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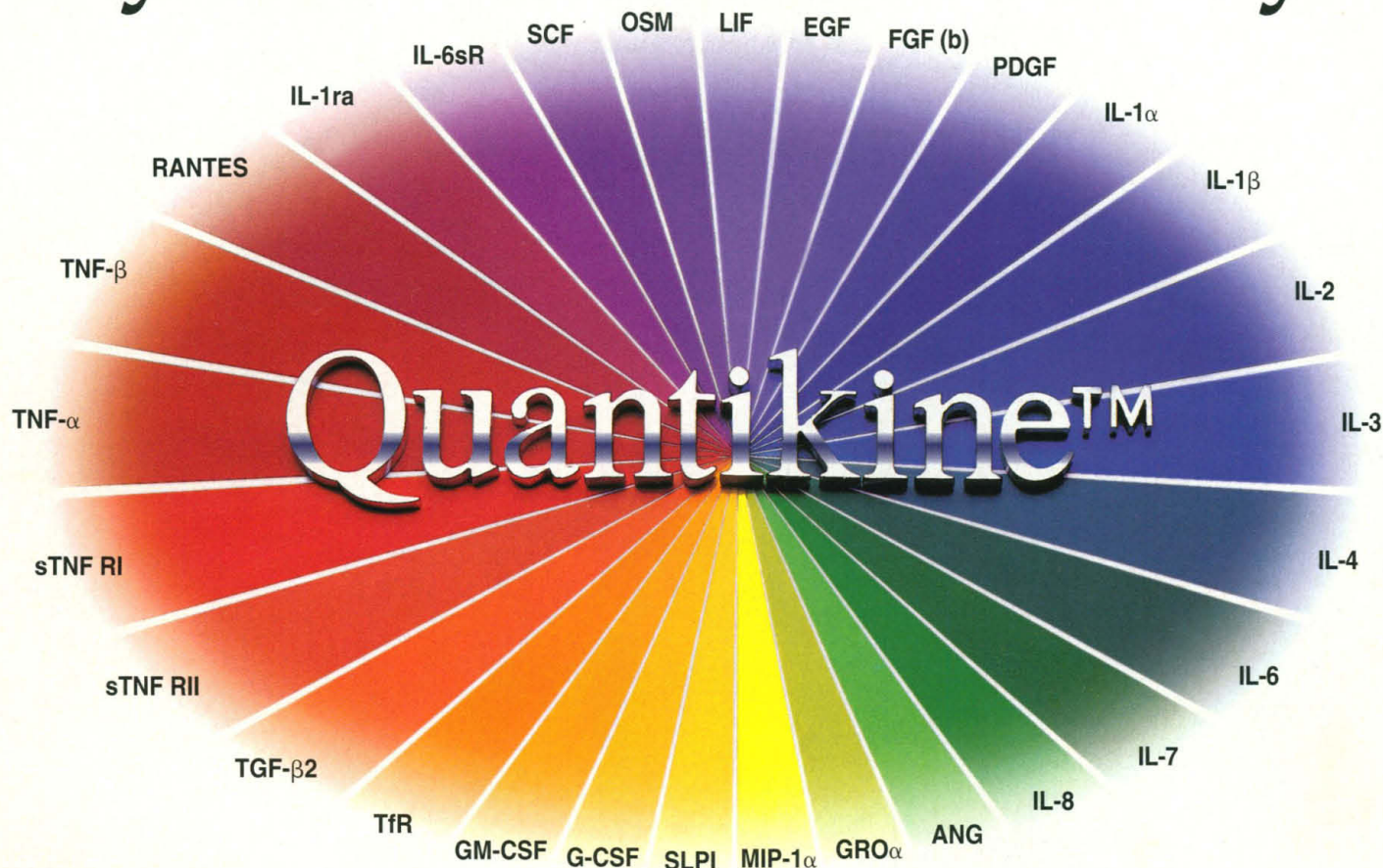
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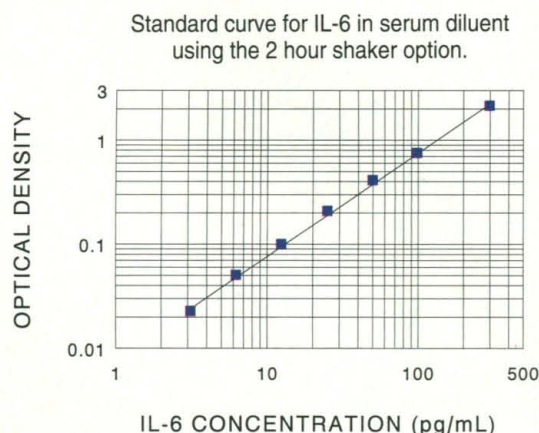
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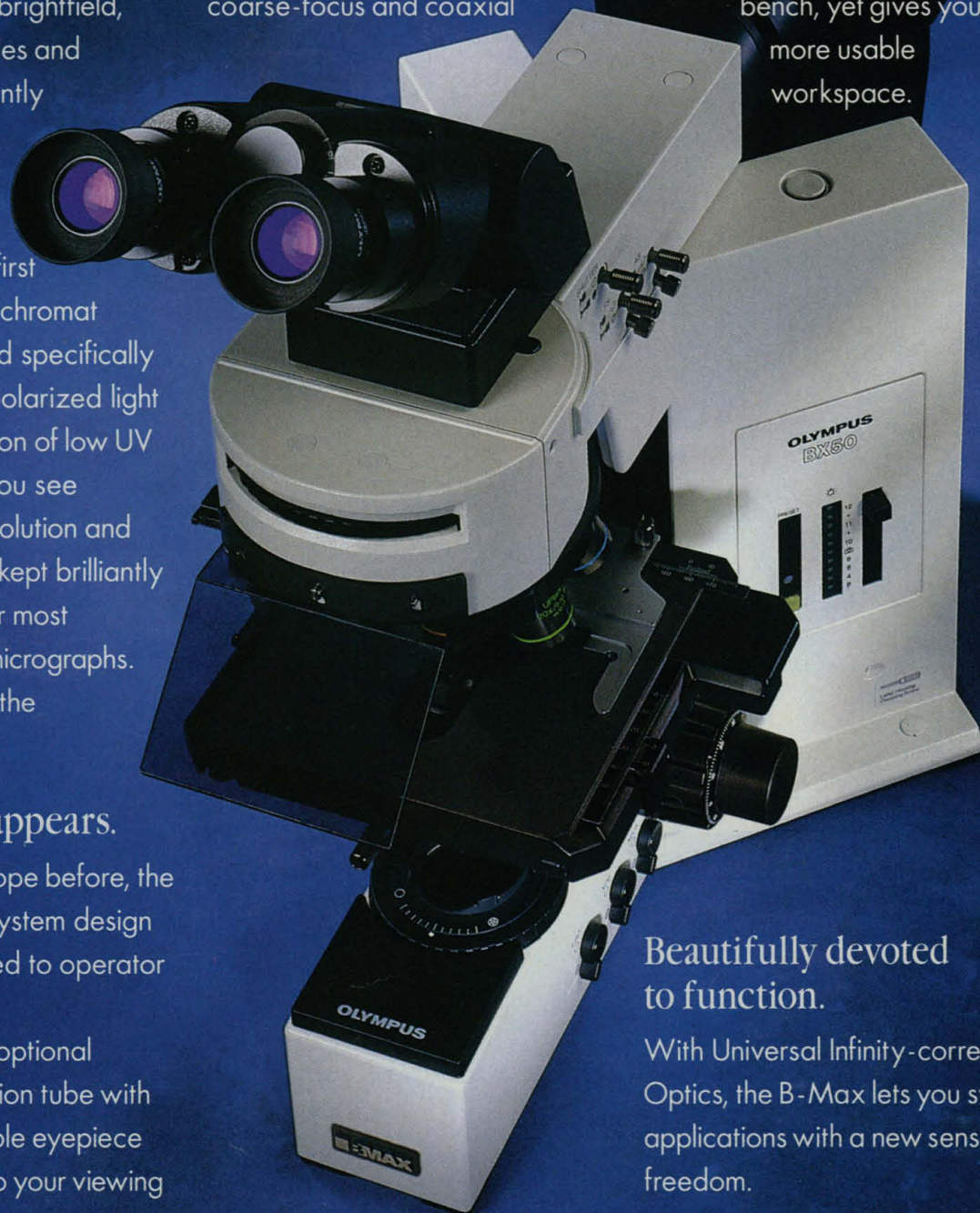
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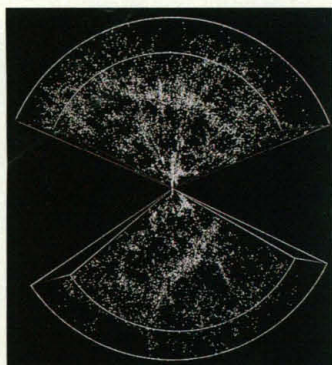
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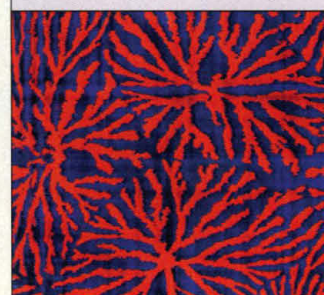
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A polyanhydride film viewed under cross-polarized light microscopy. Polyanhydrides can be designed to degrade within any length of time ranging from 1 day to 6 years by the alteration of their chemical composition. These bioerodible polymers are currently used in drug

