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Science in Europe '94  
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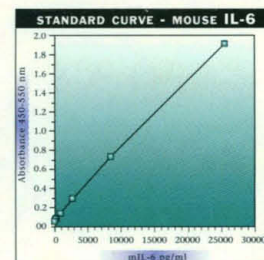
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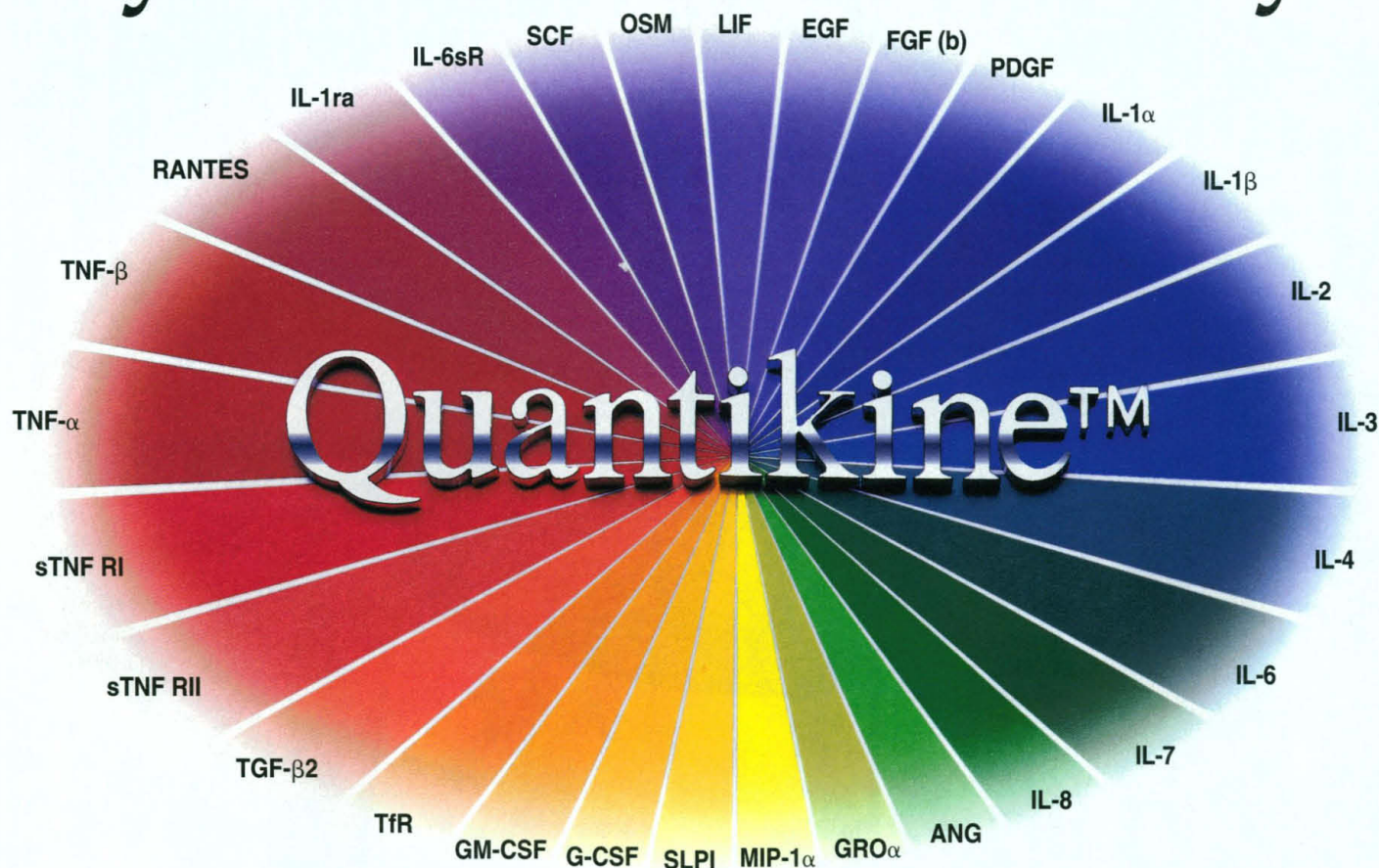
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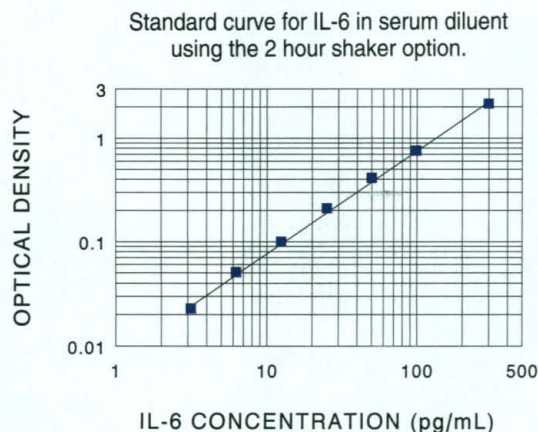
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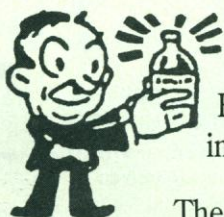
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Storm clouds and a small ray of sunshine over St. Basil's Cathedral in Red Square, Moscow, could be a metaphor for the state of science in Russia—the focus of this year's special issue on Science in Europe. Six scientific fields, each of which is facing a different range

