

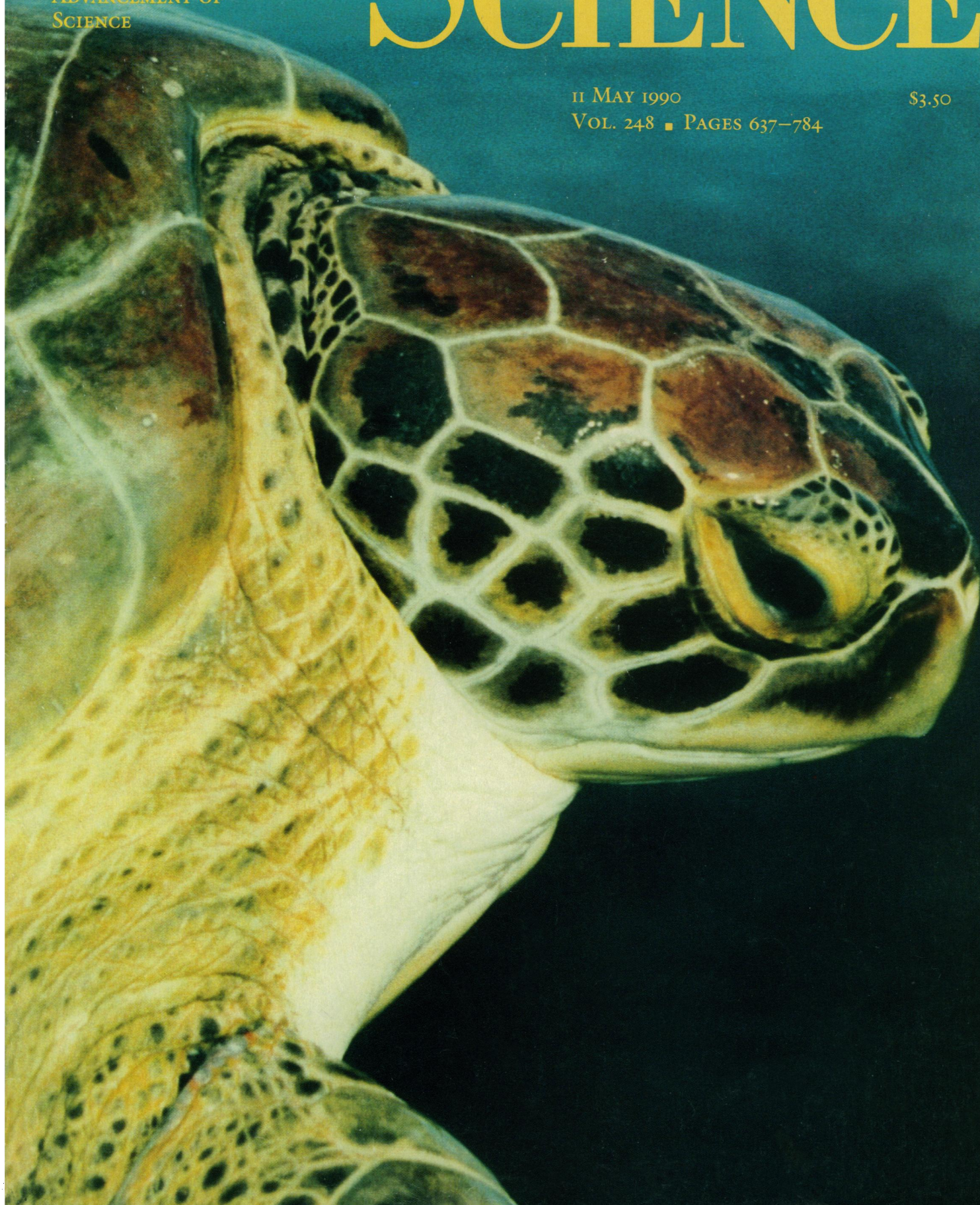
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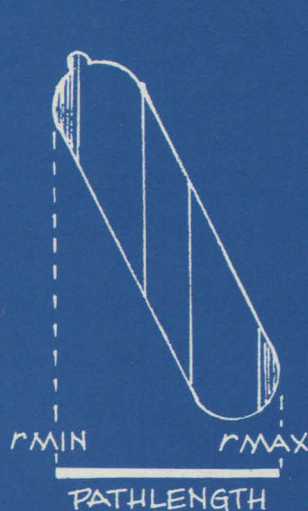
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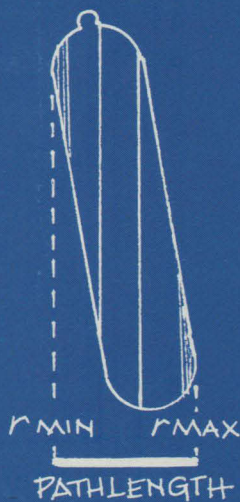
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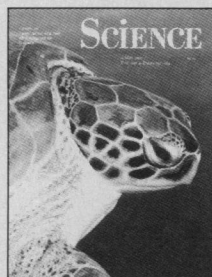
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**COVER** The hypothesis that endangered green turtles (*Chelonia mydas*) return to their natal beach to nest is supported by restriction fragment analysis of mitochondrial DNA. Thirty or more years may elapse before these high-seas travelers make their first return migration. Reproductive colonies are likely to be demographically independent and consequently must be managed on a colony-specific basis. See page 724. [Photograph by Anne B. Meylan]

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## This Week in SCIENCE

### Immune interactions

**A**N understanding of conformation changes that occur when antibodies bind antigens is important for clarifying the nature of such interactions and for practical purposes, such as production of highly specific antibody reagents and development of synthetic vaccines. Crystal structures at high resolution have been obtained for various antigens and antibodies; now high-resolution structures of the Fab' portion of specific antibodies complexed to their complementary synthetic peptide—a 19-amino acid portion of the protein myohemerythrin—and the Fab' molecules not complexed to peptide have been solved and compared (page 712). Stanfield *et al.* describe these interactions and the types of structural changes that accompany binding; they discuss the implications of the changes for interpreting what is involved in immune recognition. The structure of the peptide differs when free in solution, bound to Fab', and in the native molecule. These differences raise the interesting issue of how antibodies against peptides can bind to both the peptide and the protein of which the peptide is a part.

### Martian tilt

**T**HE axial tilt or obliquity of Mars—the angle between the planet's orbital and equatorial planes—may have been much less when Mars formed some 4.5 billion years ago than it is today (page 720). Currently Mars has a tilt that is slightly greater than that of Earth, giving Mars, like Earth, annual seasons. Rubincam proposes how the increased Martian tilt could have been brought about. Oscillations in obliquity, which occur on hundred thousand-year time scales, and associated climate changes could have altered the distribution of mass on the planet: at low obliquity, the poles may have grown colder and carbon dioxide in the Martian regolith (the weathered material between surface and bedrock) could have been released and deposited

as frost at the poles; the enlarging polar caps would deform the planet at the poles and at the equator. Mass rearrangements would lag behind the growth and decay of the polar caps because of the planet's viscosity. The viscous deformation thus is credited with inducing changes in axial tilt. These changes imply an evolving climate for Mars that is perhaps very different now from what it was when the red planet formed.

### Returning home

**A**s much as 30 years after they have hatched, most female green sea turtles (cover) will return to their "birth beach" to lay their eggs (page 724); such homing, which then is repeated each breeding season, often requires migration over thousands of kilometers from foraging grounds. In studies by Meylan *et al.*, the fidelity of turtles to their birth beaches was illustrated in patterns of mitochondrial DNA, which is maternally inherited. Individual turtles at rookeries on beaches along the Caribbean and the Atlantic showed specific types and patterns of mitochondrial DNA markers, and little evidence was obtained for gene flow between colonies. The data support "natal homing" rather than "social facilitation" (in which virgin females follow experienced breeders to a nesting beach and thereafter return to that beach regularly to nest) as an explanation for the remarkable fidelity of turtles to nest sites. The results indicate that efforts at population recovery for these endangered animals must be handled for each beach independently.