delivery devices for the treatment of brain cancer and other diseases. See page 1715. These polymers are among the materials discussed in the special section on Materials Science beginning on page 1698. [Photograph: E. Mathiowitz, J. Jacob, and D. Chickering]



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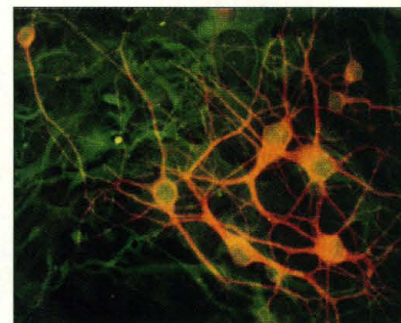
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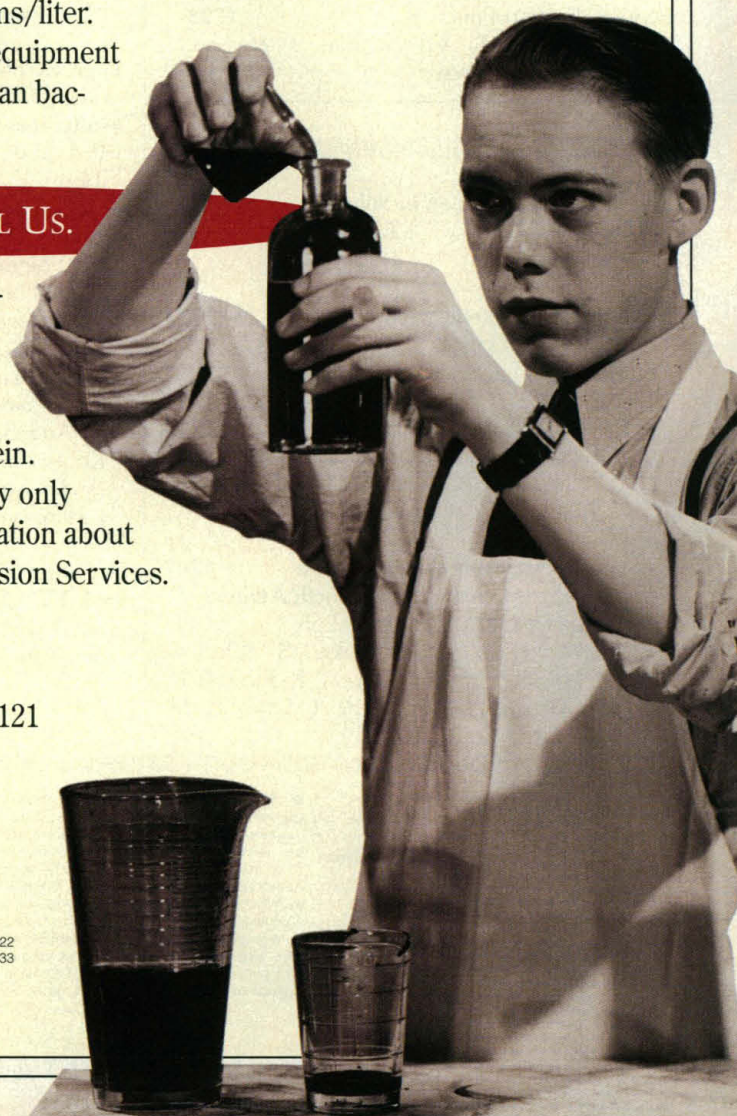