of problems, are examined in News reports beginning on page 1259. International funding is discussed in Policy Forums on pages 1280 and 1281, and reviews of books on Russian science begin on page 1346. [Photo: Rick Kozak]



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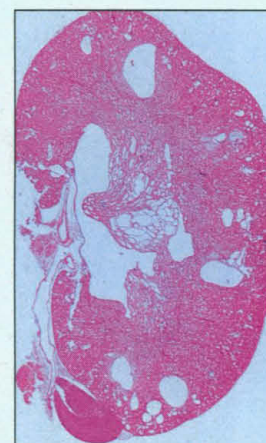
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## Completing the cycle

Many biological compounds, such as steroids, contain rings, so the control of cyclization reactions is an important goal in synthetic chemistry. Cationic cyclization is an important method for performing this carbon-carbon bond-forming transformation, but side reactions of the highly reactive carbocation intermediates can limit its usefulness. Li *et al.* (p. 1289) have used catalytic antibodies to synthesize an cyclic alcohol from an acyclic olefinic sulfonate ester with high selectivity (98 percent). The hapten was designed so that the binding energy of the antibody stabilized the concerted cyclization pathway.

## True or false?

Assigning "true" and "false" values to the parameters in a randomly constructed algebraic expression obeying the rules of Boolean algebra causes the expression as a whole to evaluate to true or false. Simple expressions can almost always be made true, while sufficiently complicated ones are rarely solvable, and, as Kirkpatrick and Selman (p. 1297; see also a news story by Cipra, p. 1249) show, there is a sharp transition from satisfiability to non-satisfiability. This mathematical phase transition has many characteristics of phase transitions in other systems, and its existence has implications for the difficulty of finding solutions to a variety of computational problems.

## Protojaws

A glimpse of the early diversification of animals, as well as early ecosystems, is provided by unusually preserved fossils from the Cambrian Burgess Shale and

other recently discovered sites. Chen *et al.* (p. 1304) describe Cambrian predators that have arthropod affinities from rocks near Chengjiang, China. Some specimens may have approached 2 meters in length, were equipped with complex jaws, and may have swam smoothly to catch trilobites and other fauna (see Perspective by Briggs, p. 1283).

## Seismic starts

Recent strain measurements in the New Madrid seismic zone in the Central United States, along with the historical and geologic seismic records suggest that the interval between large earthquakes is about 1000 years or so. But there is little obvious surface deformation. Schweig and Ellis (p. 1308) review these various data and conclude that the seismic zone is young, perhaps just a few tens of thousands of years old.

## Special delivery

Peptides that bind to newly synthesized class I molecules of the major histocompatibility complex (MHC) in the endoplasmic reticulum (ER) originate in the cytosol. The free class I peptides are undetectable in the cell, which likely reflects the operation of a rapid degradation pro-

cess. Suh *et al.* (p. 1322) show that such peptides likely avoid degradation in the ER because the transporter associated with antigen processing (TAP), the transmembrane protein that delivers these peptides from the cytosol into the ER, is already associated with class I MHC molecules. They find that TAP is mainly associated with class I heavy chains that are already bound to  $\beta_2$ -microglobulin.