### Bacterial virulence

**B**ACTERIA growing inside host cells face a hostile environment that includes toxic substances, degradative enzymes, and an acid pH. Their survival probably depends on their ability to express genes that they do not express when growing in more congenial environments. When *Salmo-*

*nella* grow inside macrophages—the antigen-processing cells of the immune system—they produce two proteins, GroEL and DnaK, in great abundance (page 730). In organisms that cause tuberculosis, Legionnaire's disease, and schistosomiasis, GroEL and DnaK are the dominant substances that induce immune responses. Buchmeier and Heffron propose that these two proteins may be crucial virulence factors of *Salmonella*, ensuring intracellular survival by stabilizing bacterial components. Their abundance may account for their immunodominance: produced in large quantities, they may be the most likely bacterial products to later be presented at the macrophage surface to the immune system. Live vaccines are generally more protective than killed ones; this may be due to the fact that they contain replicating immunogens.

### Conformational peptide

**O**NE target for antifertility vaccines is chorionic gonadotropin, a placental hormone critical for sustaining pregnancy after implantation has occurred. Bidart *et al.* have synthesized a small peptide that mimics a conformational determinant of this protein that might be useful in antifertility vaccines (page 736). The peptide includes 10 amino acids of the hormone's  $\alpha$  subunit and 11 amino acids from its  $\beta$  subunit. These two discontinuous regions are recognized by a monoclonal antibody that reacts specifically with the intact hormone but not with its individual subunits. The peptide, when bound to a larger carrier molecule, elicited antibodies that reacted with the original hormone, and these antibodies interfered with hormone binding to receptors. The immunologic and biochemical approaches taken toward identifying the discontinuous determinant and for synthesizing the immunogenic peptide may be applied to a range of clinical and experimental systems in which immune responses to conformational determinants are important.

