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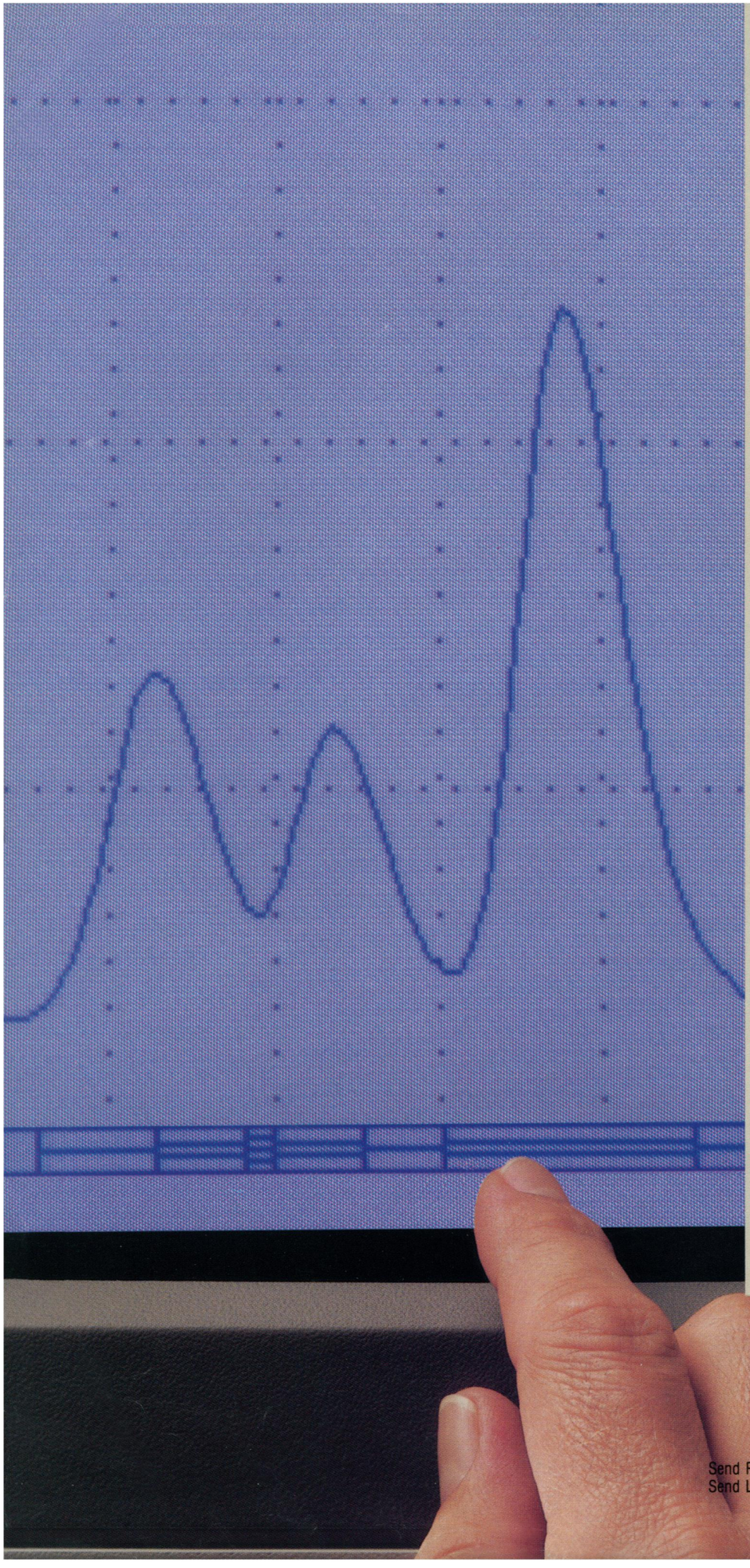