## Transcription origins

The archaeobacteria form a kingdom of organisms separate from eukaryotes and eubacteria. Rowlands *et al.* (p. 1326; see also a news story by Barinaga, p. 1251) have isolated a protein from an archaeobacterium *Pyrococcus woesei* that has structural and functional similarity to eukaryotic TBP (TATA-binding protein). In eukaryotes, TBP is required for transcription (the making of RNA), whereas TBP has never been isolated in eubacteria. Finding TBP in archaeobacteria suggests that TBP was required for transcription before the divergence of the eukaryotes and archaeobacteria.

## Kidney disease model

Autosomal recessive polycystic kidney disease (PKD) affects

about 1 in 10,000 infants and is characterized by formation of multiple cysts in the kidney and by liver abnormalities. The genes responsible for the disease have not yet been identified. Moyer *et al.* (p. 1329) describe a transgenic mouse line containing an insertional mutation on chromosome 14 that produces a phenotype resembling human PKD. A candidate gene whose expression is affected by the mutation encodes a protein with a sequence motif found in cell cycle regulators. This animal model may provide insights into the genetic origin of PKD as well as its cellular pathogenesis.

## Long and short of it

One of the pathological hallmarks of Alzheimer's disease (AD) is the deposition of amyloid in senile plaques in the brain and in the walls of cerebral blood vessels. This amyloid is composed of a 39- to 43-residue amyloid  $\beta$  protein ( $A\beta$ ) derived from the amyloid  $\beta$  protein precursor ( $\beta$ APP). In familial AD, the disease co-segregates with mutations in the  $\beta$ APP gene. Suzuki *et al.* (p. 1336) show that these mutations increase the ratio of long (42- to 43-residue) to short (40-residue)  $A\beta$  produced from  $\beta$ APP. Because long  $A\beta$  forms insoluble amyloid fibrils more rapidly than short  $A\beta$ , these results suggest a mechanism by which the  $\beta$ APP mutations may enhance amyloid deposition.

## How evident?

Michaels *et al.* (p. 1341) and Kerr and McElroy (p. 1342) debate the significance of recent trends in ultraviolet radiation flux measured at Toronto.

## Bursting in air

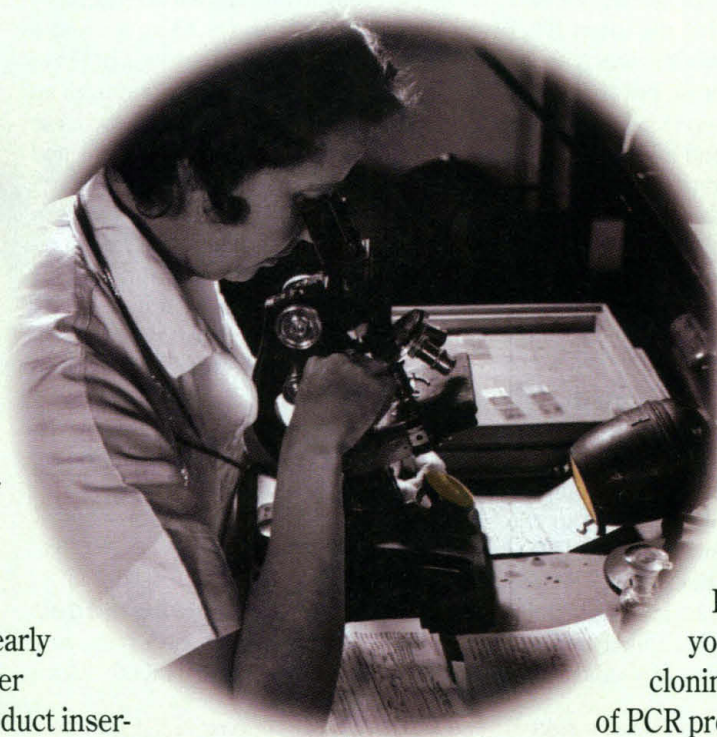
In the course of surveying the heavens for astrophysical gamma-ray bursts, the detectors aboard the orbiting Compton Gamma Ray Observatory recorded, in the space of 2 years, a dozen transient but energetic events apparently originating in the upper atmosphere. As Fishman *et al.* explain (p. 1313; see also news story by Kerr, p. 1250), these events operate on a millisecond time scale, with photon energies up to hundreds of kiloelectron volts. No certain physical mechanism is known that would generate these bursts, but they are most plausibly associated with some sort of unusual electrical discharge high in the atmosphere.