■ RUTH LEVY GUYER



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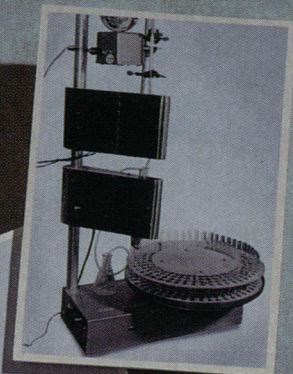
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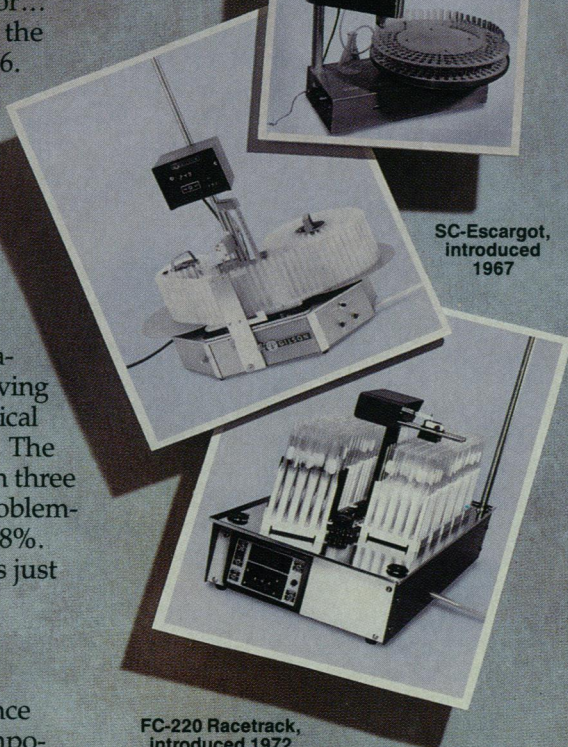
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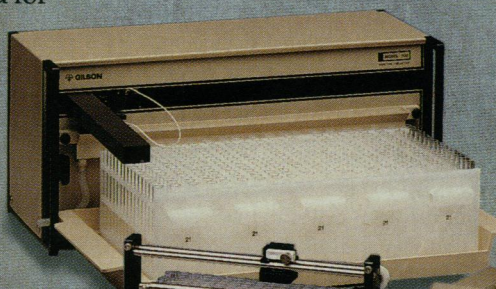
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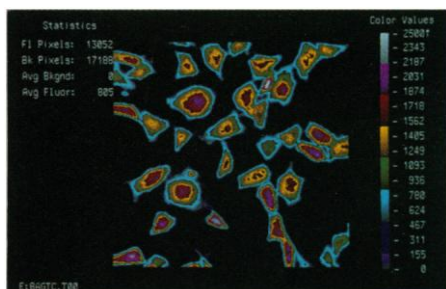
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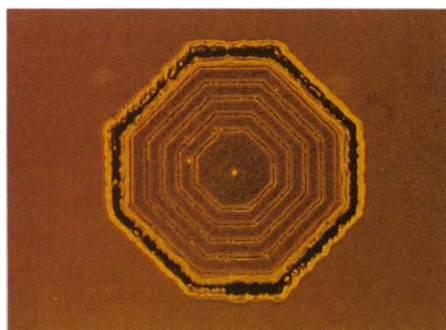
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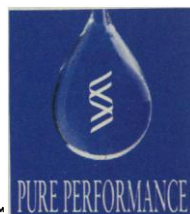
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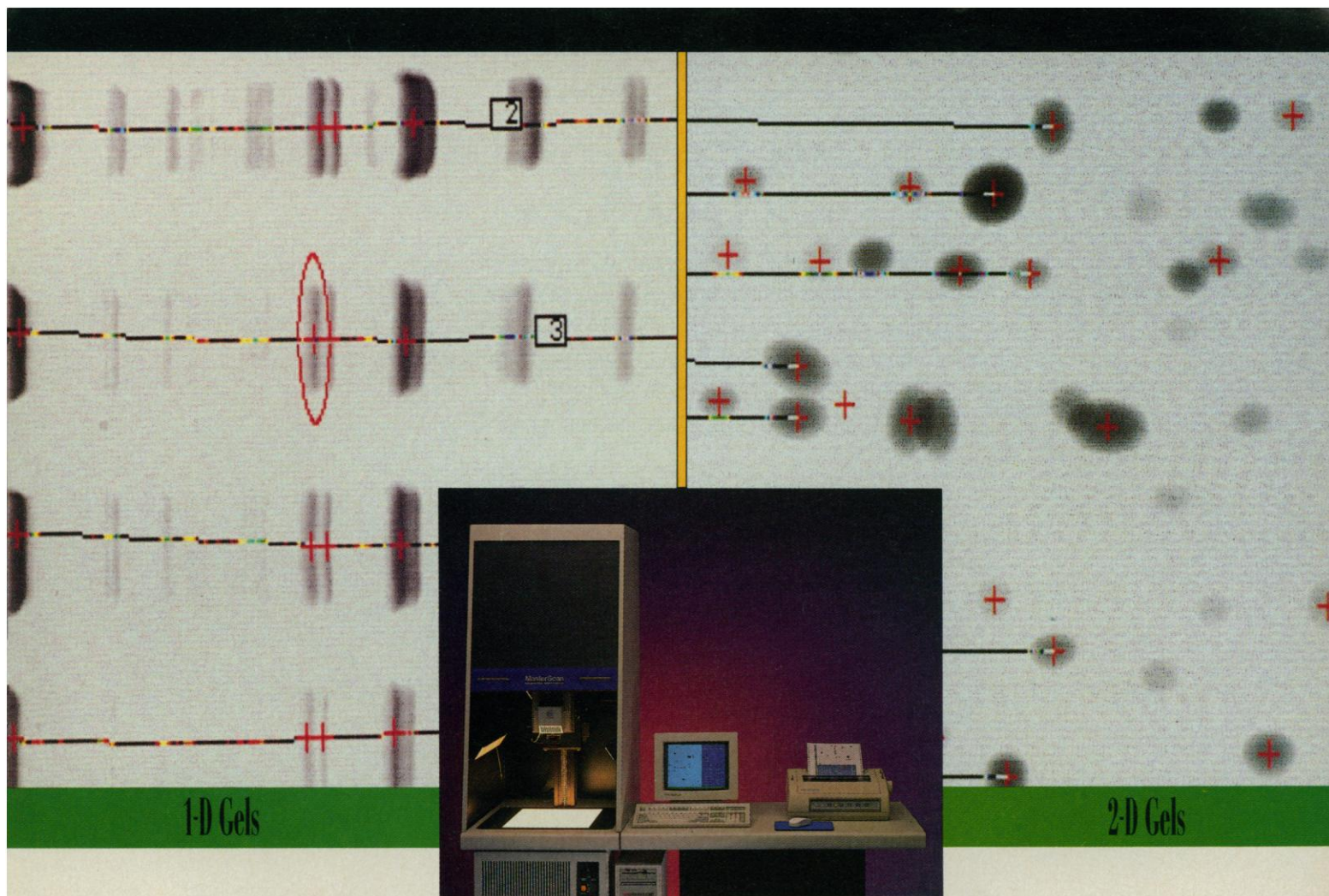