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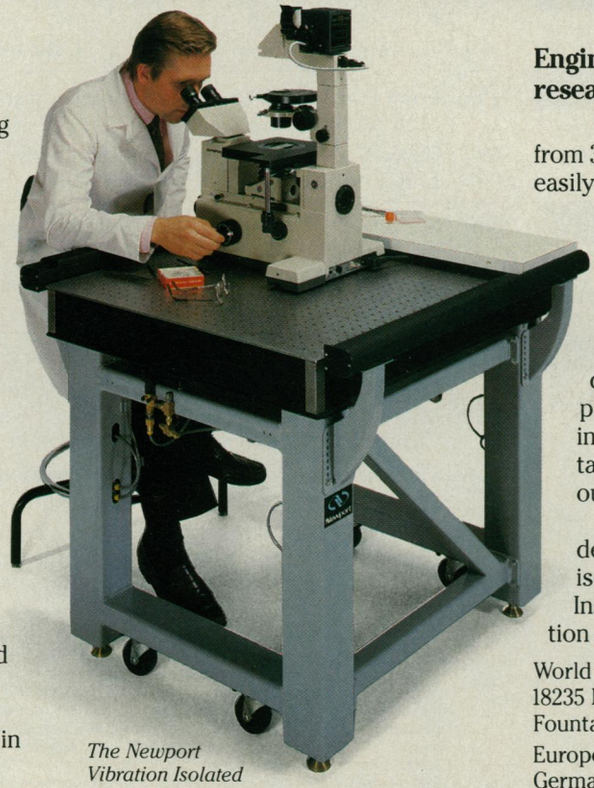

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COVER Electron micrograph of the Hin invertasome, a novel nucleoprotein structure that contains three distant DNA sequences brought together by the interaction of two different proteins. The Hin protein (a site-specific recombinase) binds to two recombination sites that are subsequently localized to the Fis-bound recombinational enhancer by Hin-Fis protein-protein interactions. This complex assembly represents a key intermediate in the recombinatiion reaction. See page 511. [Karen A. Heichman and Reid C. Johnson]

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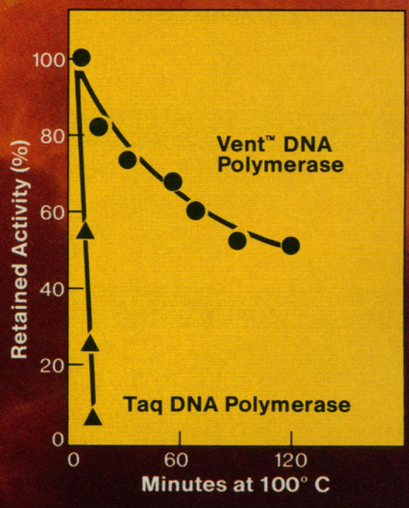

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This Week in SCIENCE

Meta-analysis

As one expert has put it, the opinions of experts are on average no good, because what any expert concludes in a review of a body of work is generally based on that person's training. But through the statistical technique called meta-analysis it may be possible to bring more rigor to the summing-up efforts of data analysts in fields as unlike one another as medicine, marketing, meteorology, and education. Meta-analysis applies formal statistical methods to collections of separate but similar experiments. It is a controversial technique, subject to various misapplications and misinterpretations. The technique, its strengths, potential applications, and anticipated pitfalls are described on page 476 by Mann.

Evolution in vitro

VARIATION, selection, and replication, three events that occur in evolution, can be made to occur in the laboratory with a new procedure called SELEX. SELEX leads to enrichment of those nucleic acid ligands that bind with highest affinity to a target protein. Besides providing further insights into how proteins and nucleic acids interact (which is all-important for understanding gene expression), SELEX may help elucidate steps that have occurred in the evolution of these interacting species and may make it possible to "evolve" useful high-affinity molecules for clinical and pharmacological purposes. SELEX is discussed by its developers, Tuerk and Gold (page 505), and by Abelson in a Perspective (page 488).

Low-lying locomotion

BLACK racer snakes can slither along the ground in several different ways. When they undulate laterally, all parts of the body move at once and a sinusoidal trajectory is traced along the ground. When they move by concertina locomotion, which is an effective strategy for moving through tunnels and other tight places, different parts of the body are in motion while others are at rest. How costly, in terms of energy expended, are these types of locomotion and how do they compare with the costs of locomotion by limbed animals? Snakes fitted with masks were put on motorized treadmills; oxygen consumption was measured and speed, endurance, and type of movement recorded (page 524). The net costs of transport (how much energy is required to move the animal a given distance) were compared with costs predicted for limbed animals—birds, lizards, and mammals—of similar size. Concertina movement was more costly than lateral undulation, which was as costly as the locomotion of the various limbed animals. This surprising result refutes biomechanical predictions that limbless motion would be economical. Walton *et al.* point out that because limbless locomotion is so costly for getting out of tight spots (the concertina mode), retention of even the smallest of limbs may have been favored in evolution.

AIDS enzyme inhibitor

HIV-1 protease is an enzyme that is essential for proper assembly and maturation of infectious AIDS viruses; it has therefore been considered a prime target for novel antiviral agents. Erickson *et al.* describe the rationale behind the design of a new protease inhibitor—A-74704—and the crystal structure of a complex that includes this molecule in the active site of the enzyme (page 527). The inhibitor was designed so as not to be proteinaceous; in other instances it has been found that peptides are poorly absorbed when administered by the oral route and are subject to rapid degradation and metabolism in host organisms. A-74704 is a symmetric molecule that fits into the twofold symmetric active site of the protease. It was 10,000-fold more selective for the HIV-1 protease than for other tested proteases, some of which, like renin and pepsin, are essential normal components of the host organism whose activities should not be inhibited.