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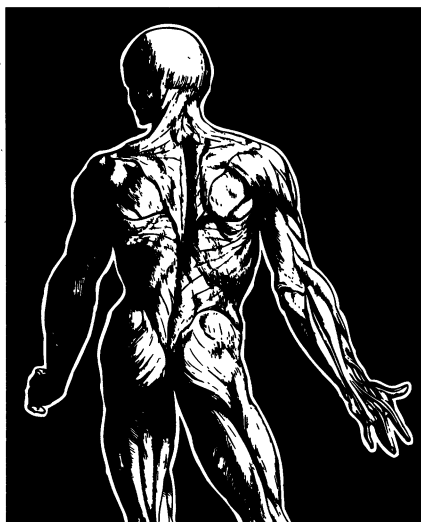
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## CONFERENCE AGENDA

### SUNDAY, OCTOBER 2

Welcoming Reception

### MONDAY, OCTOBER 3

#### Plenary Session I: Genome Analysis – The New Frontier

*"Human Gene Identification by Positional  
Cloning"*

Dr. Francis Collins, National Center for  
Human Genome Research

*"Genetic Basis of Human Colorectal  
Cancer"*

Dr. Bert Vogelstein, Johns Hopkins  
Oncology Center

*"Mapping Genes and Genomes: Genetic  
Dissection of Complex Traits"*

Dr. Eric Lander, Whitehead Institute/  
MIT

#### *"Human Genome Diversity"*

Dr. Mary Claire King, University of  
California, School of Public Health

#### *"Manipulating Cancer Genes in the Mouse"*

Dr. Harold Varmus, National Institutes  
of Health

*"Intellectual Property: DNA and its  
Offspring"*

Dr. Kate Murashige, Morrison &  
Foerster

*"Presymptomatic Diagnosis of Self and  
Progeny"*

Dr. C. Thomas Caskey, HUGO

#### Concurrent Sessions

**M1** *"New Methods of DNA-Based  
Diagnosis"*

Dr. Stephen P.A. Fodor,  
Affymetrix, Inc.

**M2** *"Human Gene Identification"*

Dr. Kay E. Davies, Institute of  
Molecular Medicine, University  
of Oxford

**M3** *"Social and Scientific Issues in  
Genetic Testing"*

Dr. Nancy Wexler, Hereditary  
Disease Foundation

**M4** *"Gene Therapy"*

Dr. Inder M. Verma, The Salk  
Institute

### TUESDAY, OCTOBER 4

#### Plenary Session II: Development and Signal Transduction

**Special Guest: Donna Shalala, U.S.  
Department of Health and Human  
Services**

*"MYOD & Myogenesis"*

Dr. Harold Weintraub, Fred  
Hutchinson Cancer Research Center

*"Genome Analysis in the Mouse"*

Dr. Shirley M. Tilghman, Princeton  
University

*"Pax: Genes for Mice and Men"*

Dr. Peter Gruss, Max Planck Institute  
of Biophysical Chemistry, Germany

*"From an Interferon Clone to the  
Regulation of Oncogenesis"*

Dr. Tadatsugu Taniguchi, Institute for  
Molecular and Cellular Biology,  
Osaka University

*"C. elegans Genome Project"*

Dr. Richard Wilson, Washington  
University Medical School

*"Small GTPases – Switching on Biological  
Responses"*

Dr. Alan Hall, MRC Laboratory for  
Molecular Cell Biology, U.K.