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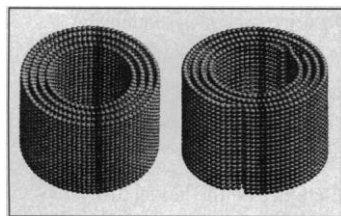


## Slip-sliding away

Molecularly thin films can have properties very different from the same material in bulk. Reiter *et al.* (p. 1741) applied an oscillatory shear motion to films of a covalent fluid confined between atomically smooth mica surfaces and found its frictional response to be intermediate between what would be expected of a simple liquid or solid. The film deforms reversibly under lateral motions up to a significant fraction of its thickness and then yields, a behavior reminiscent of rubber. Comparison to the response of monolayers that are strongly attached to the substrates and thus present a well-defined shear interface suggests that the sliding observed here may be due to slipping of the fluid molecules along the mica walls.

## Carbon paper

Bucky tubes and bucky onions, among the more exotic products of the current infatuation with fullerenes, have been



thought to be tidily layered structures made of concentric fullerene-like sheets, but Zhou *et al.* (p. 1744) say otherwise. By studying physical and chemical properties of these carbon nanostructures, including their compressibility, they deduce that defects are not only present but important, and that the structures are continuous, not nested. Locally, bucky tubes and onions resemble turbostratic graphite and are best described overall as a paper-mache of graphitic sheets.

## Fat pigs, skinny pigs

Domestic pigs have been bred over the centuries from their wild ancestors for rapid growth and low body fat, polygenic qualities linked to several genetic loci and influenced by environmental factors. Andersson *et al.* (p. 1771) crossed pure-bred Large White domestic pigs with European wild boars to produce mixed offspring that grew more slowly and were more fatty; using linkage maps based on established DNA markers for the porcine genome, they were then able to show that growth and fatness are correlated with a cluster of quantitative trait loci (QTLs) on chromosome 4. These findings may be a starting point for a search for comparable QTLs related to human obesity.

## Salt, dust, and ice

The size and intensity of the polar atmospheric circulation probably changed greatly between recent glacial and interglacial times, causing changes to the input of sea salt and continental dust to central Greenland. Mayewski *et al.* (p. 1747) have evaluated the 41,000-year records of numerous chemical species in two recently drilled ice cores from Greenland. The amounts of sea salt and dust incorporated into the ice are generally larger in parts of the core representative of colder times, indicating the presence of a large and strong polar circulation system, but there are also several interesting deviations from this broad correlation.

## Better barrier

Gallium arsenide (GaAs) has several potential advantages over silicon for the construction of field-effect transistors (FETs), including faster operation and optoelectronic capabilities. Hopes for GaAs have been stymied, however, because unlike silicon it does not form an insulating oxide layer that would isolate the transistor from its environment. Jenkins *et al.* (p. 1751) have grown gallium sulfide (GaS) on GaAs by vapor deposition to form an insulating

barrier that passivates the GaAs surface, and have thus made a GaS/GaAs FET with an on-to-off resistance ratio comparable to that of commercial devices.

## Hard shell

Metal surfaces coated with diamond films would have exceptional wear resistance and durability, but making diamond stick to metal is difficult. Moreover, diamond film is often chemically incompatible with steel surfaces, owing to carbon solubility and reactivity of the metal surface. Drory and Hutchinson have chemically deposited a diamond coating onto commercial titanium alloy (p. 1753), and have used an indentation method to show that the diamond adheres well. The diamond-on-metal films offer a test bed for studying other metal-ceramic interfaces.

## Dissolving Fas

The Fas molecule is a cell surface receptor that signals apoptosis and which has been linked to excessive lymphocyte apoptosis in HIV-infected humans. Cheng *et al.* (p. 1759) have found a soluble version of Fas, encoded by a variant form of Fas messenger RNA, that, in vitro, attaches to Fas antibodies

and blocks their action against cell surface Fas molecules. Human patients with systemic lupus erythematosus, an autoimmune disease, showed elevated levels of soluble Fas, and injection of soluble Fas into mice gave rise to autoimmune deficiencies.

## Brain waves

The roles of astrocytes and neurons, which together make up the central nervous system, have generally been thought distinct: The neurons do the signaling, and the astrocytes provide structural and trophic support. Recently, however, astrocytes have been shown to respond to neuronal triggers, and now Nedergaard (p. 1768) has shown that the reverse is also true. A single astrocyte in a culture of rat astrocytes and neurons was electrically stimulated, generating a wave of increased cytosolic calcium that spread not only to neighboring astrocytes but also to neurons. The neuronal response was decreased by the gap junction blocker octanol, suggesting an intercellular rather than synaptic mode of transmission.

## Rule reversal

In the development of double-positive CD4<sup>+</sup>8<sup>+</sup> thymocytes, positive selection normally pushes those carrying major histocompatibility complex (MHC) class I T cell receptors onto the CD8 lineage, while those with MHC class II receptors follow the CD4 path. Bendelac *et al.* (p. 1774) have found an exception to this rule in the form of a subset of T cells that can be selected by MHC class I molecules and yet are CD4<sup>+</sup>, indicating that signals from CD8 are not necessary to generate a T cell with specificity for class I.



