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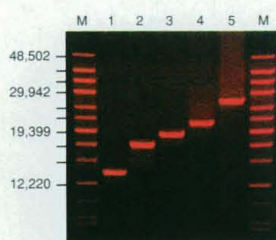


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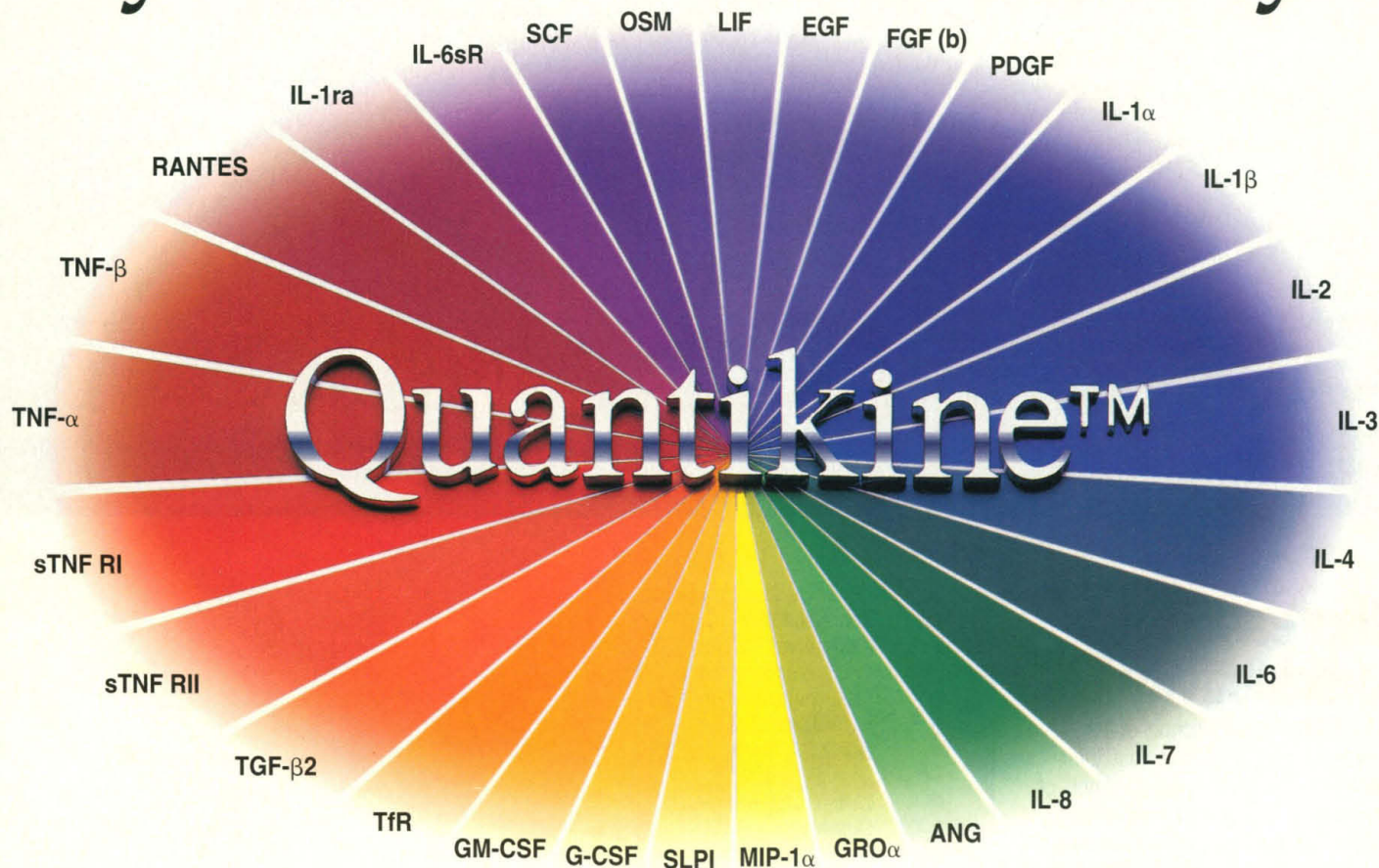
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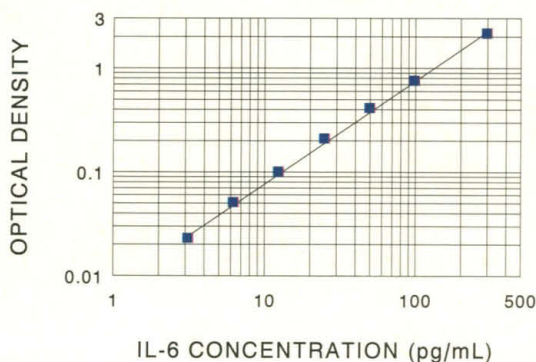
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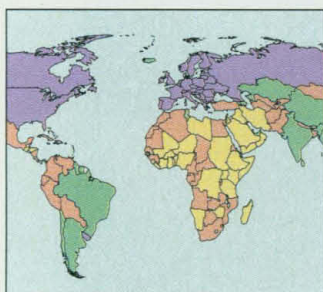
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Light work