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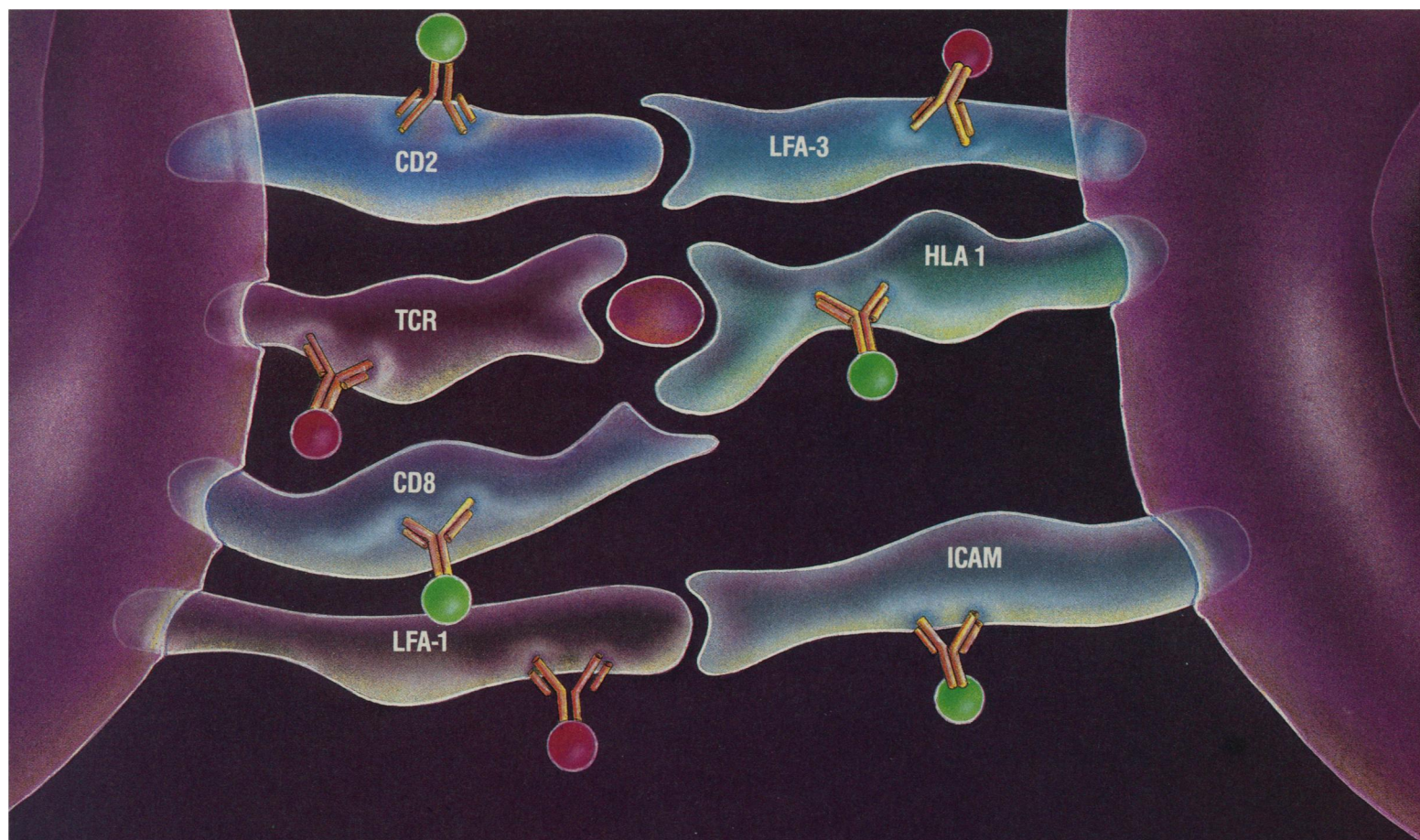
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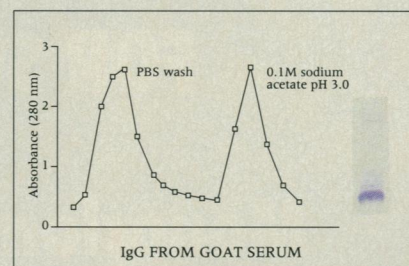
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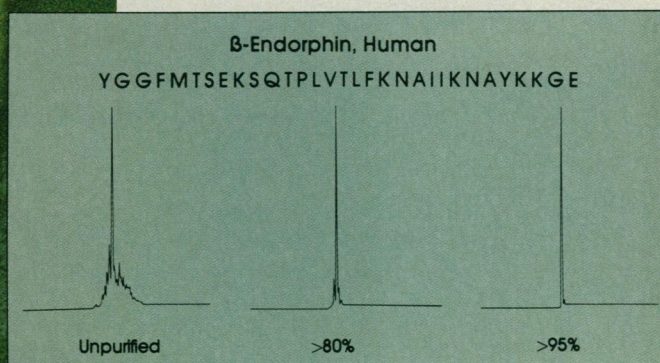
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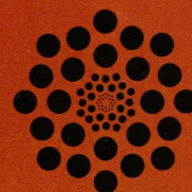
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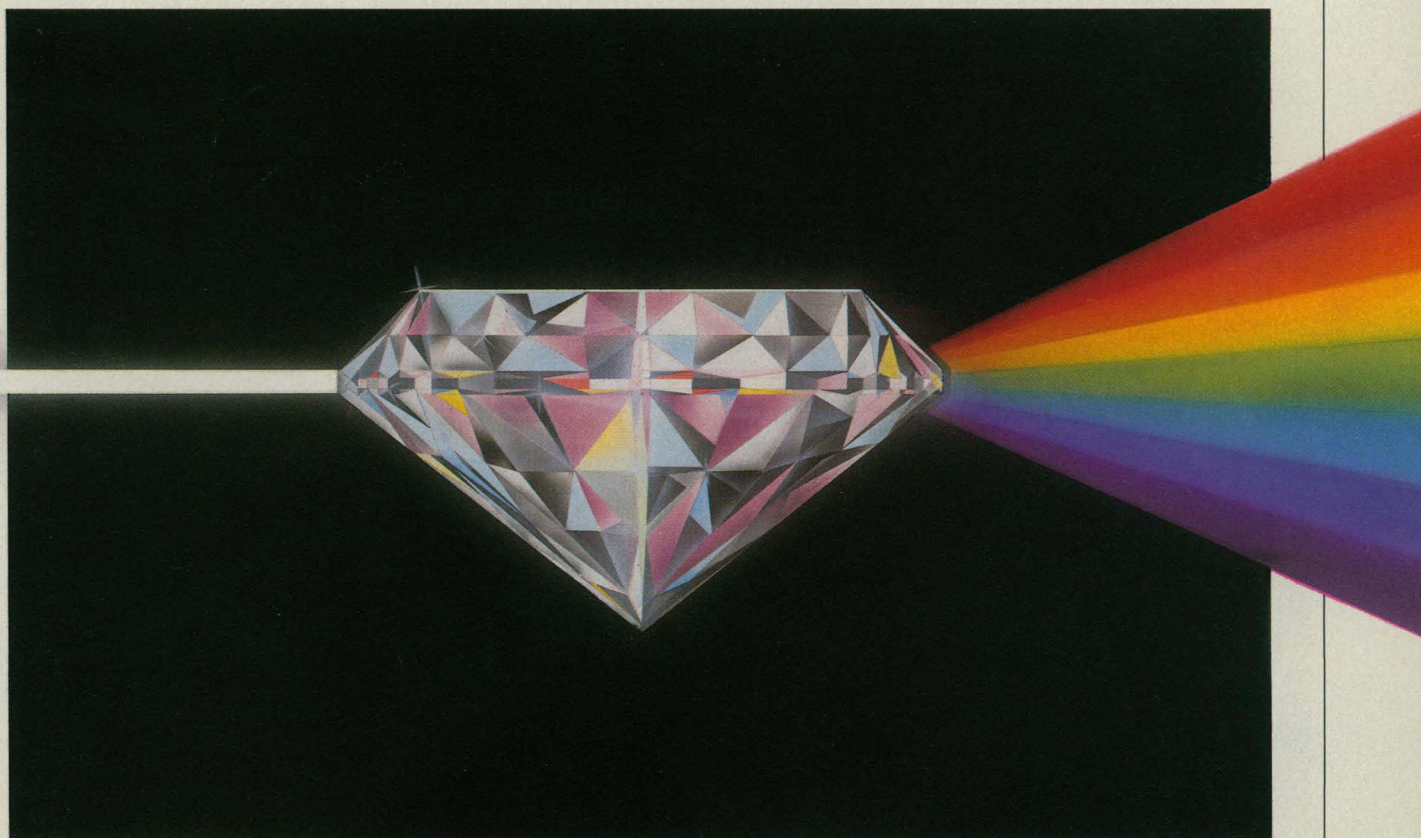
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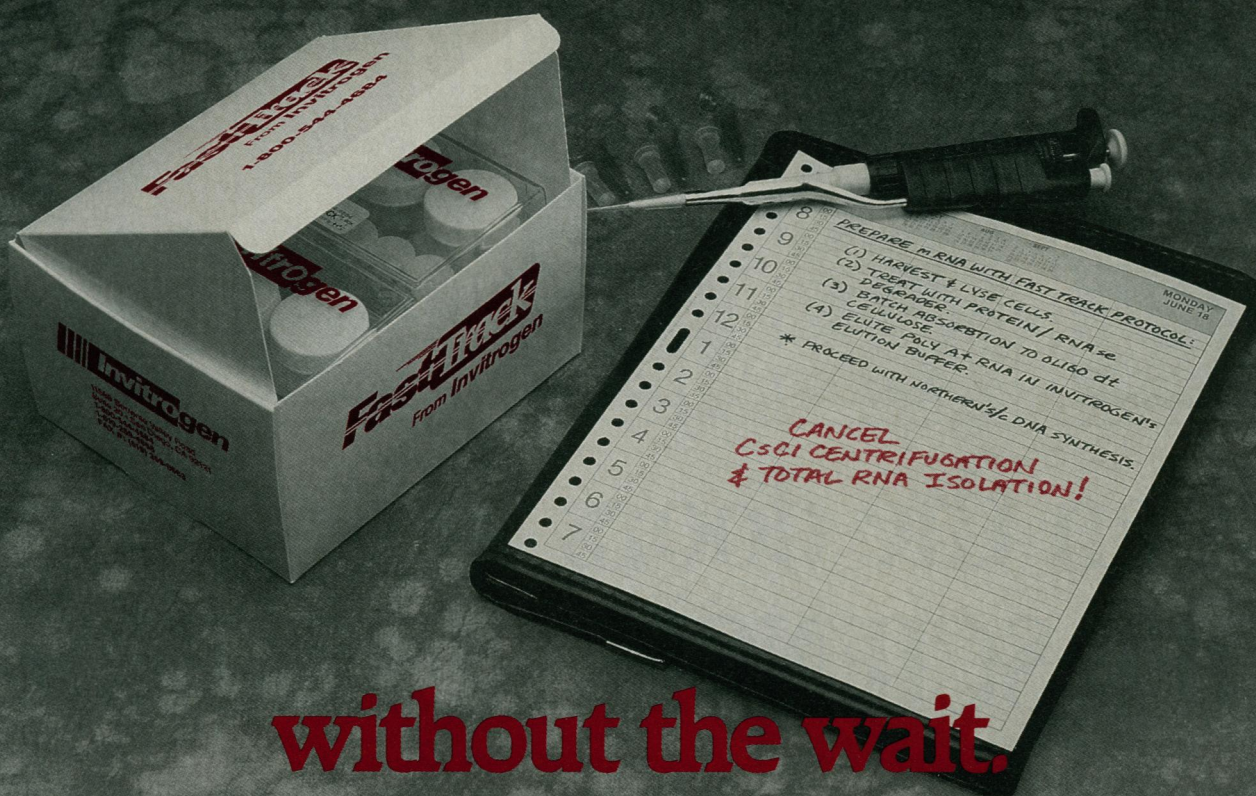
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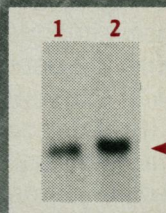
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**Figure 1.**