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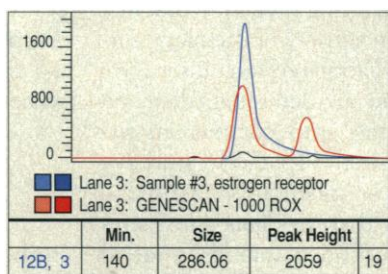
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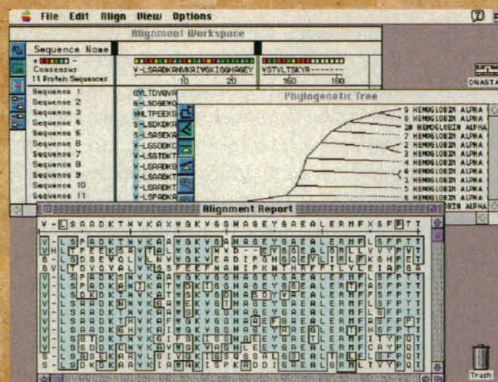
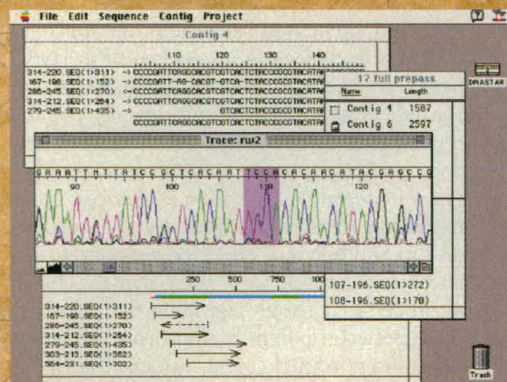
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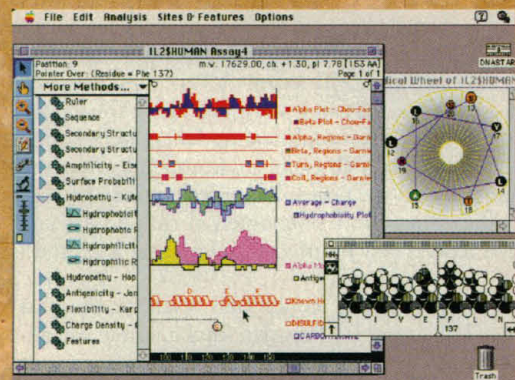
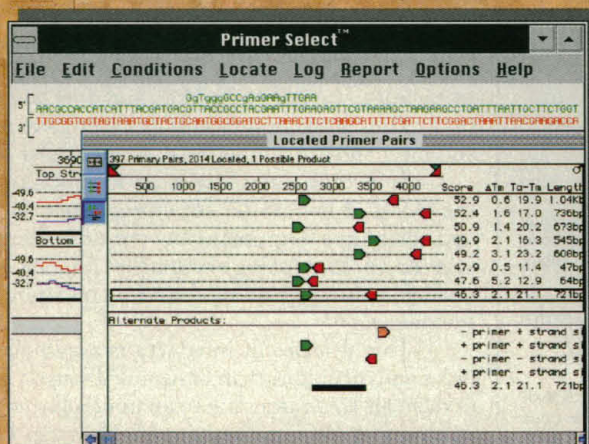
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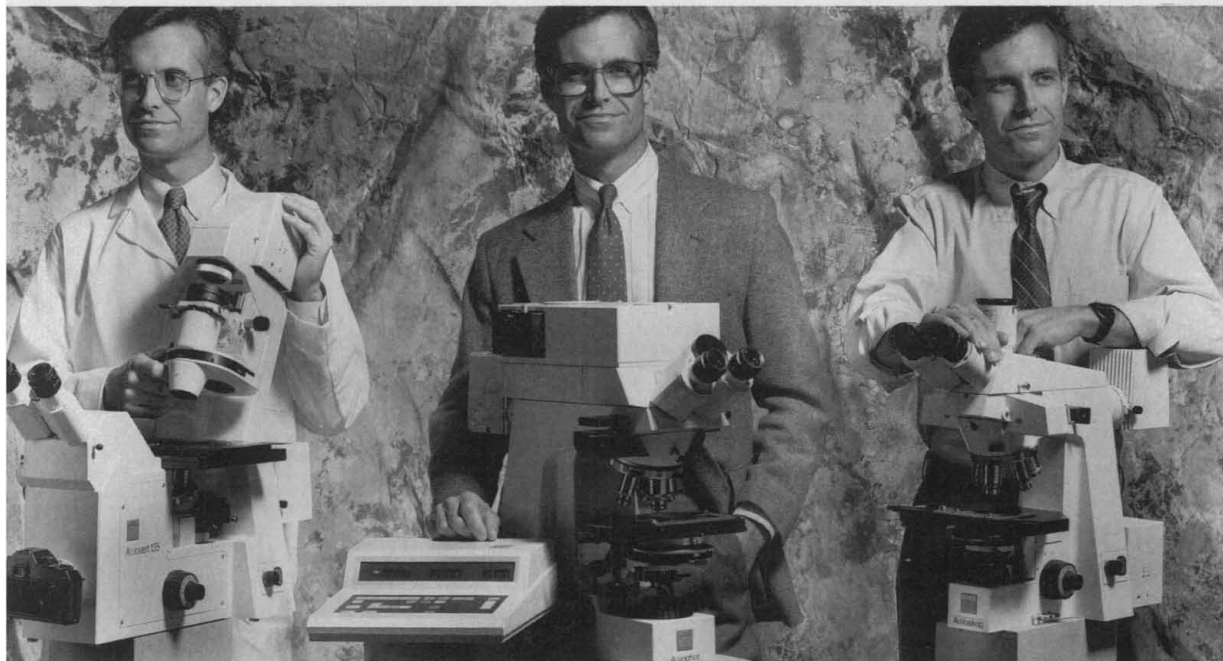
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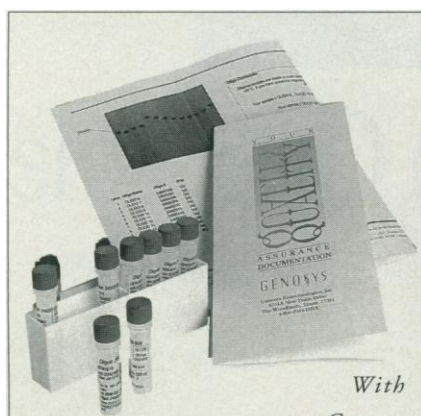