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COVER

A female chimpanzee from the East African Kasakela social community in Gombe National Park, Tanzania. Results of noninvasive genotyping from the hair of chimpanzees from Gombe and other communities across Africa support the influence of kin selection and

cooperation of related males on the evolution of social structure of chimpanzee communities. The results also suggest that a West African subspecies merits consideration as a separate species. See page 1193 and the News story on page 1172. [Photo: Phillip Morin]



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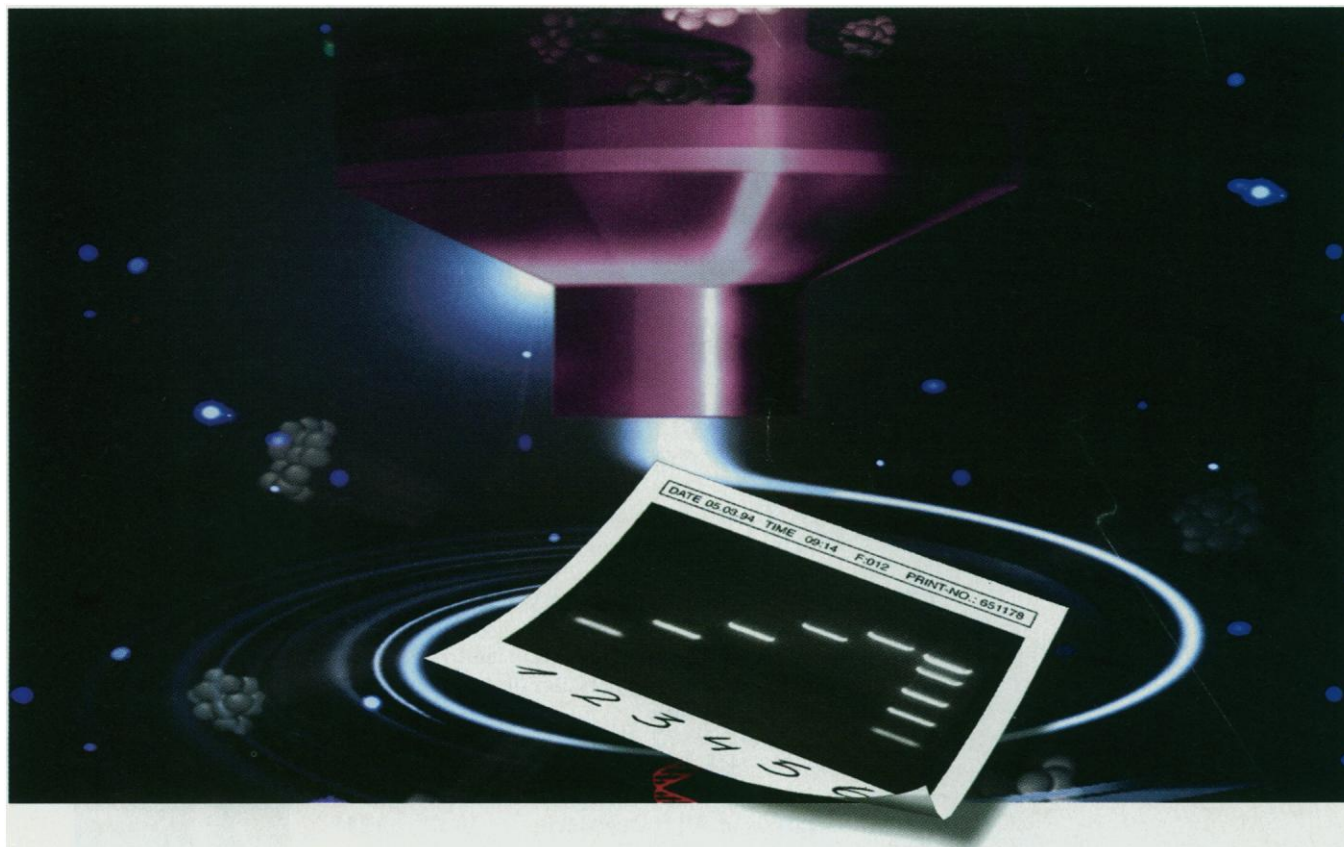
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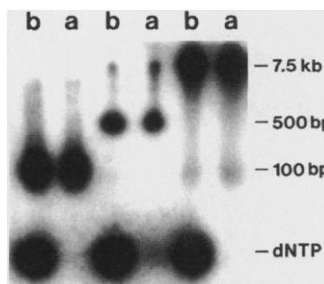
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Computing sound