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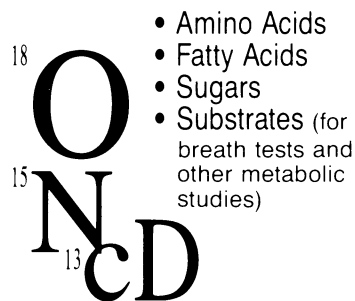
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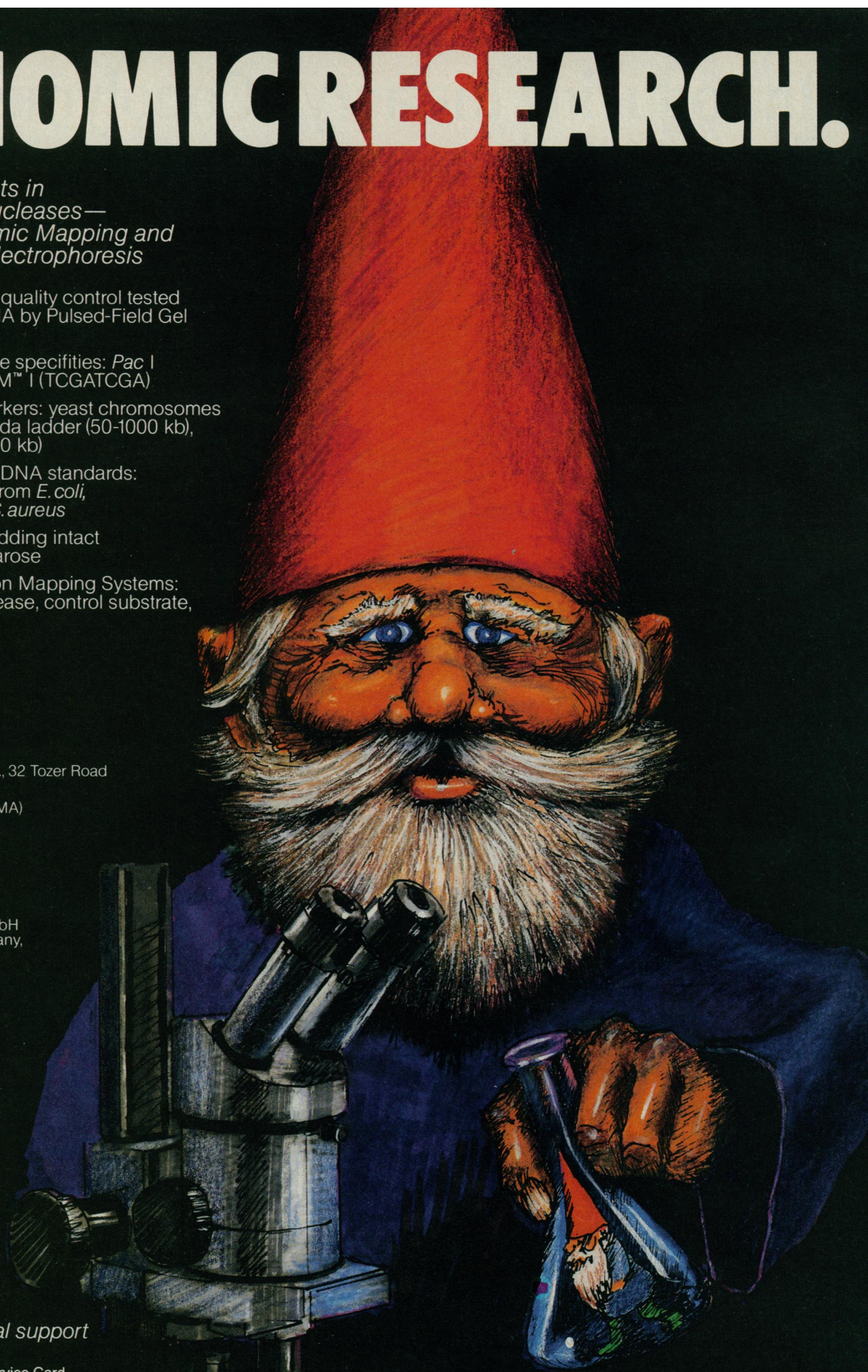
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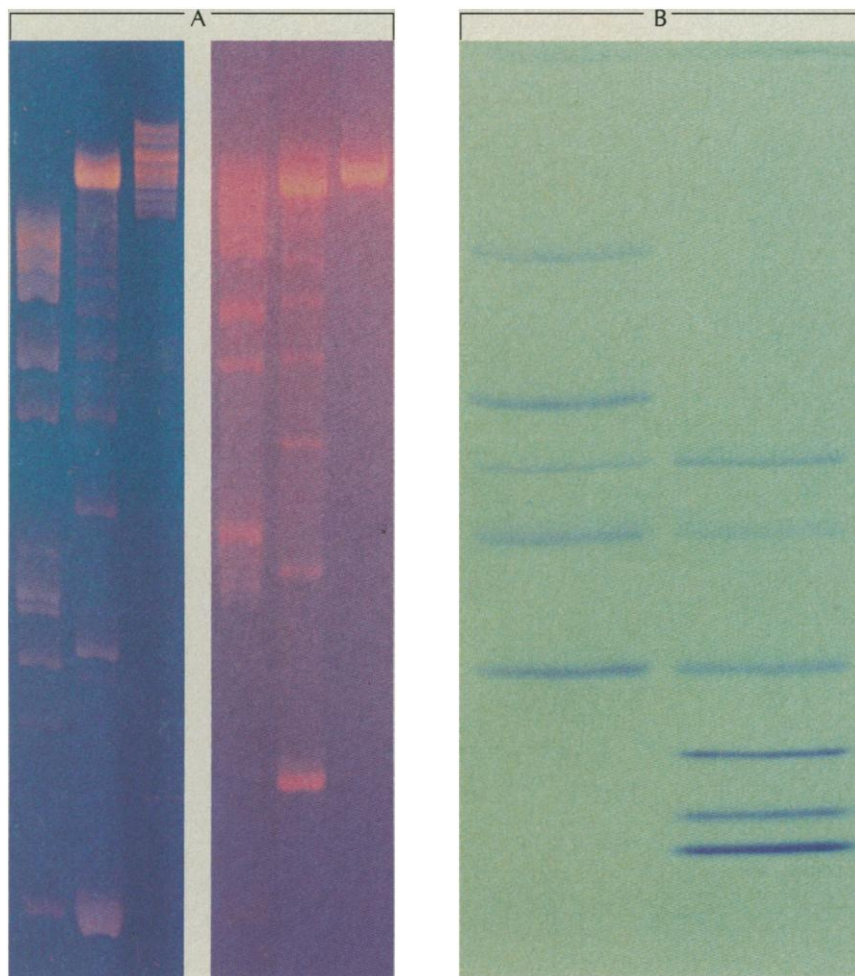
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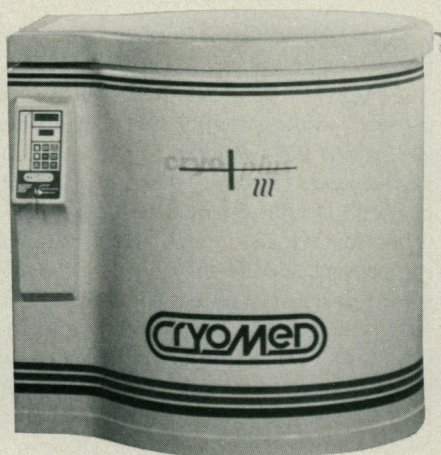
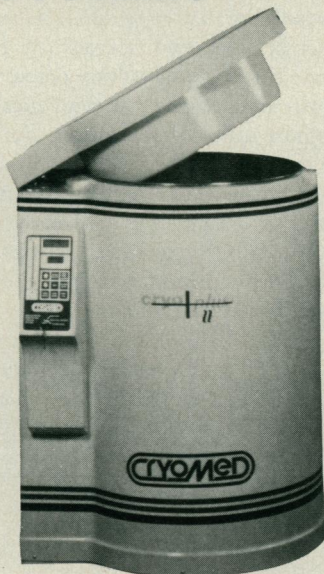


