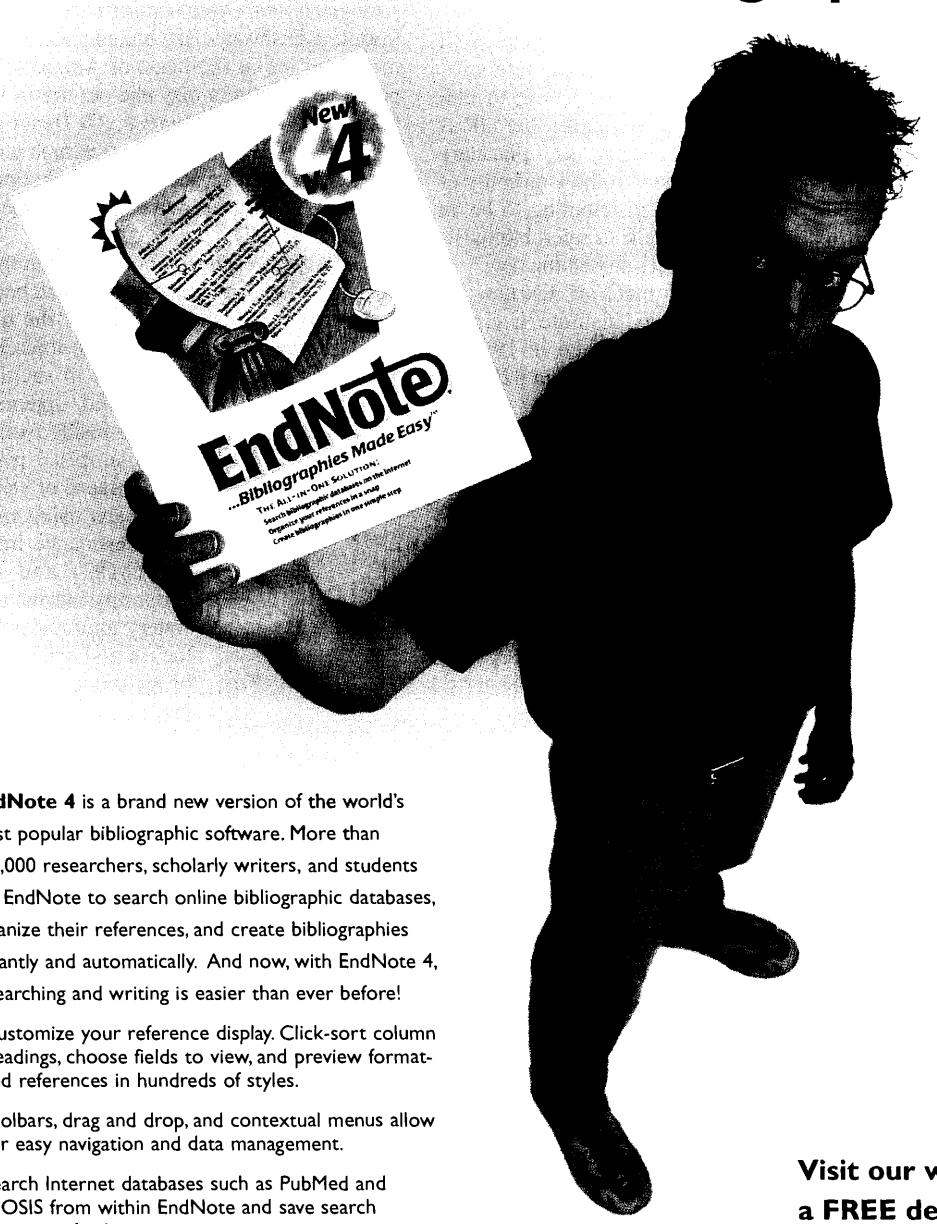

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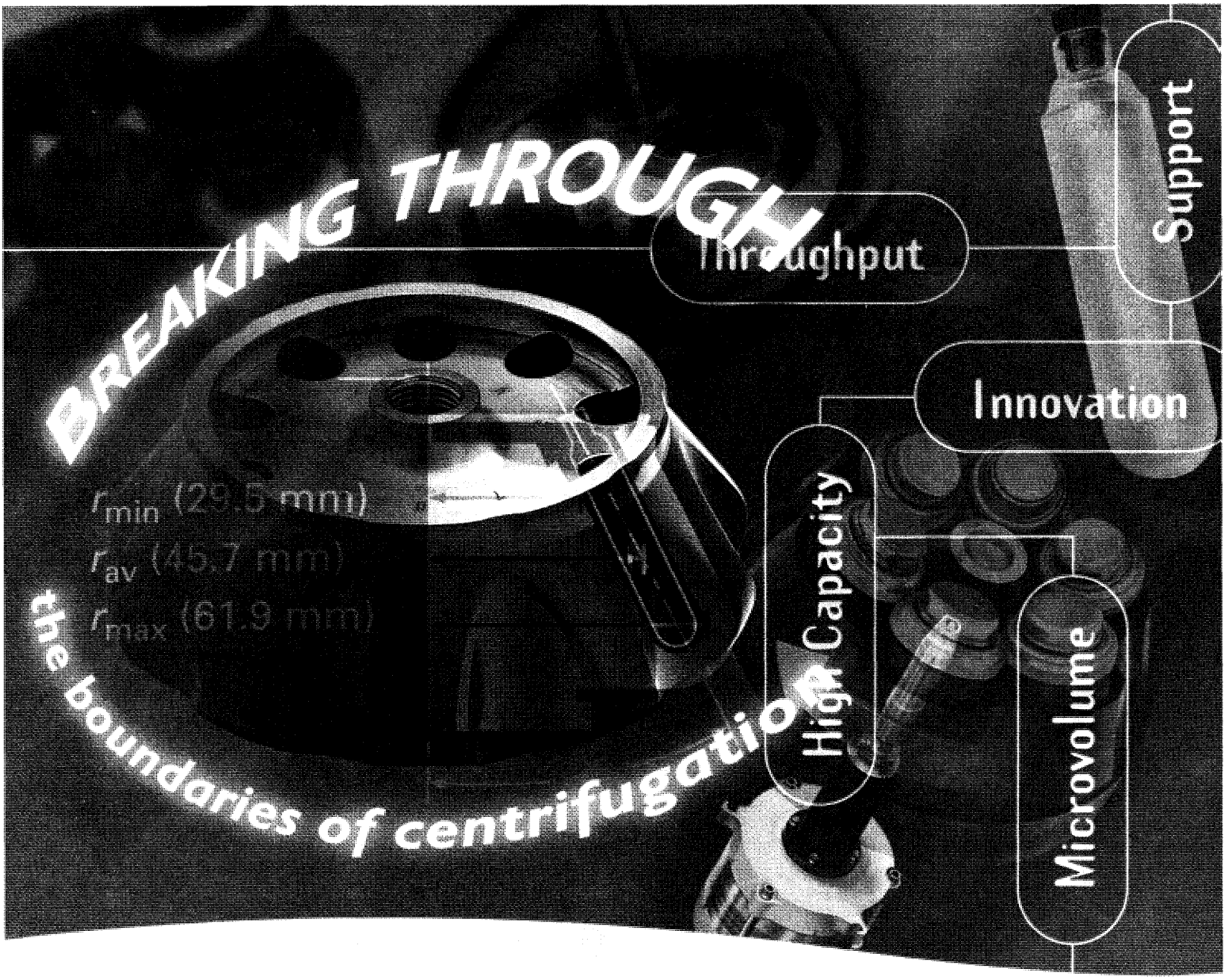

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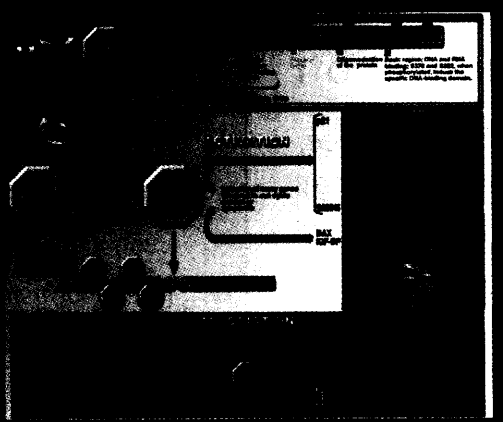