One form of nondestructive evaluation uses ultrasonic pulses to probe the integrity of solid objects. A better understanding of how the acoustic field propagates from source to detector can improve the quality of the evaluations. Schechter *et al.* (p. 1188) discuss applications of massively parallel processing to simulations of sound wave propagation. When performed on computers such as the Connection Machine, simulations can be carried out in real time and visualizations of the wave-field can be generated quickly.

■

Melting glass

How does the atomic structure of liquids control diffusion and flow? For example, silicate magmas are composed of networks of various sizes of silicate species, and these affect their viscosity and thus transport. Farnan and Stebbins (p. 1206) used two-dimensional magic-angle spinning nuclear magnetic resonance to examine the relation between structure and viscosity of molten $K_2Si_4O_9$ just above the glass transition temperature. The high viscosity at this temperature is predominantly controlled by breaking and reforming of silicon-oxygen bonds among the silicate species in the melt, rather than by the relative motion of individual clusters.

■

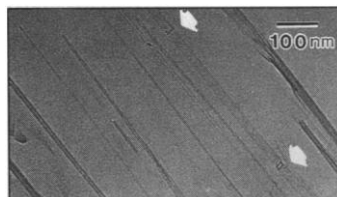
Nanotube alignment

Carbon nanotubes can be aligned by dispersing them into a resin and cutting the resulting blocks into nanometer-scale slices with a microtome. Ajayan *et al.* (p. 1212) argue that shear flow during the cutting process pulls or deforms the nanotubes; because of their high mechani-

Social structure and speciation in chimpanzees

Chimpanzees sleep in tree nests and typically make a new nest each night. Morin *et al.* (see cover and news story by Morell, p. 1712) followed free-ranging chimpanzee individuals in western and central Africa and collected hair from their nests. These samples were used in a genetic analysis of eight single sequence repeat loci in order to determine the degree of relatedness in and between groups. Within a community, males are more related than females. The western subspecies, *Pan troglodyte verus*, appears to have diverged from the other two subspecies about 1.6 million years ago and may represent a separate species.

cal strength, they do not break but rather form a well-aligned



array. Such samples could facilitate the study and use of single nanotubes.

■

Optical arithmetic

Computation with optical signals is attractive because it is inherently parallel. Devices for optical processing need to manipulate many bits quickly, particularly in the basic functions of correlation, memory, and matrix multiplication. In an optical correlator, for example, a beam containing an object image is combined with a reference beam within an optical material, in this case a polymer. A read beam containing another image is imposed on the polymer in a four-wave mixing geometry. The scattered light creates a fourth beam that carries the cross-correlation of the object and reads beams. Halverson *et al.* (p. 1215) developed an optical image processor based on conjugated polymer materials. By matching the processing architecture to the nonlinear optical properties of the poly-

mer, they correlated two 5000 pixel images in less than 160 femtoseconds (a rate of 3×10^{16} operations per second).

■

On autoimmunity

Two reports present insight from mouse models into T cells modulation of both antibody and cellular autoimmune diseases. Finck *et al.* (p. 1225) studied a mouse analog of systemic lupus erythematosus, in which autoantibody production by B cells requires T cell help. The B7 molecule on activated B cells interacts with CD28 or CTLA-4 antigens on T cells. They found that an engineered soluble form of murine CTLA-4 blocked autoantibody production. Experimental autoimmune encephalomyelitis (EAE) is a mouse model for T cell-mediated multiple sclerosis; EAE can be suppressed by feeding the mice myelin basic protein, which produces peripheral tolerance. Chen *et al.* (p. 1237) isolated T cell clones from the mesenteric lymph nodes of orally tolerized SJL mice that could suppress EAE when transplanted. The CD4⁺ clones were identical to T helper cell type 1 except that they produced transforming growth factor- β as well as interleukins-4 and -10, which down-regulate the cell-mediated autoimmune response.