Antibodies in cystic fibrosis

CHRONIC lung infections plague patients with cystic fibrosis, and death is often attributed to infection with the causative bacterium *Pseudomonas aeruginosa*. However, patients who are able to make "opsonizing" antibodies to the mucoid exopolysaccharide (MEP) coating of these bacteria appear to fare better than do those who make nonopsonizing antibodies; the opsonizing antibodies help leukocytes ingest and then kill the bacteria. Although there is no animal model available for cystic fibrosis, it is possible to induce chronic lung infections in mice and rats with *Pseudomonas aeruginosa* (page 537). Pier *et al.* have found that these experimental animals can be protected from lung disease with a MEP vaccine that induces opsonizing antibodies. This raises the possibility that a similar vaccine could be used in humans to induce protective immunity.

Embryoid inducer

A factor secreted by mouse cells can change the way in which embryonic frog tissue develops (page 561). During embryonic development, animal pole cells from frog embryos form brains and eyes in response to inductive signals. When these cells are removed from embryos in the midblastula stage and put in culture, they differentiate into epidermis and nothing else. But, when they are exposed to the mouse factor PIF, pigmented eyes and brains form, twitching occurs (a sign of the development of muscle tissue), and a body axis takes shape. Sokol *et al.* partially purified PIF and show that in its presence explanted material begins to look like a miniature embryo. The ability of PIF to induce frog "embryoids" raises some interesting questions: do frog cells make an equivalent factor, what is the role of PIF in mice, what is the relation of this factor to other inducing factors in developing organisms, and does PIF interact directly with tissues or act by inducing other factors? ■ RUTH LEVY GUYER

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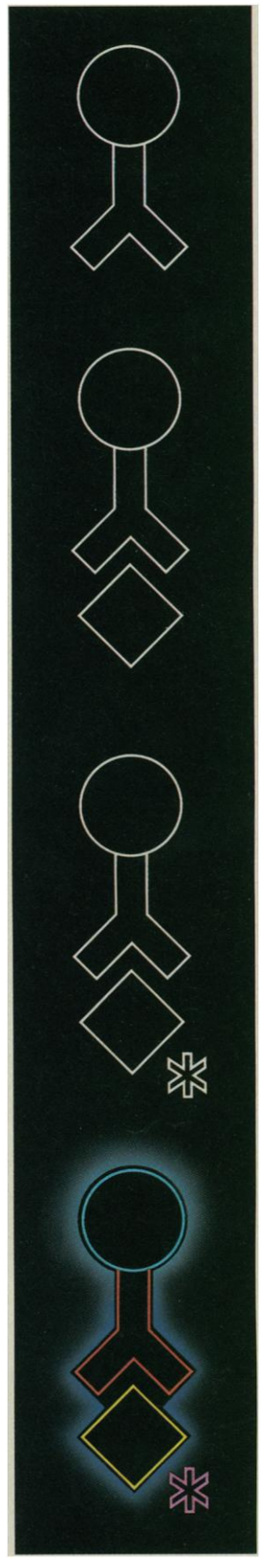

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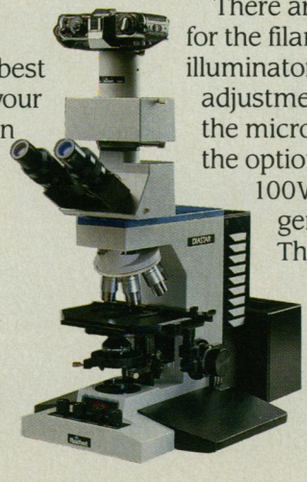