#### Concurrent Sessions

**T1** *"Gene Targeting"*

Dr. Elizabeth Robertson, Harvard  
University

**T2** *"Sequence to Function"*

Dr. Temple F. Smith, Biomolecular  
Engineering Research Center,  
Boston University

**T3** *"Education and the Human Genome  
Project"*

Dr. Paula Gregory, National Center  
for Human Genome Research, NIH

**T4** *"Chromatin Structure and the  
Regulation of Gene Expression"*

Dr. Gary Felsenfeld, Laboratory of  
Molecular Biology, NIH

### WEDNESDAY, OCTOBER 5

#### Plenary Session III: Mapping

*"Toward the Ultimate Generation of an  
Integrated Map of the Human Genome"*

Dr. Daniel Cohen, C.E.P.H., France

*"Application of High Resolution Genetic  
Maps to Studies of Common Disorders"*

Dr. Jeffrey C. Murray, University of  
Iowa

*"Yeast Genome Project"*

Dr. André Goffeau, Université  
Catholique de Louvain, Unité de  
Biochimie Physiologique

*"The Drosophila Genome Project – a  
Progress Report"*

Dr. Gerald M. Rubin, University of  
California

*"Status and Prospects for the Complete  
Human Genome Sequence"*

Dr. Richard A. Gibbs, Baylor College  
of Medicine

*"High Speed DNA Sequencing: Present and  
Future Technologies"*

Dr. Lloyd M. Smith, University of  
Wisconsin