Replacement parts

Proteasomes, which are large protein complexes with more than a dozen distinct subunits, degrade proteins and are thought to be involved in generating peptides for major histocompatibility complex (MHC) class I processing of endogenous antigens. Two reports discuss the role of the proteasomal components LMP-2 and LMP-7, whose genes are located in the MHC class II region. Akiyama *et al.* (p. 1231) cloned the two proteasomal subunits, X and Y, that are replaced by the homologous LMP-2 and LMP-7 subunits after treatment of the cell with interferon γ . They suggest that this subunit switching occurs in response to nonself-antigen challenge, as occurs in viral infection. Fehling *et al.* (p. 1234) found that mice that carried a homozygous deletion of the LMP-7 gene were apparently normal and healthy. However, the mice had reduced levels of MHC class I cell surface expression and were inefficient in their presentation of the male HY self-antigen.

■

RecA homolog

In *Saccharomyces cerevisiae*, the RAD51 gene is required for recombination and the repair of double-strand DNA breaks. Although RAD51 protein is structurally similar to RecA, the *Escherichia coli* protein that catalyzes pairing and strand exchange between homologous DNA, such activity had not been observed for RAD51 or for any other eukaryotic protein. Sung (p. 1241) shows that RAD51 can catalyze pairing of homologous DNA and strand exchange in an adenosine triphosphate-dependent manner. Thus, RAD51 is a functional homolog of RecA.

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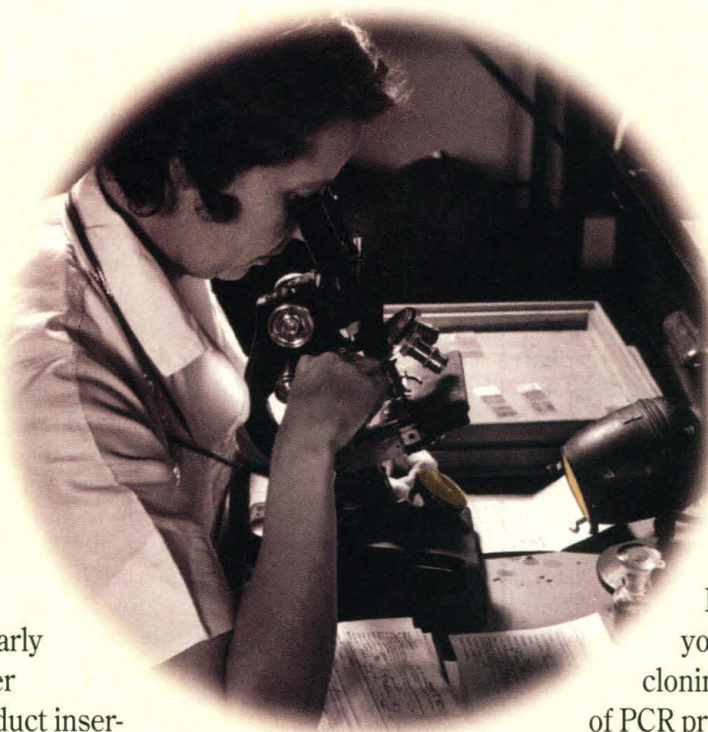
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Extension to **20 kb**

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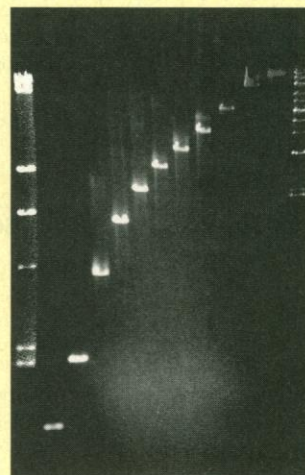
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Typical Performance of TaKaRa LA PCR

M1 1 2 3 4 5 6 7 8 9 10 11 M2 Template: 2.5 ng λ DNA



Lane M1: λ -Hind III digest markers
Lane 1: 1.0 kb
Lane 2: 2.0 kb
Lane 3: 4.0 kb
Lane 4: 6.0 kb
Lane 5: 8.0 kb
Lane 6: 10.0 kb
Lane 7: 12.0 kb
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Lane 9: 20.7 kb
Lane 10: 27.9 kb
Lane 11: 34.8 kb
Lane M2: High MW DNA markers