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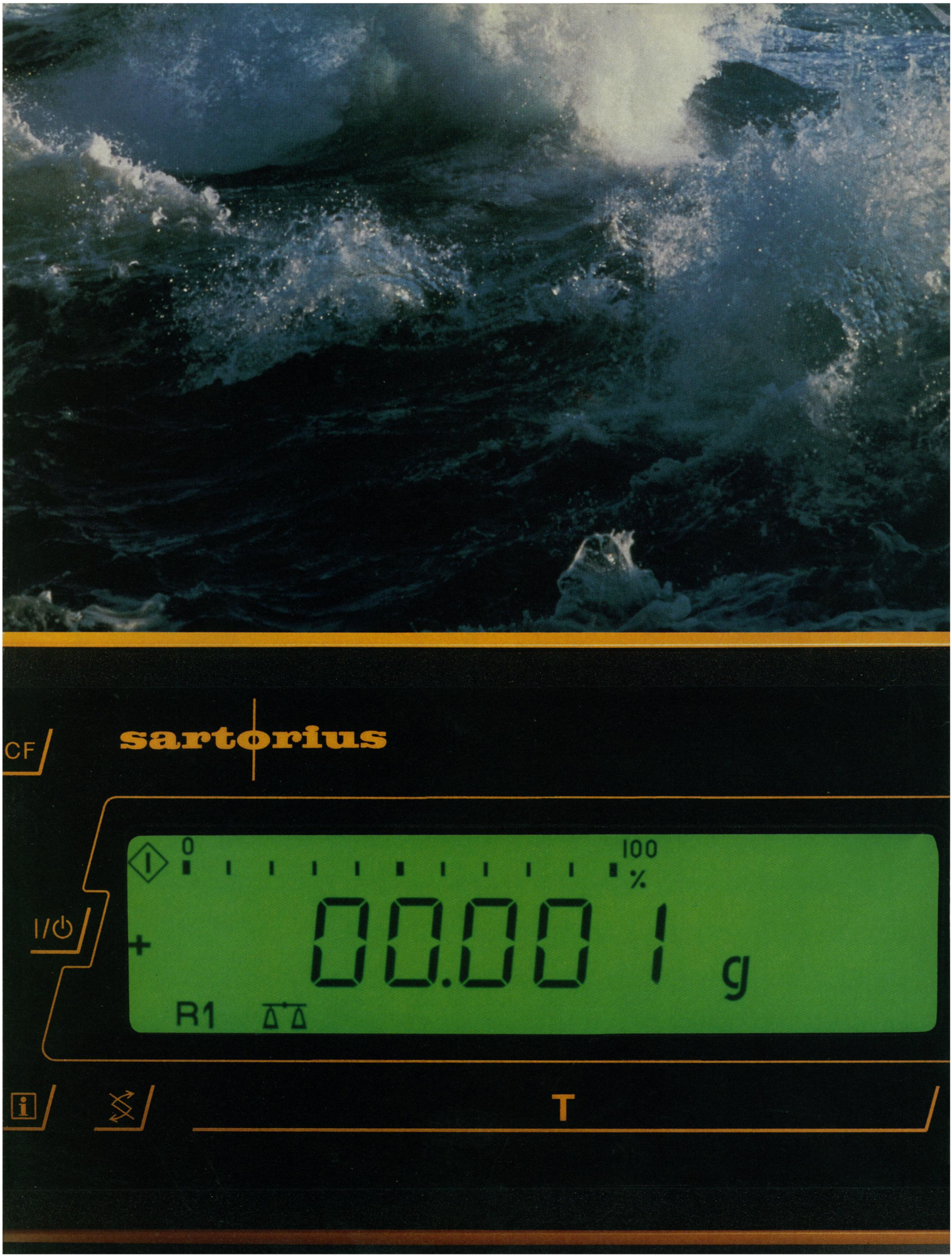
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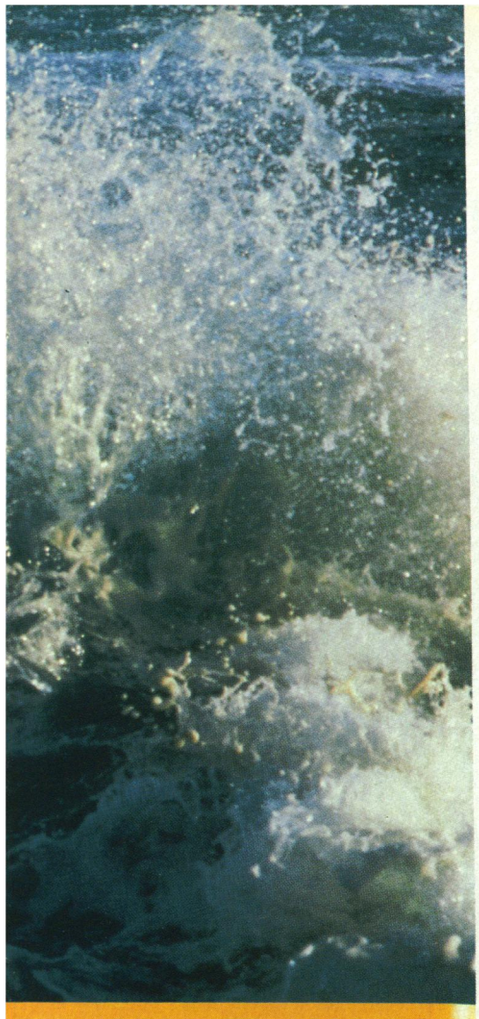