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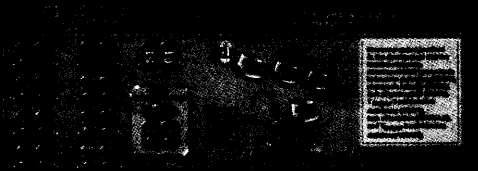

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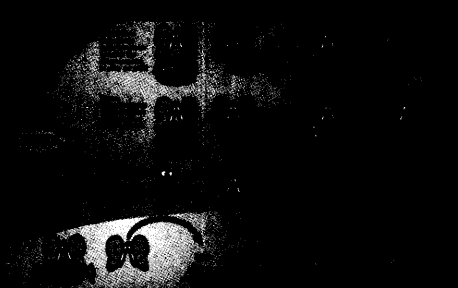

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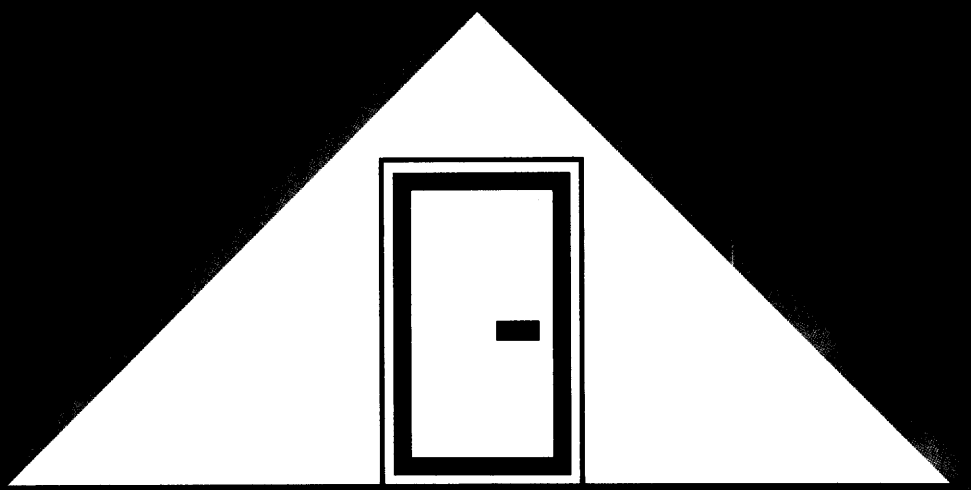

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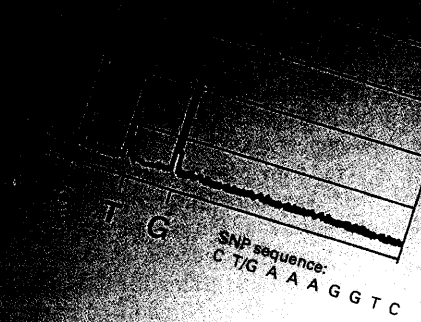

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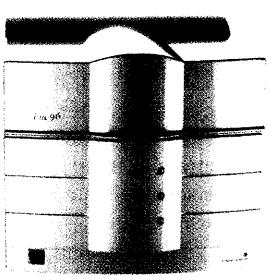

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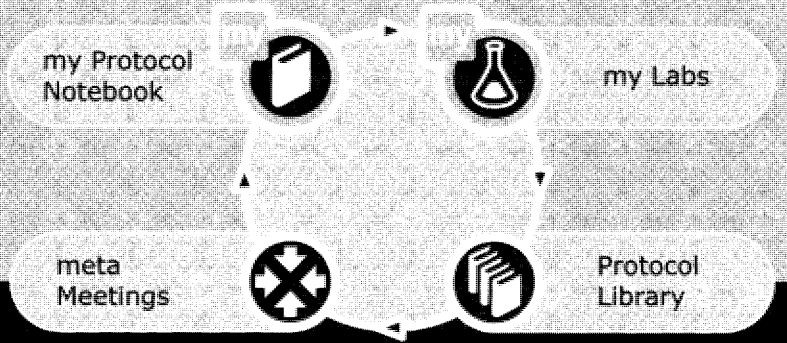