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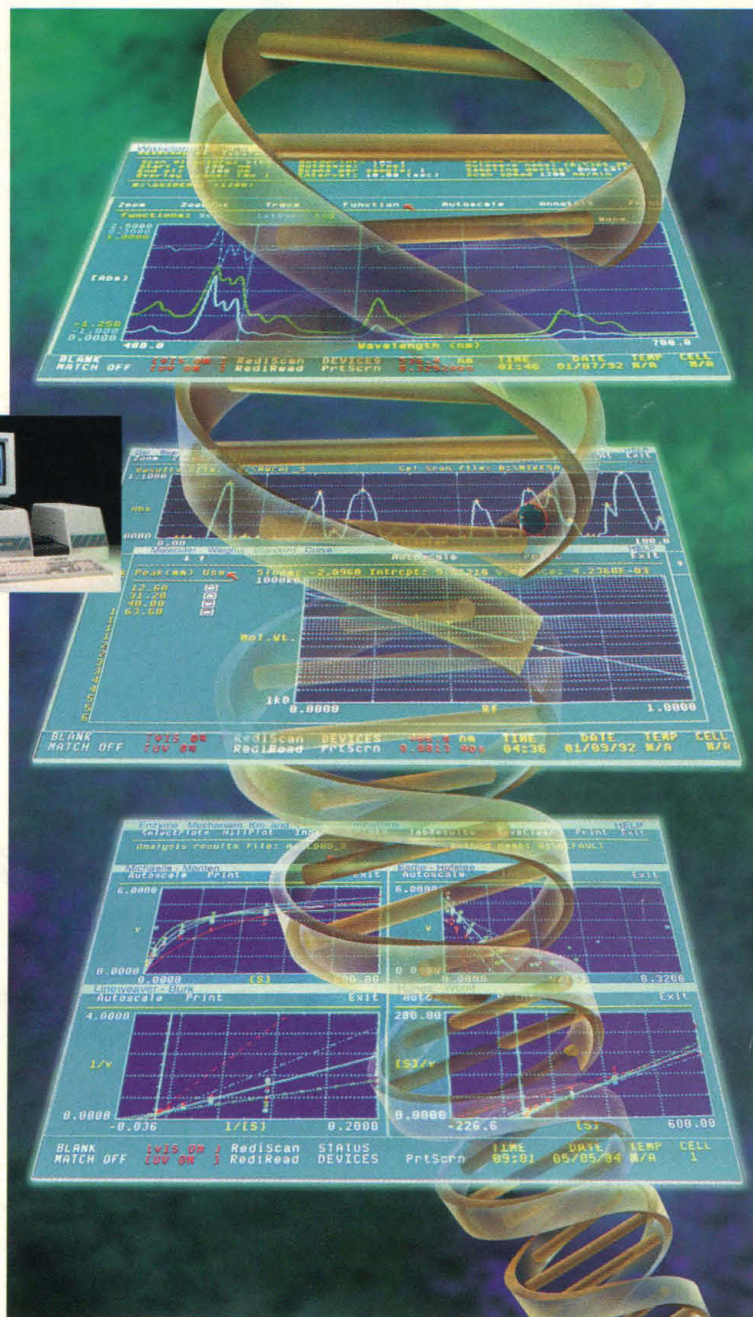
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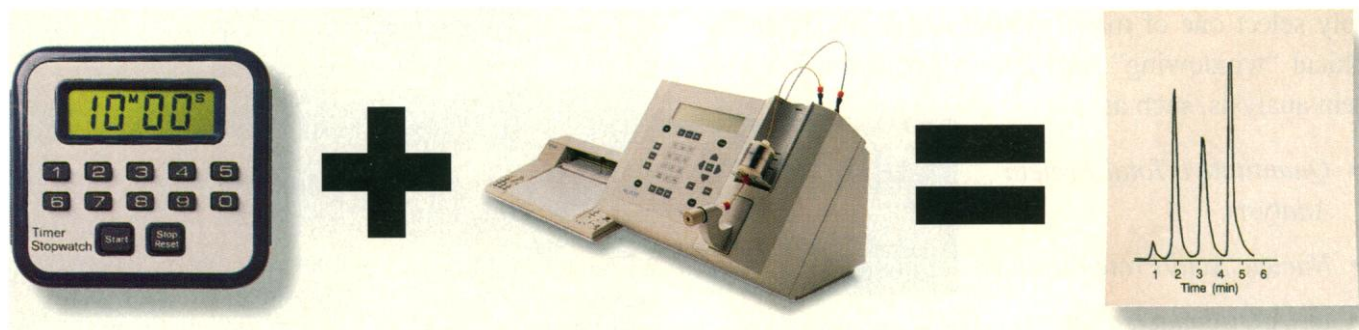
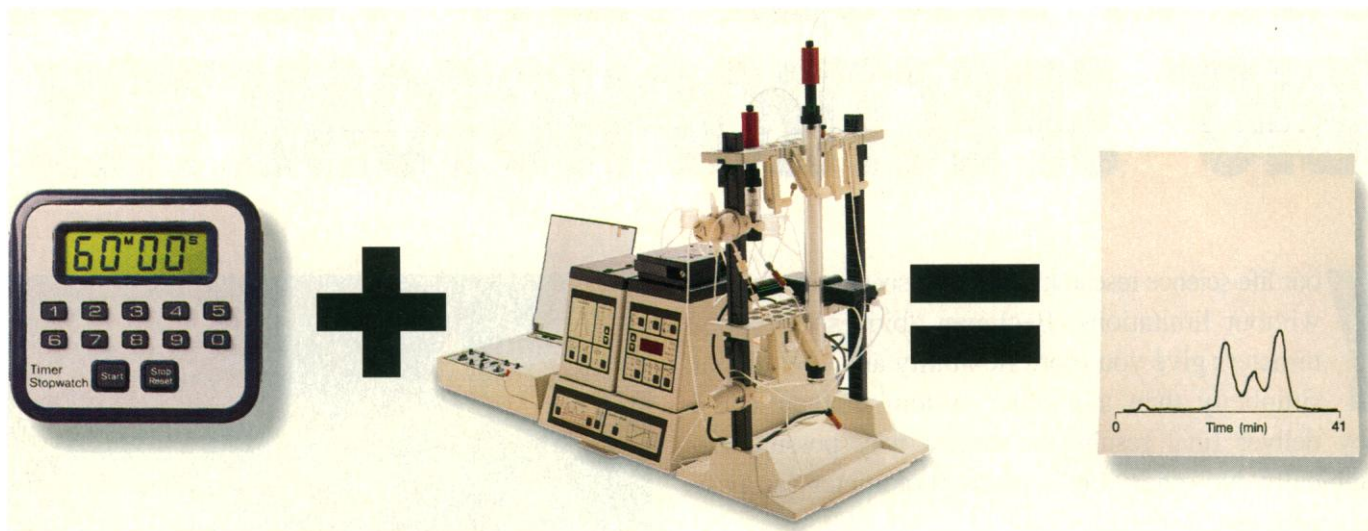