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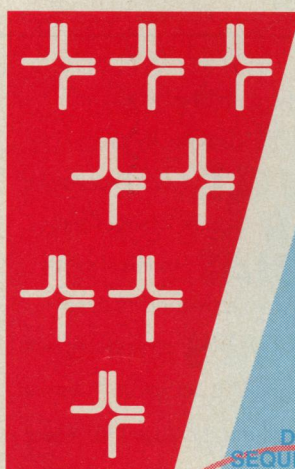
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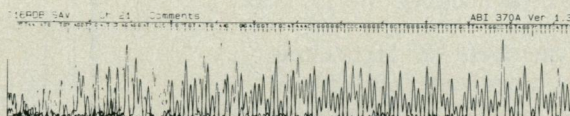
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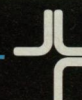
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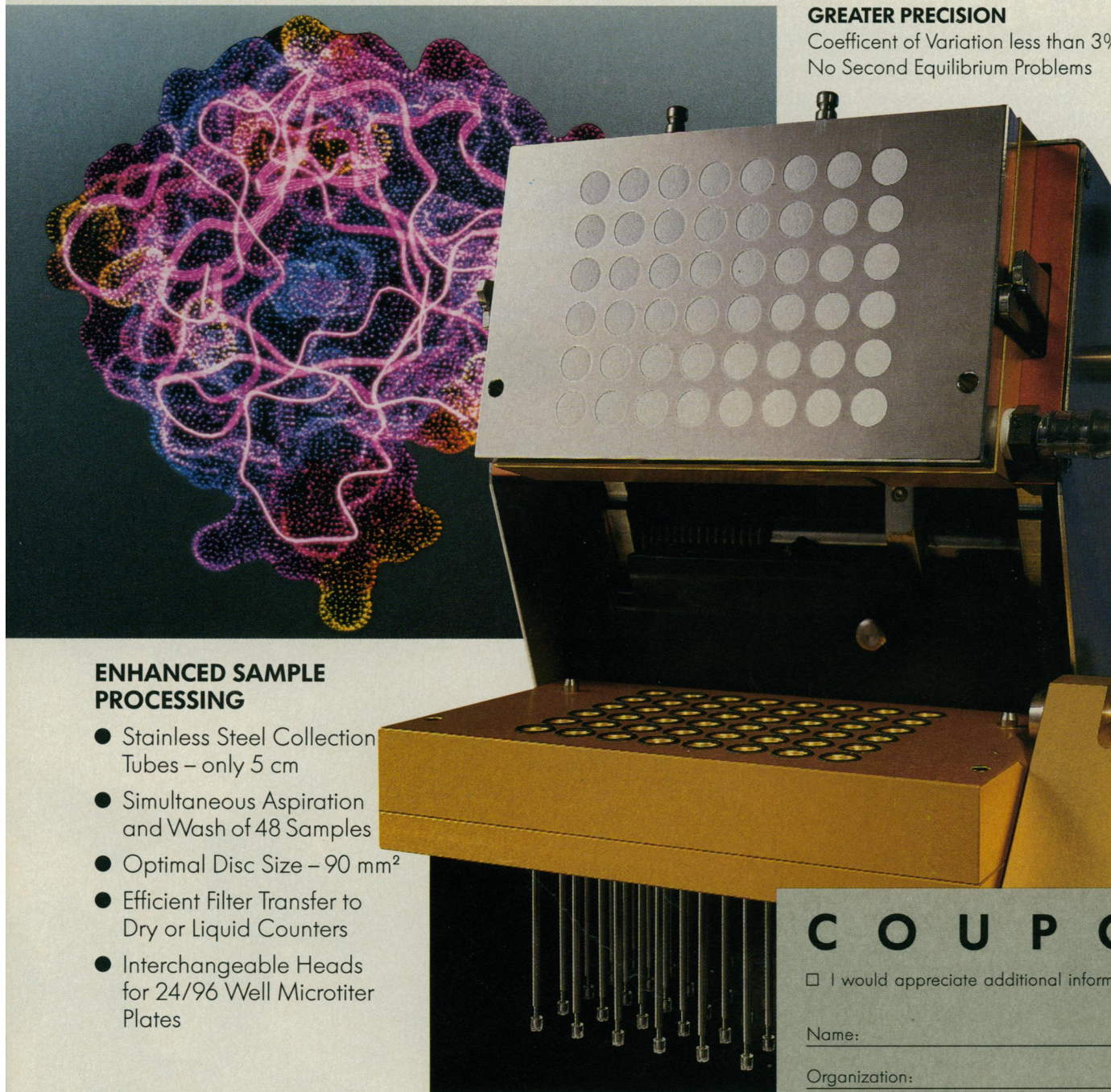
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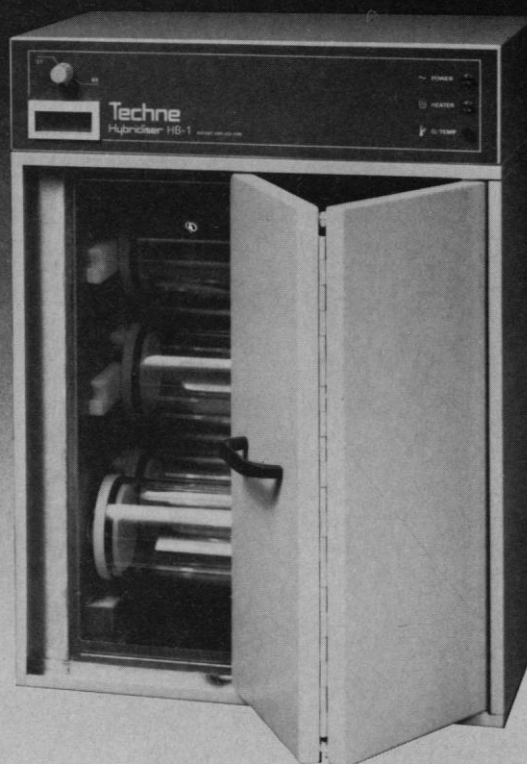
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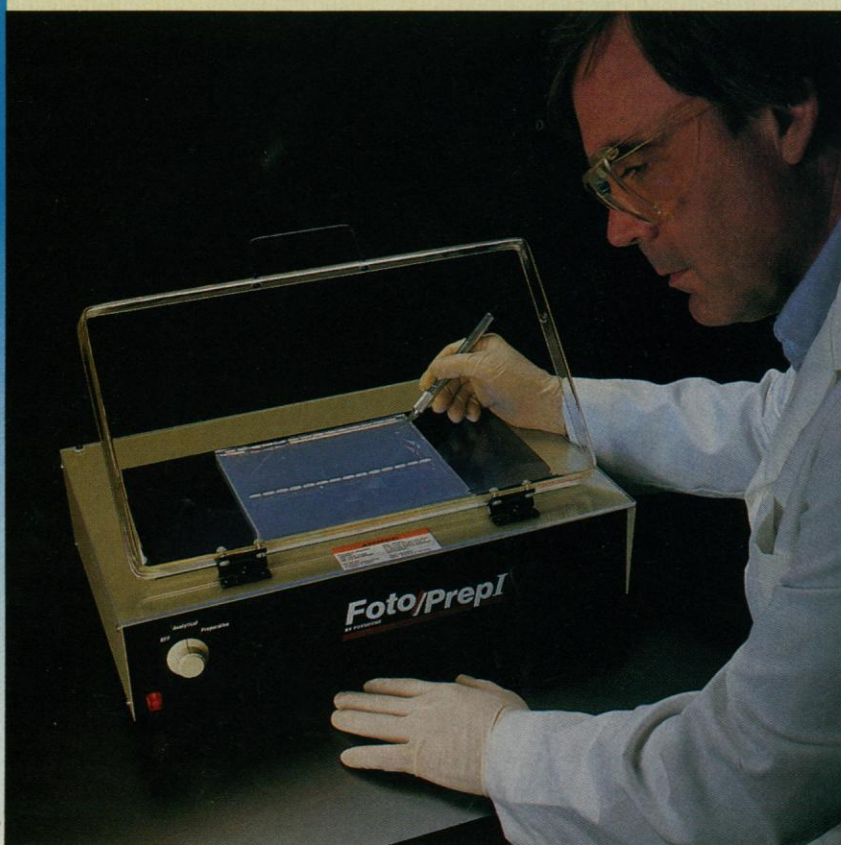
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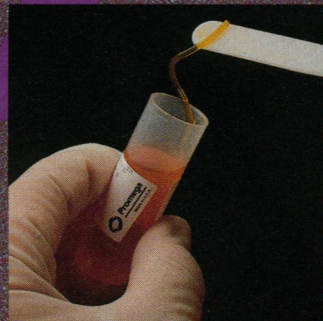
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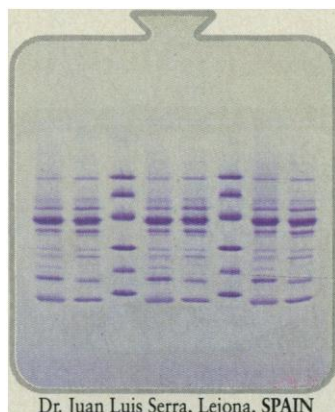
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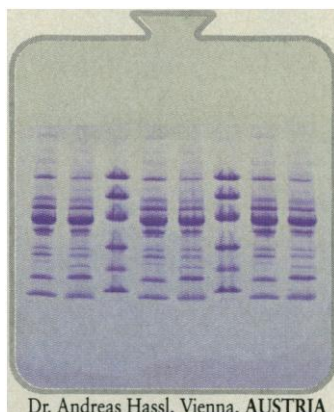
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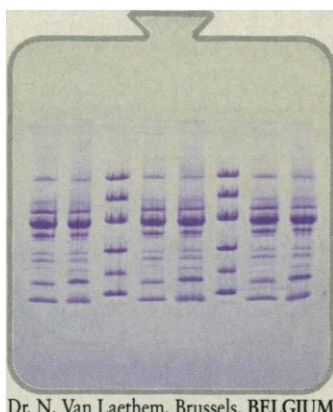