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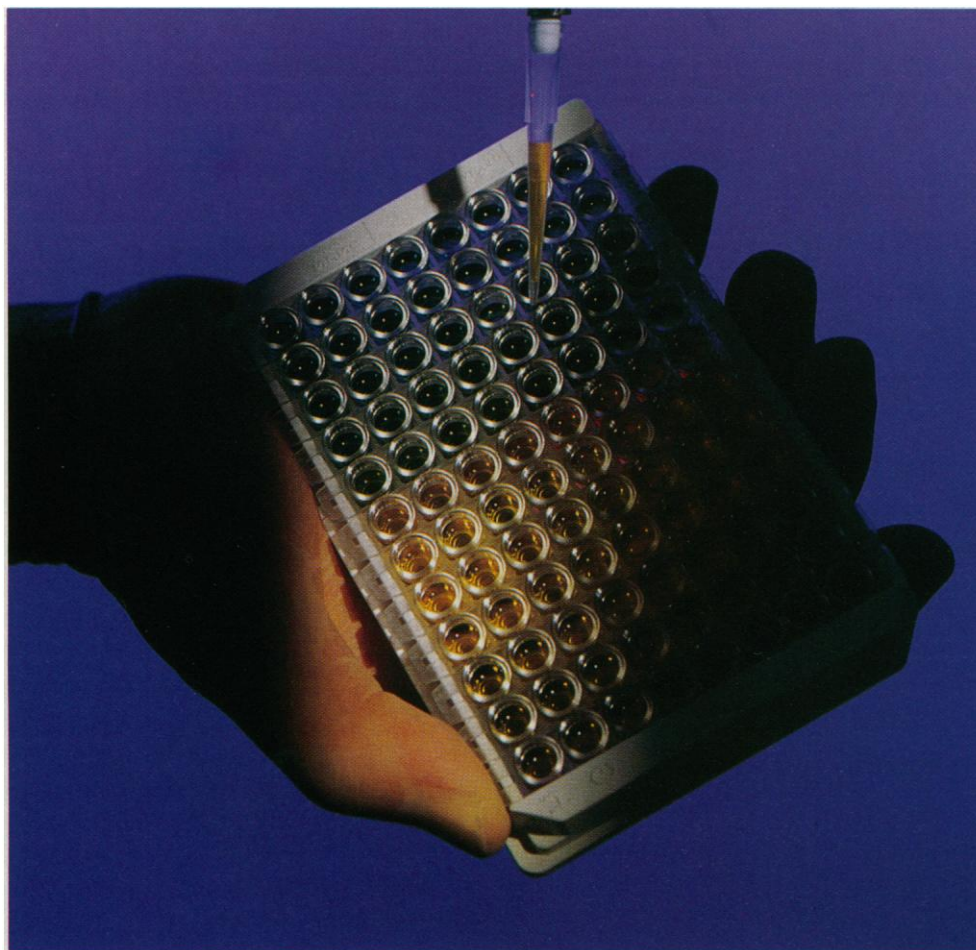
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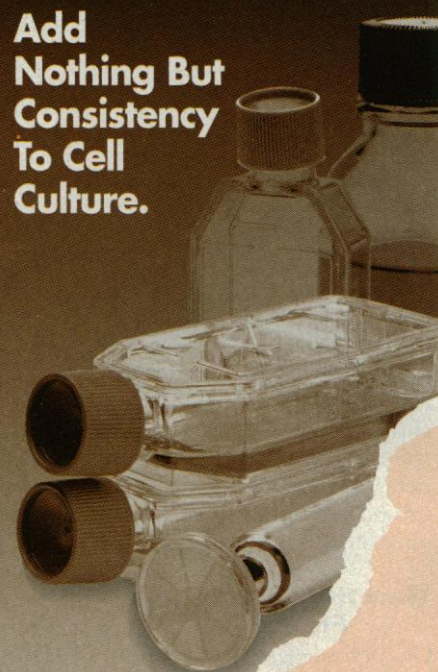
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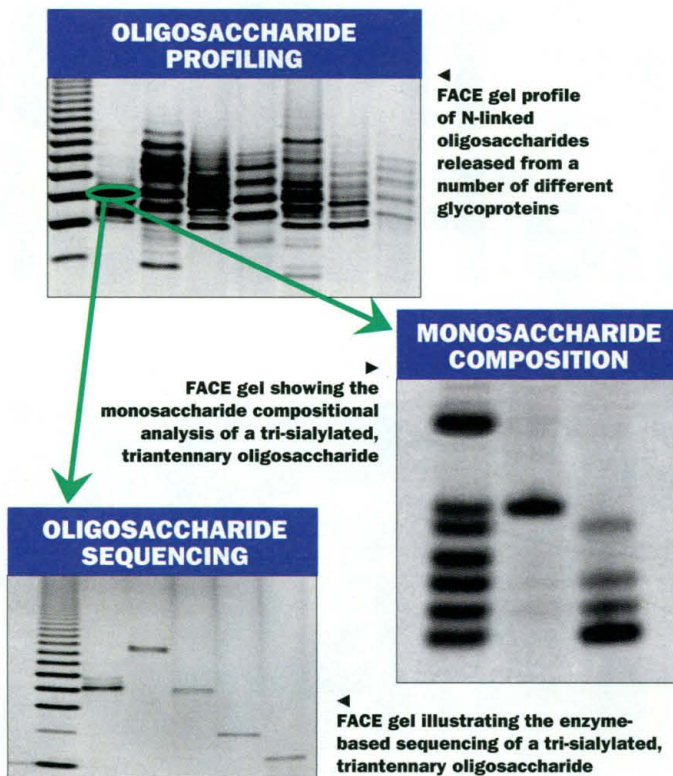