*"Towards a Complete Set of Human Genes"*

Dr. J. Craig Venter, The Institute for  
Genomic Research

#### Plenary Session IV: Mapping and Applications

*"Vertically Integrated Mapping and  
Sequencing of Human DNA"*

Dr. Maynard Olson, University of  
Washington School of Medicine

*"Interpreting Genes and Genomes"*

Dr. David J. Lipman, NIH, National  
Library of Medicine

*"Some Applications of a Genome Library"*

Dr. Melvin Simon, California Institute  
of Technology

*"Huntington Disease"*

Dr. James F. Gusella, Massachusetts  
General Hospital

*"Ancient DNA"*

Dr. Svante Pääbo, Zoologisches  
Institut, Universität München

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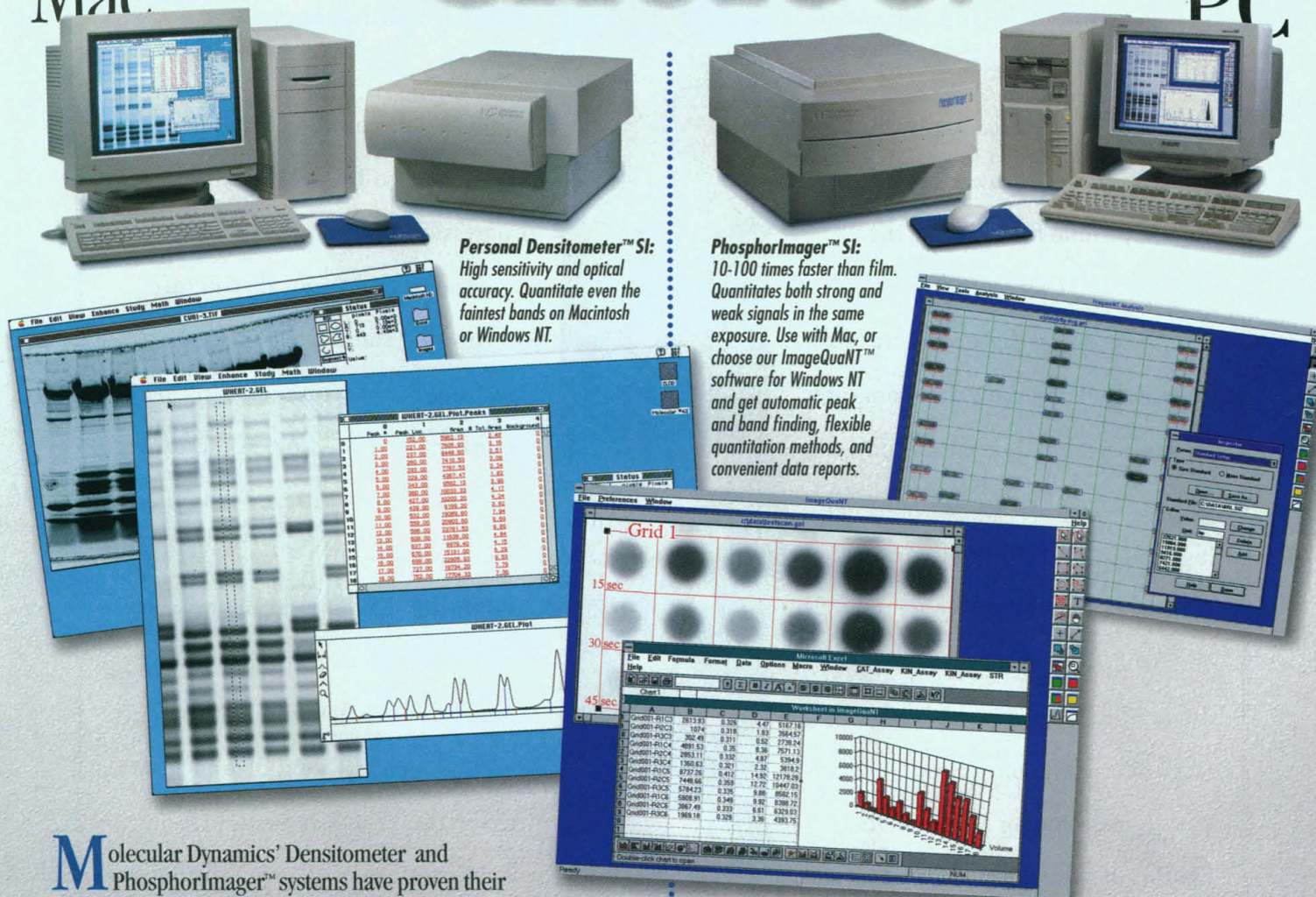
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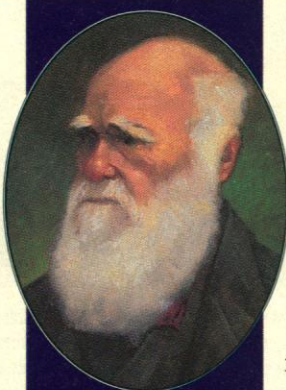
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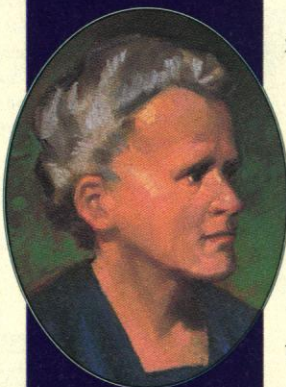
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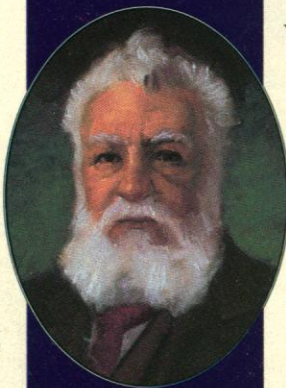
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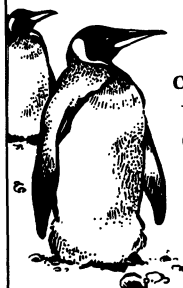
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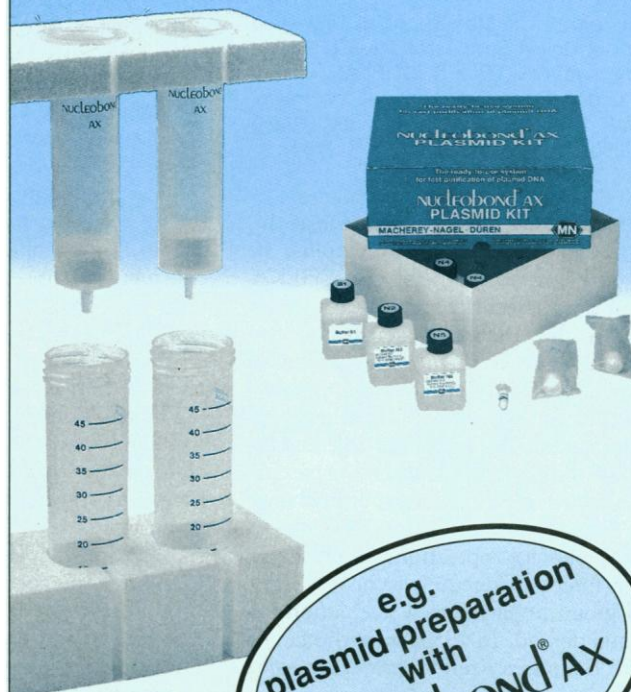
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