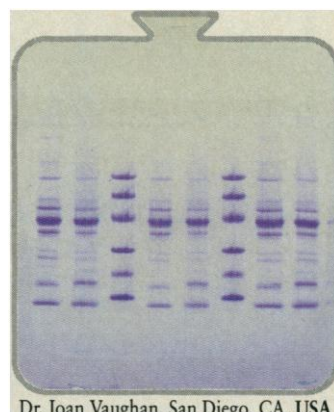
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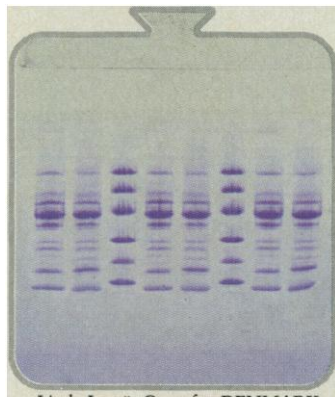
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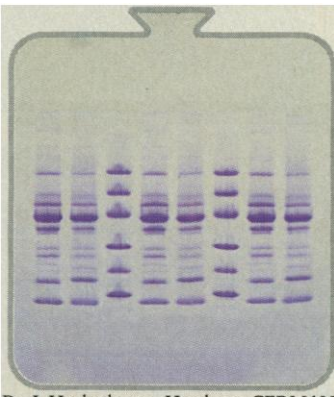
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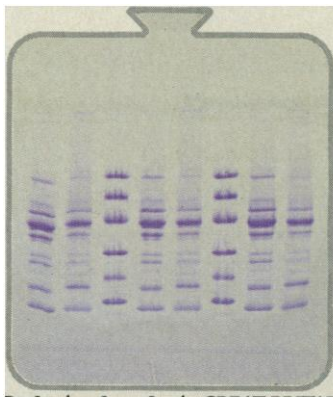
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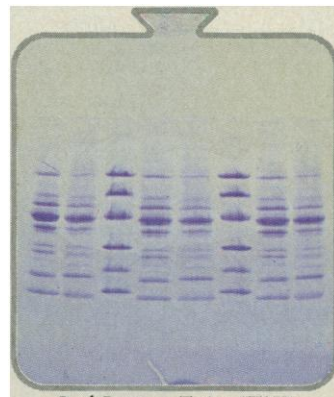
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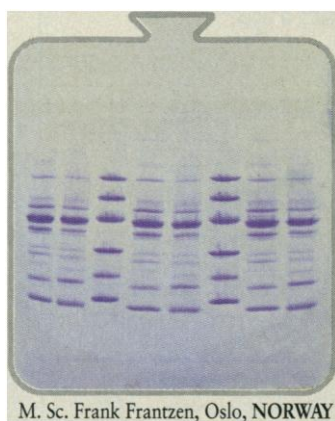
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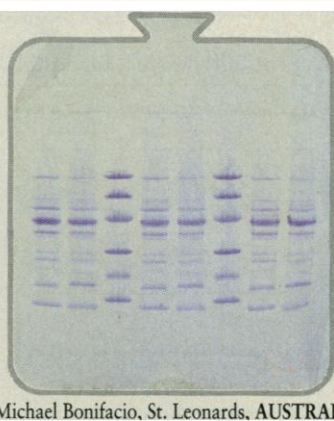
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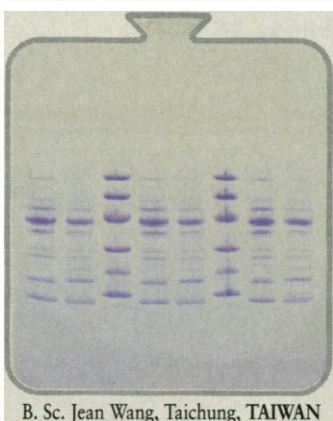
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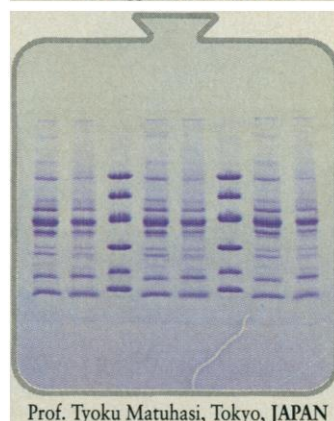
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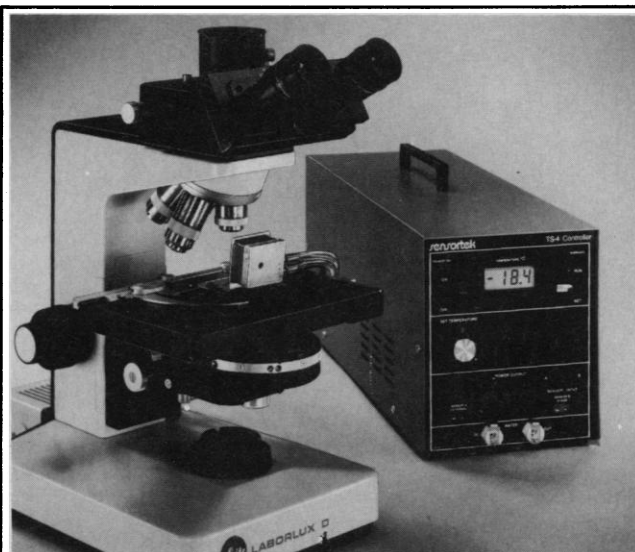
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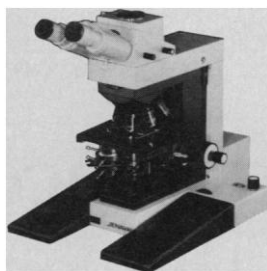
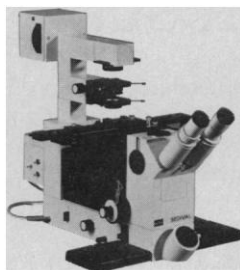