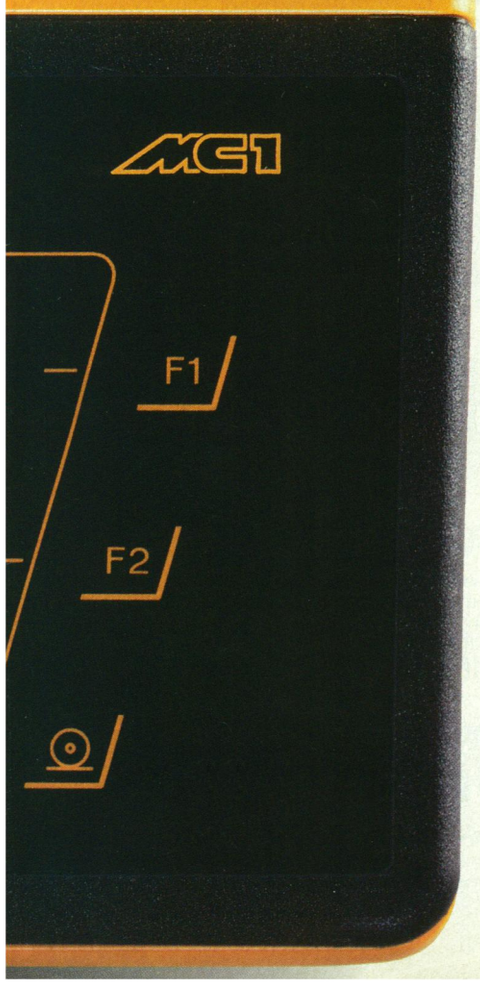

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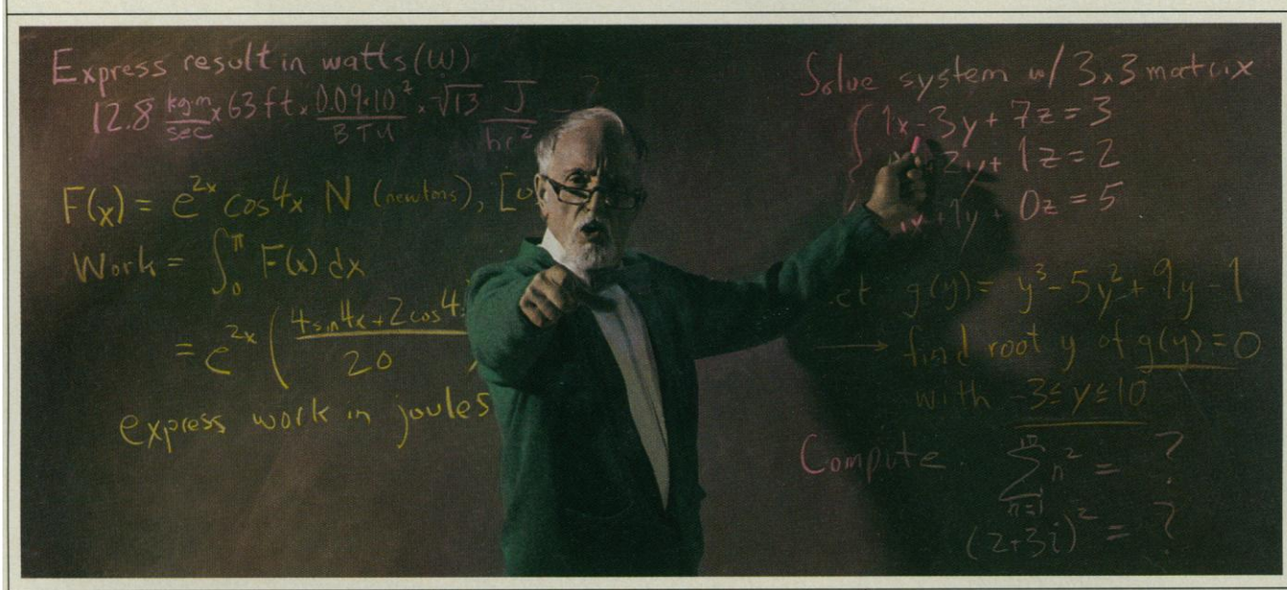