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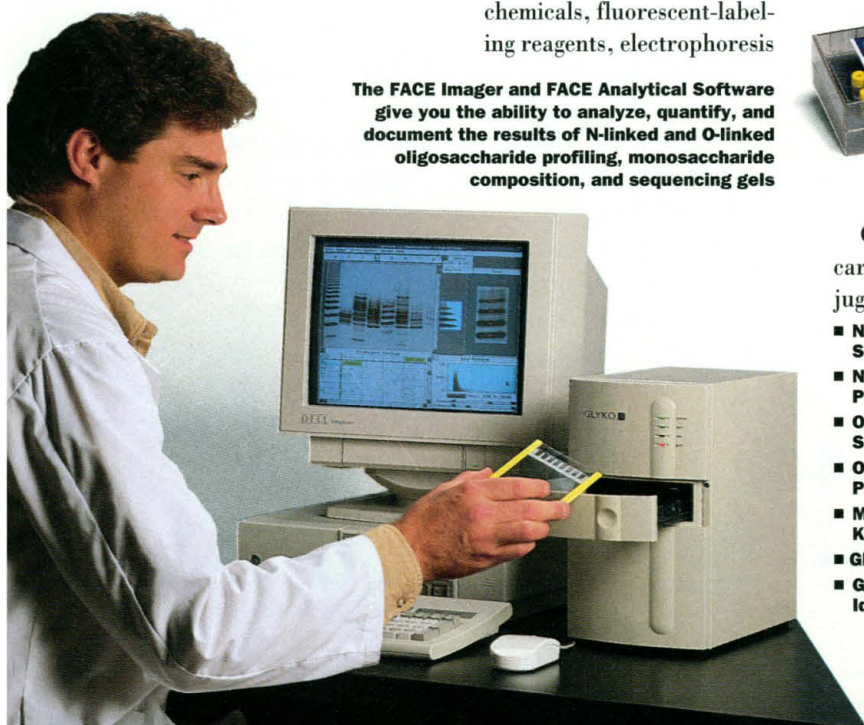
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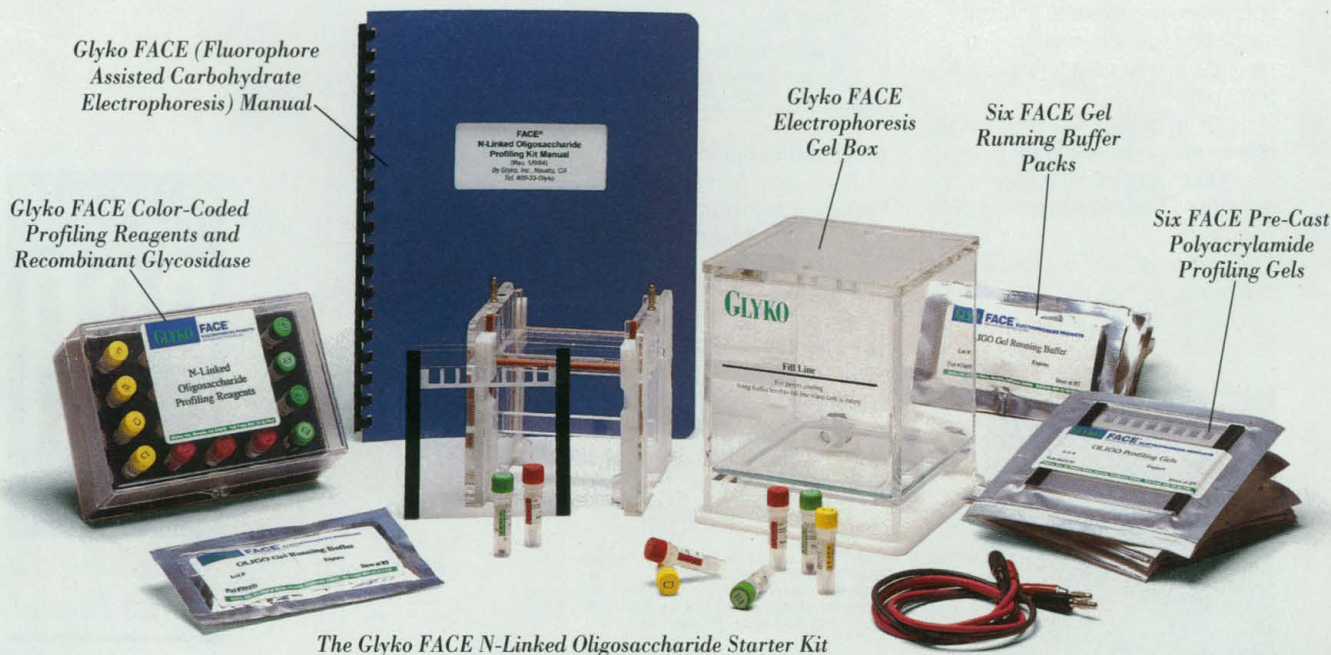