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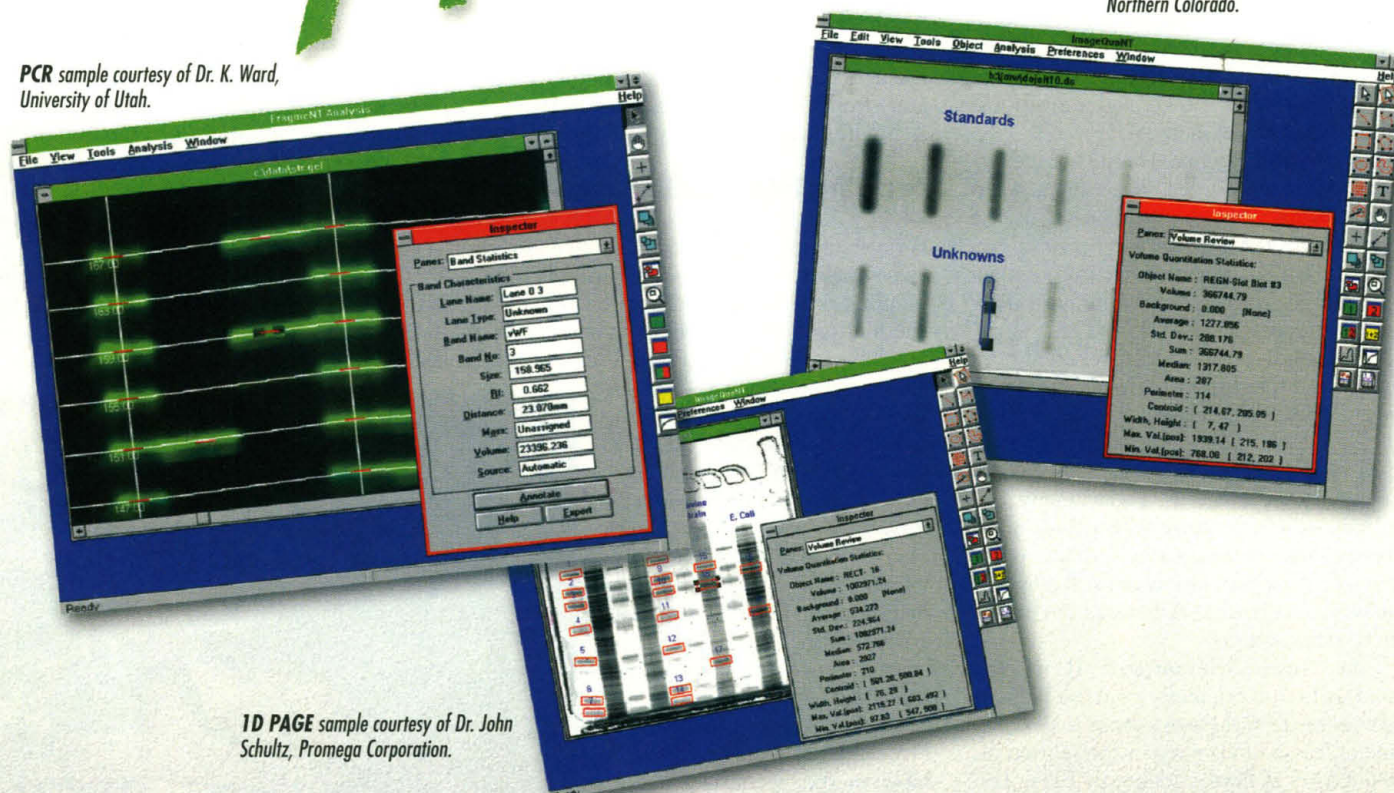
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Southern Blot sample courtesy of Dr. Steve Lee, University of Northern Colorado.