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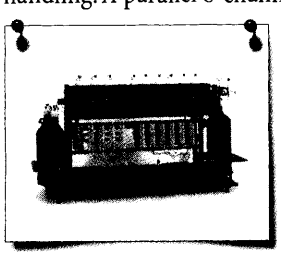

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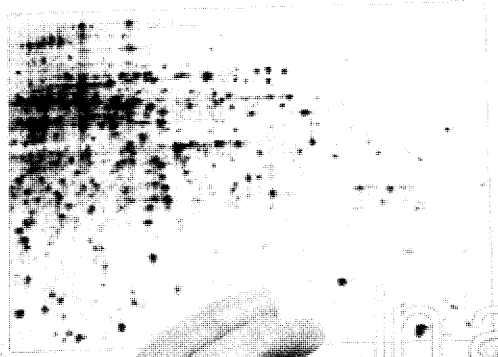

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1. Molloy, M., et al., *Electrophoresis* **19**, 837–844 (1998).

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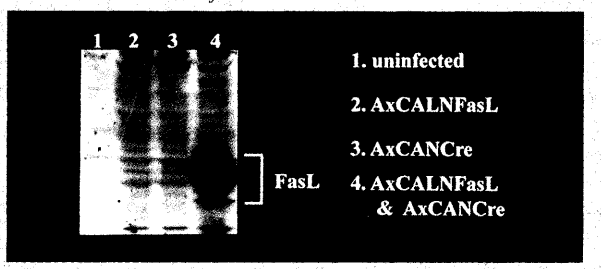
Courtesy of Dr. T. Okuyama, Department of Genetics, National Children's Medical Research Center, Tokyo



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References
1. *1 Kanegae, Y. et al. (1995) *Nucl. Acids Res.* 23, 3816
2. *2 Miyake, S. et al. (1996) *Proc. Natl. Acad. Sci. USA* 93, 1320
3. Okuyama, T. et al. (1998) *Gene Therapy* 5, 1047
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NEW PRODUCTS

MESSENGER RNA KITS

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The FirstChoice RLM-RACE Kit facilitates the isolation of the 5′ end of any message in less than one day. The kit is based on an innovative protocol that preferentially selects for capped messenger RNAs containing the 5′ end of the message. This unique kit allows the rapid amplification of the 5′ end of rare messages even in a background of partially degraded messenger RNA, ribosomal RNA, or genomic DNA.

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The Millimatic Dispenser is an adjustable bottletop microplate filler and washer that dispenses volumes from .25 ml to 3.0 ml. The unit includes a remote eight-port manifold and is fully autoclavable to 120°C. Suitable for all microplate applications, the low-cost instrument provides accuracy, precision, and convenience.

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DNA samples from a

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GenomicsCollaborative

has a growing collection of ***DNA*** *and* ***serum*** *matched to* ***phenotypic data*** *from patients with high prevalence diseases. These samples are available to support your research.*

Some examples of samples we currently have, and are actively collecting, in the following disease states are:

- *Cardiovascular disease (hyperdipidemia, hypertension, AMI stroke)*
- *Cancers (Breast, Ovarian, Colon, Prostate, Leukemia, Lymphoma)*
- *Diabetes*
- *Asthma*
- *Renal failure*

All material is:

- *Collected under IRB approved protocols and compliant with GCP*
- *Processed and stored under GCP conditions*

For information regarding our current inventory of samples and disease states please contact us.

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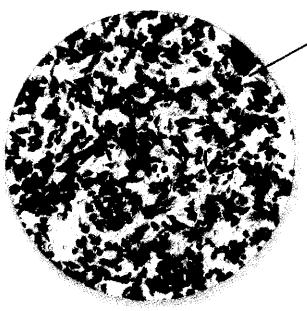

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Patented anion-exchange, gravity flow columns produce low endotoxin levels.

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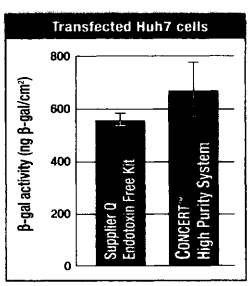

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