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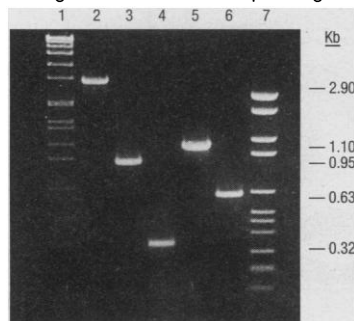
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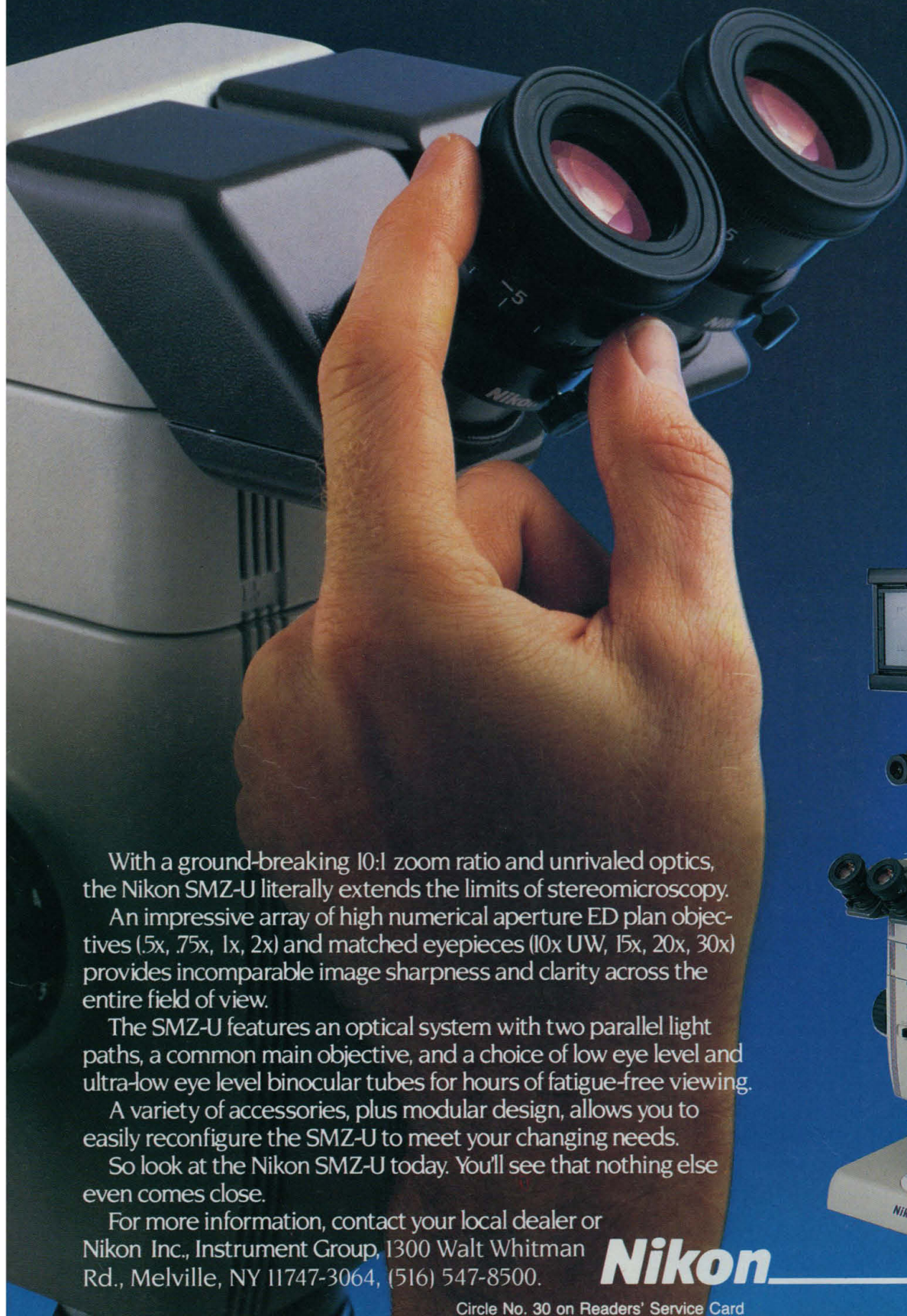
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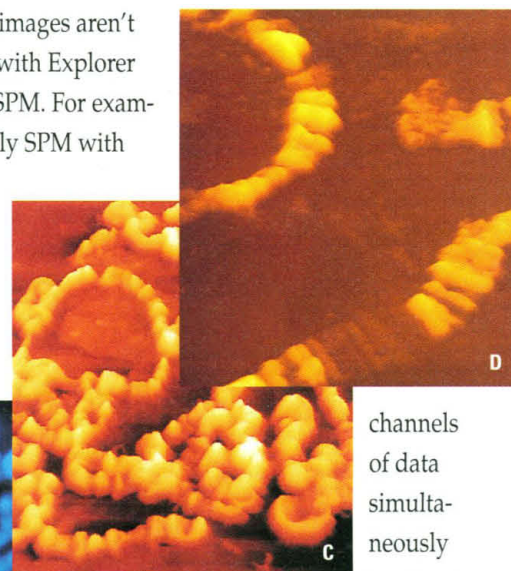