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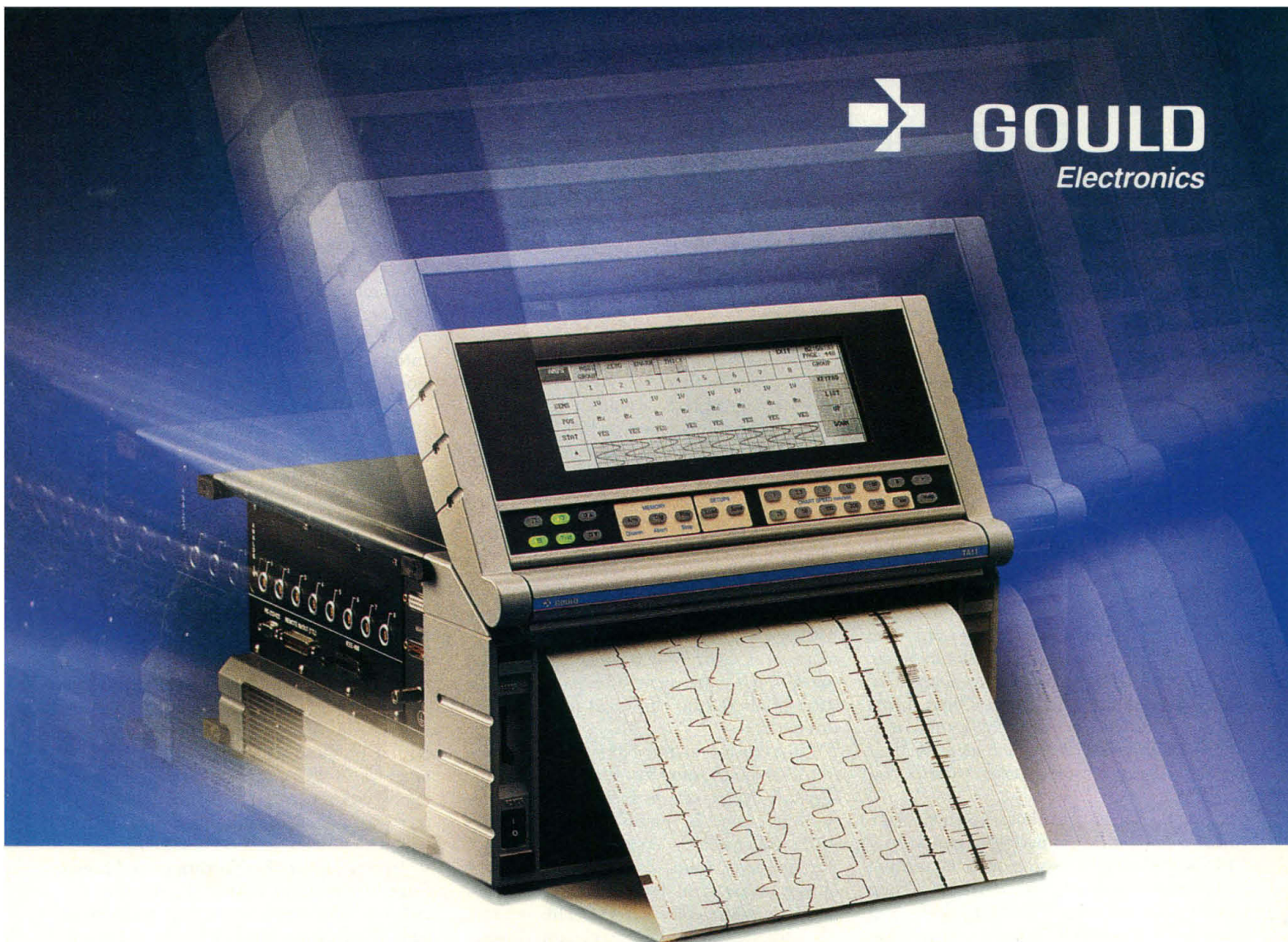