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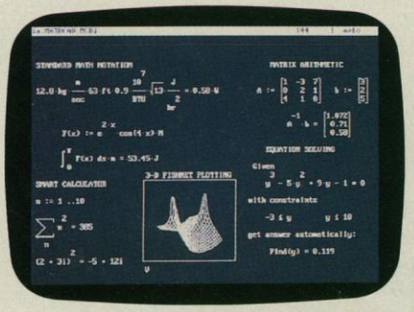

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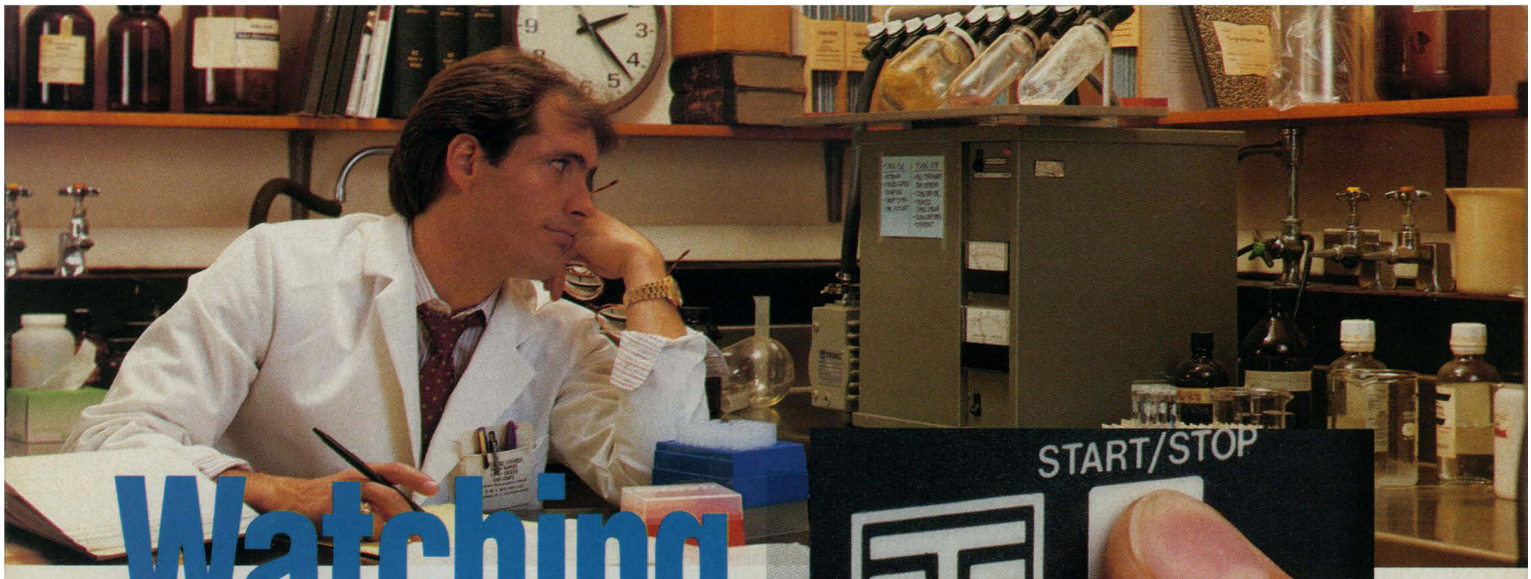