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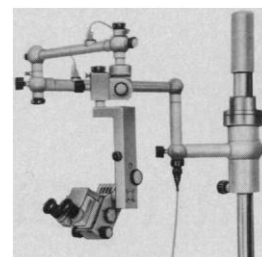
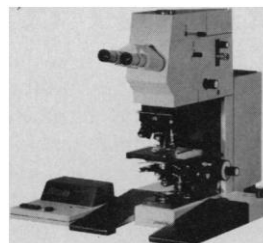
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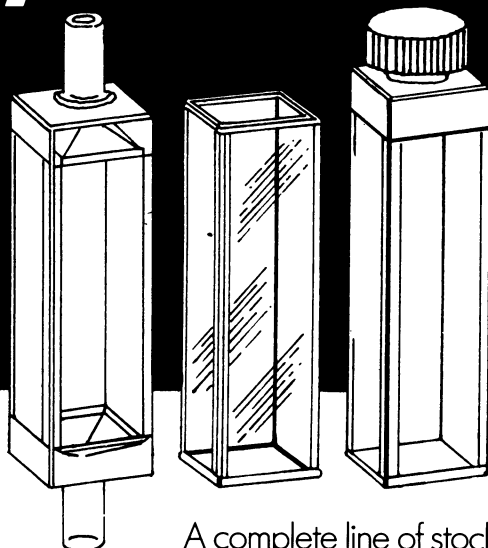
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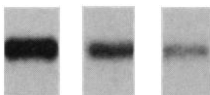
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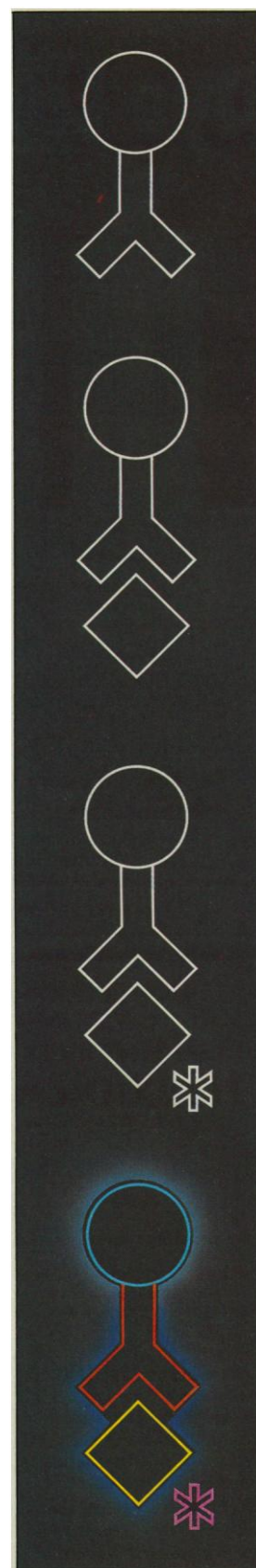
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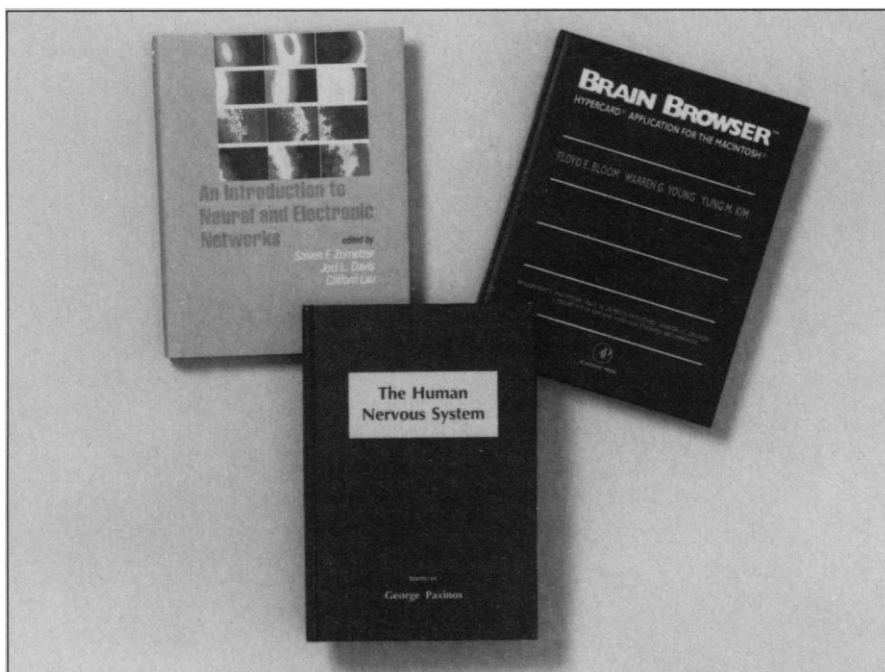
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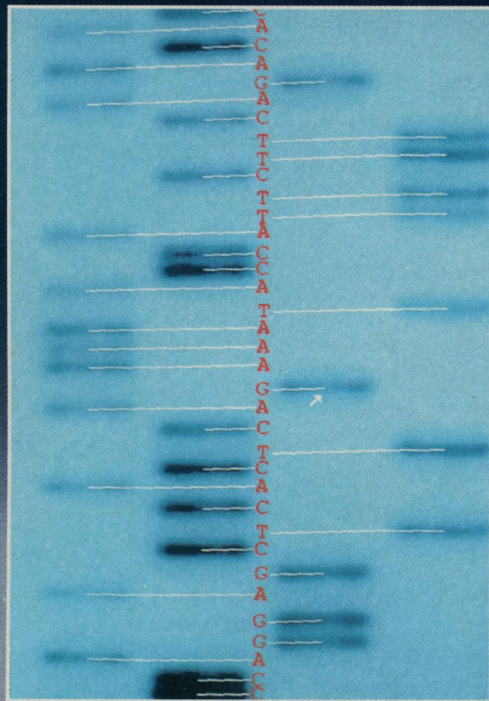
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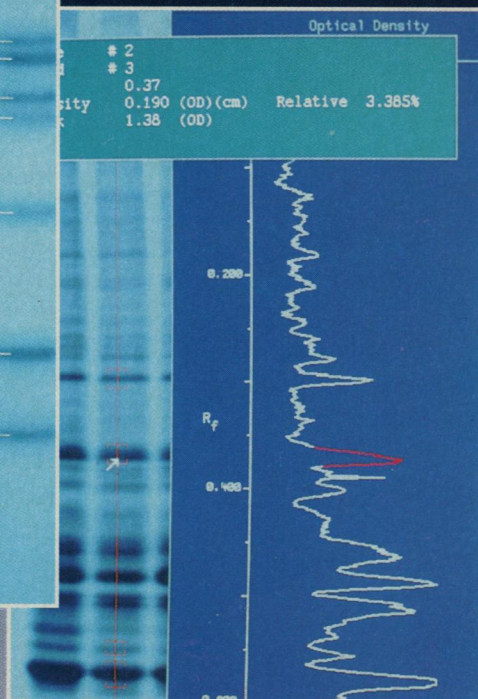
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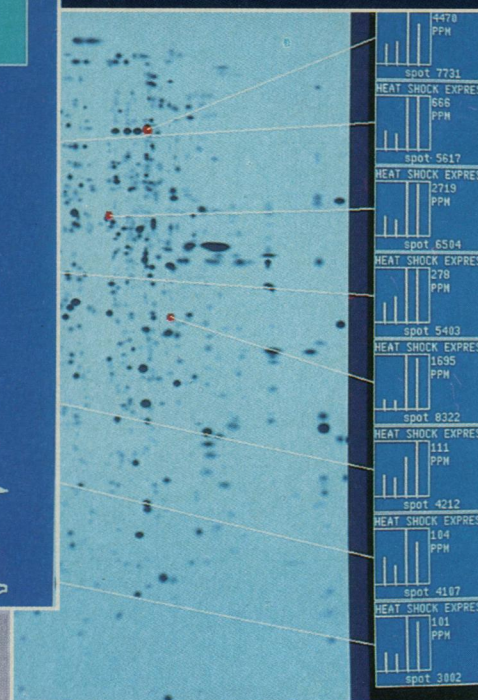
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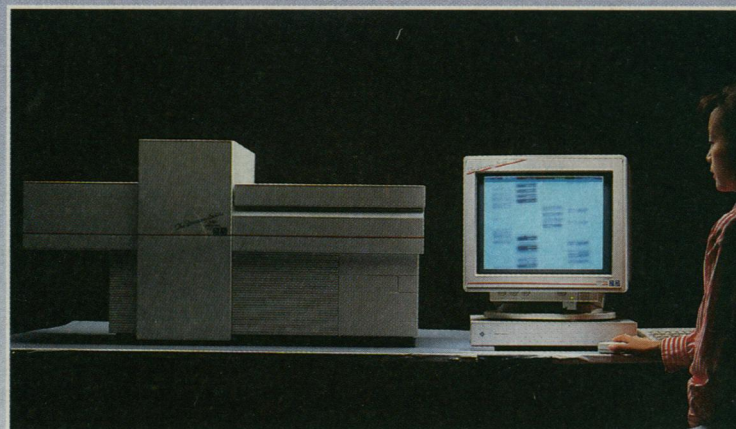
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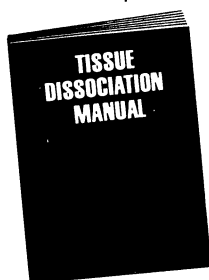
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