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100662-1	Glutathione Sulfhydryl Oxidase (<i>Penicillium sp.</i>) $2\text{GSH} + \text{O}_2 \rightarrow \text{GSSG} + \text{H}_2\text{O}_2$	50 units
100645-1	L-Glutamate Oxidase (<i>Streptomyces sp.</i>) $\text{L-Glutamate} + \text{O}_2 + \text{H}_2\text{O} \rightarrow \alpha\text{-Ketoglutarate} + \text{NH}_3 + \text{H}_2\text{O}_2$	100 units

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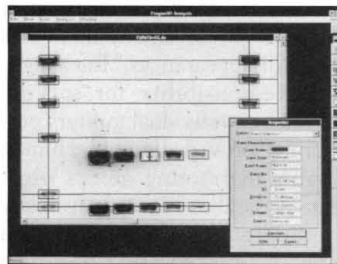
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restriction digests, quantitative polymerase chain reaction, DNA mapping, and DNA purification assays. **Molecular Dynamics. Circle 141.**

Oligo Primer Analysis Software

Oligo 5.0 Primer Analysis Software for Windows provides a number of powerful new functions to assist researchers in the selection of optimal oligonucleotides for polymerase chain reactions (PCR), sequencing, hybridizations, and other applications. The new features include an oligonucleotide database that permits porting of oligonucleotide sequence and data to and from the program. The database saves

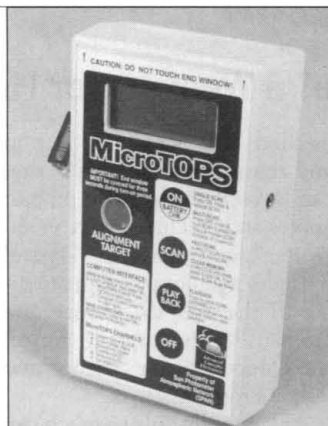
data pertinent to synthesis and generates a convenient synthesis order form. The new PCR primer search function finds all cross-compatible primers in a sequence file and orders them by either upper primer position number or by PCR product size. **National Biosciences. Circle 142.**

Antigen Retrieval Solution

Antigen Retrieval Citra solution recovers antigenicity for immunohistochemical staining in formalin-overfixed tissues and enhances staining for fixation-sensitive markers. The product can help overcome false negative staining of overfixed tissue, expand the range of antibodies used in routinely processed tissue, and increase the usefulness of archival material for retrospective studies. The solution is a safe, non-toxic, heavy metal-free pretreatment. **BioGenex. Circle 143.**

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or downloaded to a computer through the serial port. **Advanced Concept Electronics. Circle 144.**

Labeled Chromosome Probes

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Cell Transformation Assay

The Biotrak EGF Receptor Assay determines levels of epidermal growth factor (EGF) receptor through the measurement of EGF-stimulated tyrosine kinase

activity. The assay measures biologically active EGF receptor by making use of the principle that, on binding EGF, the tyrosine kinase activity of the receptor is stimulated. Minimal sample preparation is necessary. **Amersham International. Circle 146.**

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Literature

Novex Electrophoresis: A World of Difference is an 80-page, 1994–1995 catalog featuring a wide range of products, including a variety of pre-cast polyacrylamide gels for both protein and DNA separations; apparatus for running, blotting, and drying gels; premixed buffers; staining kits; and more. **Novex. Circle 148.**

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