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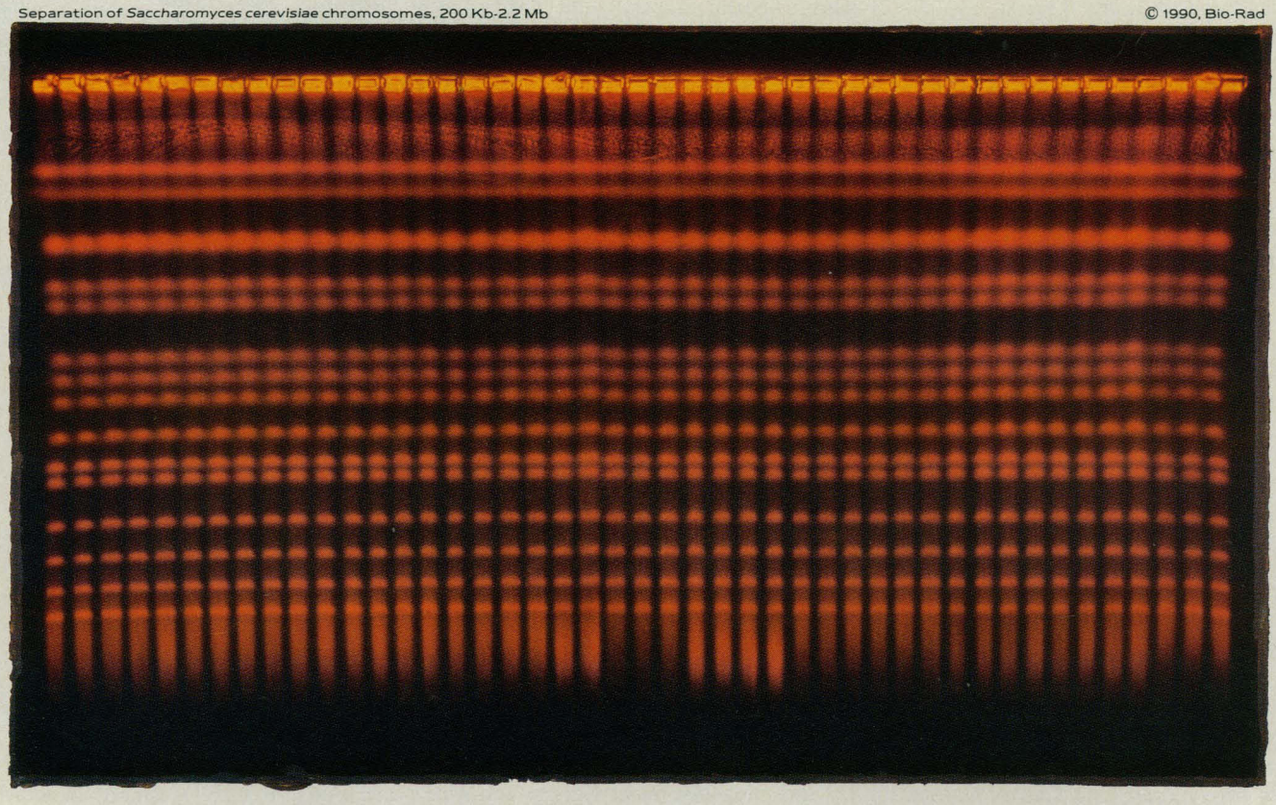

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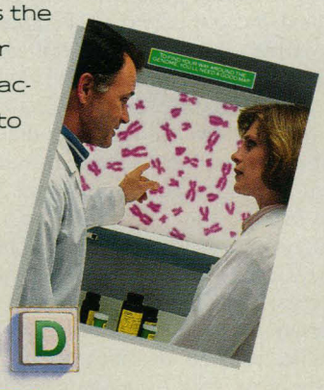

1. D. C. Schwartz and C. R. Cantor. *Cell*, **37**, 67 (1984).
2. Programmed Autonomously Controlled Electrodes. See S. M. Clark, E. Lai, and L. Hood. *Science*, **241**, 1203 (1988).

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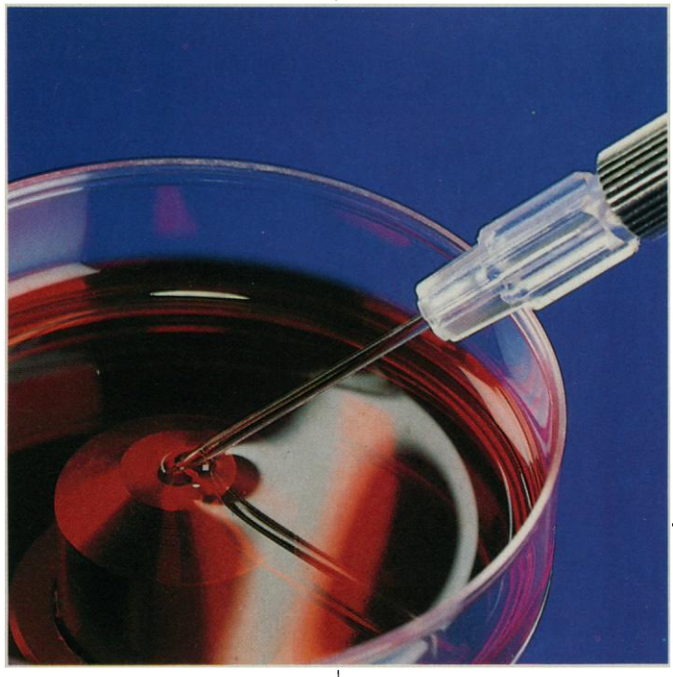