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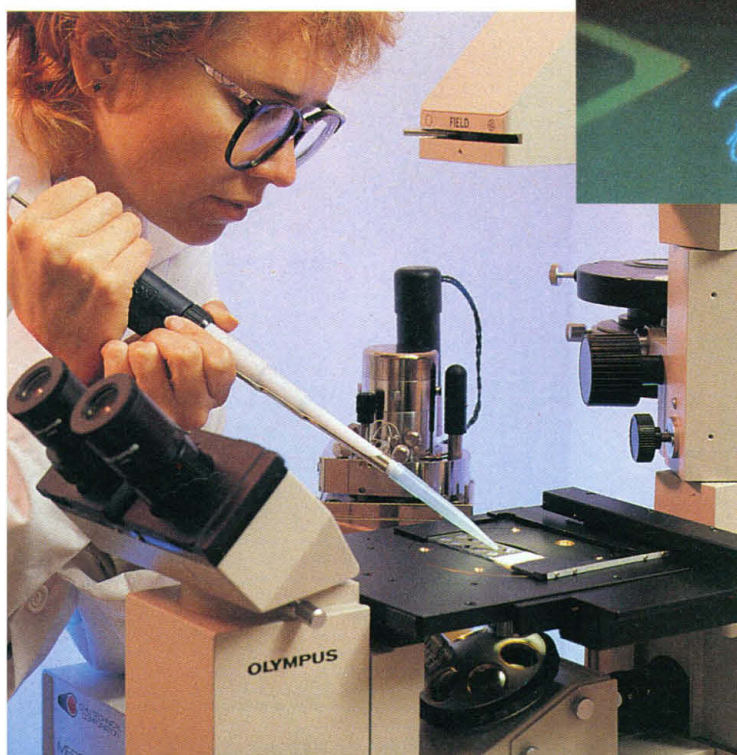
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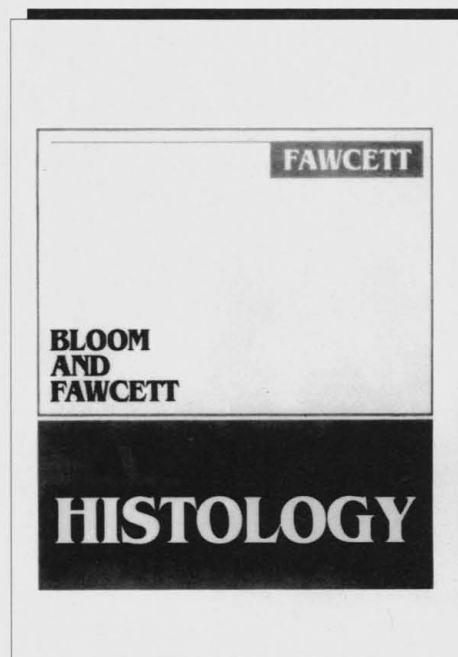
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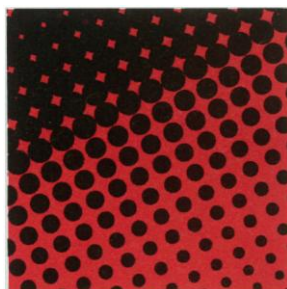
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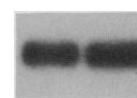
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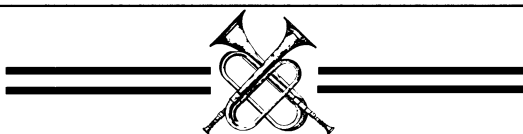
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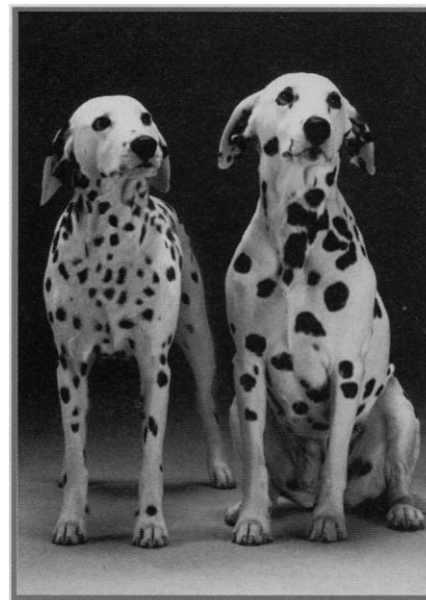
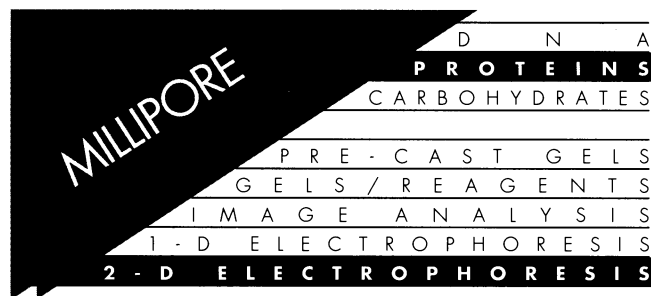
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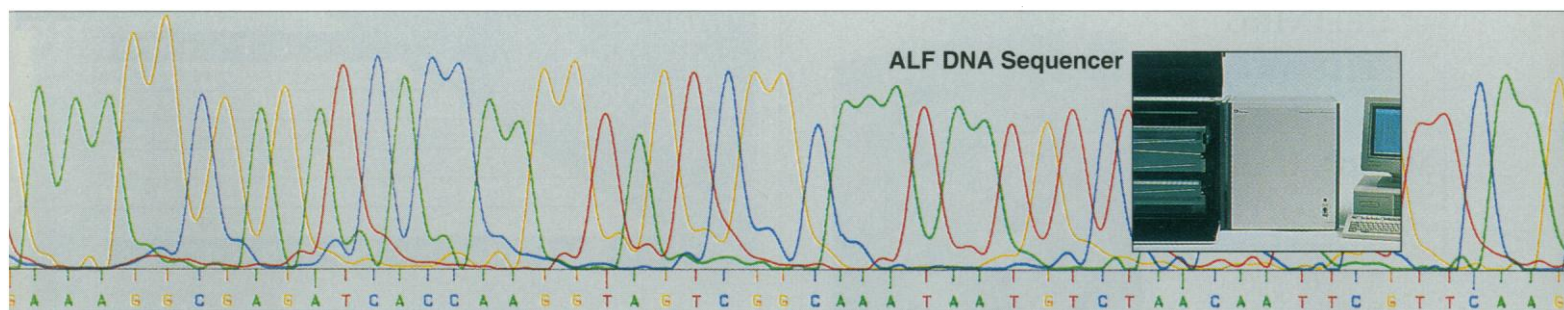
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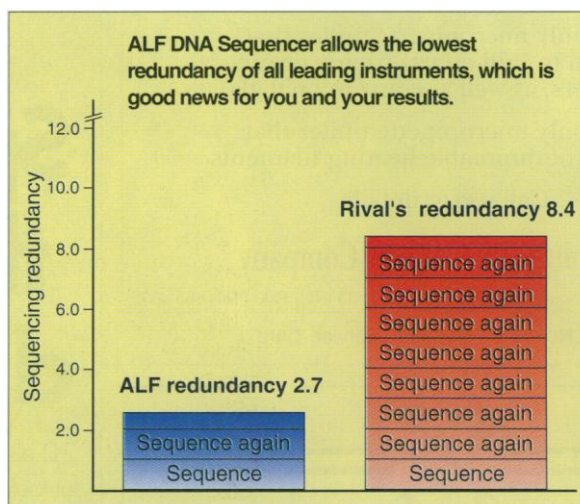
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1. Comparison of three non-isotopic automated DNA sequence analysis systems. *Clinical Chemistry*, 38 (1992) 465, Van Ranst, M., Fiten, P., Voet, M., Volckaert, G., Opendakker, G.
2. Automated low-redundancy large-scale DNA sequencing by primer walking. *BioTechniques* 15 (1993) 714-721, Voss, H., Wiemann, S., Grotheus, D., Sensen, C., Zimmermann, J., Schwager, C., Stegemann, J., Erfle, H., Rupp, T., Ansorge, W.
3. Sequence length and error analysis of Sequenase and automated Taq cycle sequencing methods. *BioTechniques* 14 (1993) 442-447, Koop, B.F., Rowan, L., Chen, W.-Q., Deshpande, P., Lee, H., Hood, L.

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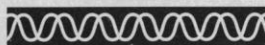
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