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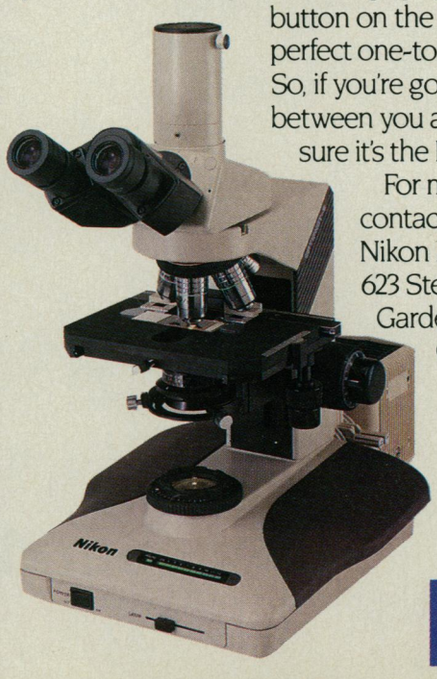

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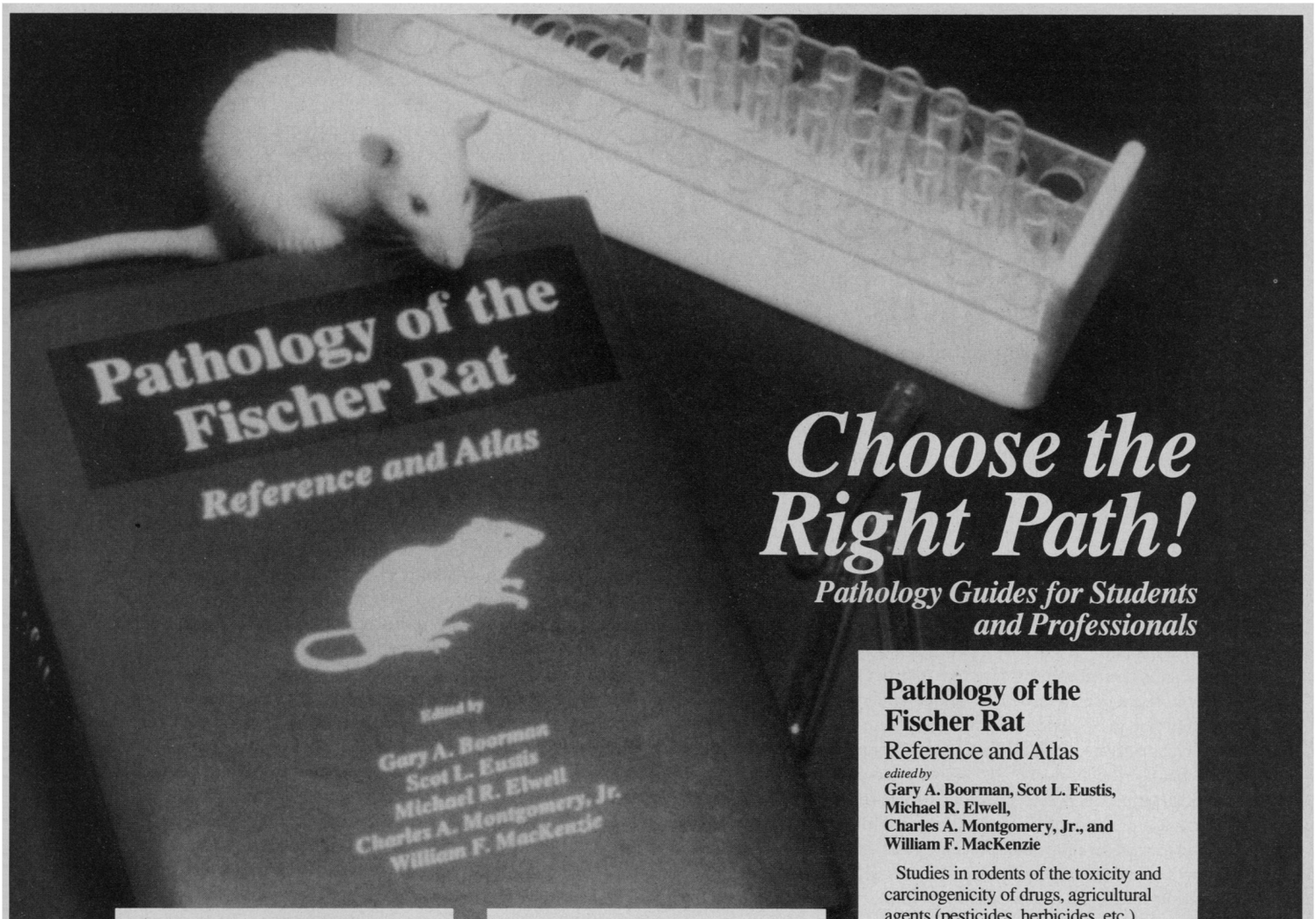

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