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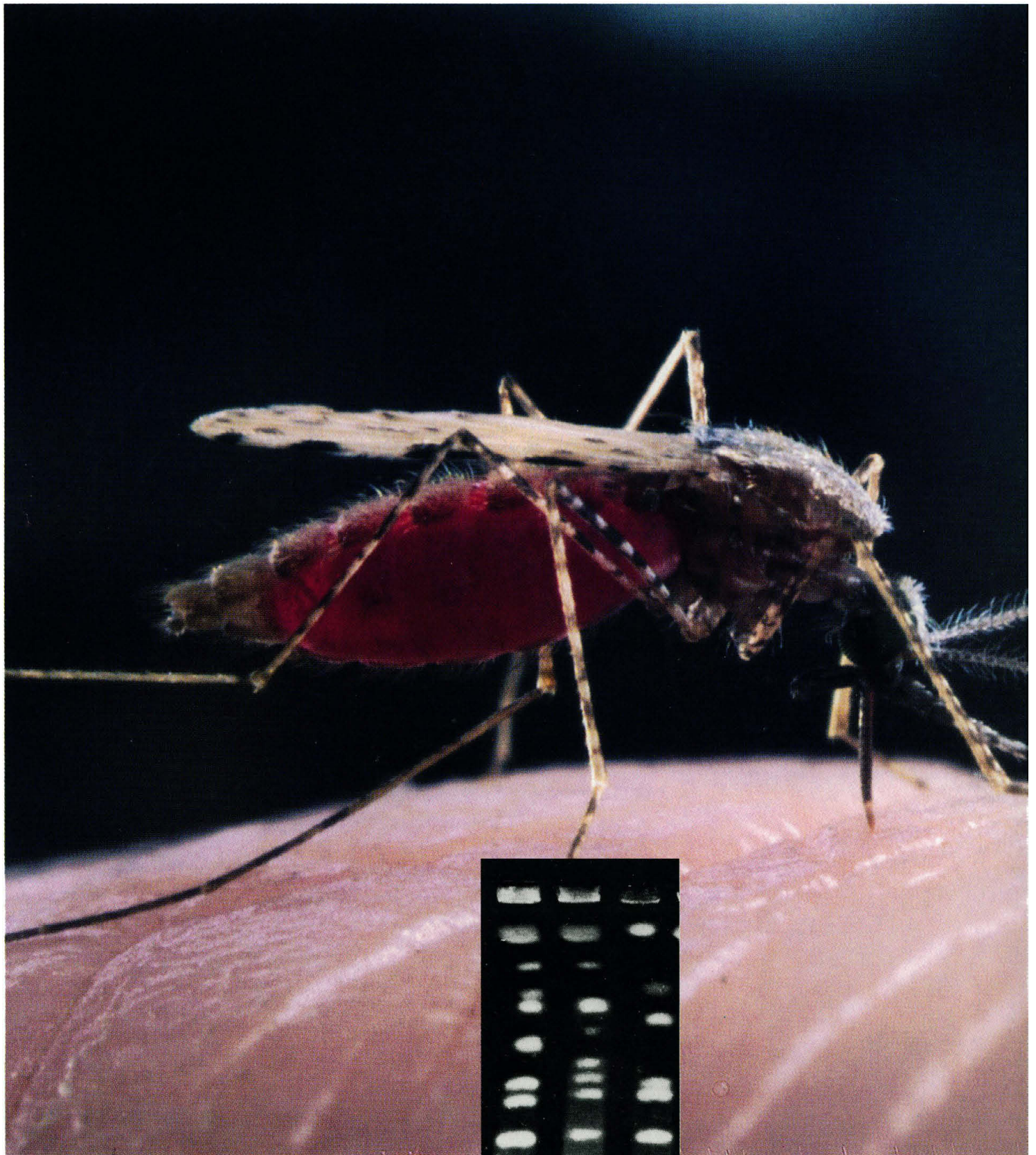
SCIENCE

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Chromosomes of 3 strains of the malaria parasite *Plasmodium falciparum*, ranging from 750 Kb to 5 Mb, separated by pulsed-field gel electrophoresis on the LKB Pulsaphor System. (Smith and Wellens, Department of Genetics and Development, Columbia University N.Y.)

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COVER Triassic sandstone and shale in valley northeast of Ulugh Muztagh, the peak on the horizon and behind the glacier in the middle ground. Note rounded topography near the glacier where Triassic sandstone, siltstone, and shale crop out and the steep topography of the mountain where metamorphic equivalents of these Triassic rocks are more resistant to erosion. See page 299. [Peter Molnar, Massachusetts Institute of Technology, Cambridge, MA 02139]

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These symposia are free, but attendance is limited and advance registration is required. To reserve a place for yourself and your colleagues at one of these symposia, please telephone 415/570-6667 or 800/874-9868 (in California, 800/831-3582), extension 8836.

TOPICS TO BE COVERED WILL INCLUDE:

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Phenol/Chloroform Extraction of Genomic DNA
Report on Mutagenesis Studies of Synthetic DNA
Hydrogen-Phosphonate Chemistry Update
New Base-Composition Assay for Synthetic DNA
Powerful "Benchmark" DNA Synthesizer
DNA Purification Using Optimized HPLC System
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LOCATIONS and DATES

Houston, Texas	Wednesday, February 4, 1987
Raleigh-Durham, North Carolina	Friday, February 6, 1987
Miami, Florida (Held to coincide with the Miami Winter Symposium)	Sunday, February 8, 1987
Chicago, Illinois	Monday, February 23, 1987
Ann Arbor, Michigan	Wednesday, February 25, 1987
St. Louis, Missouri	Friday, February 27, 1987
San Francisco, California (Held to coincide with the DNA/Hybridoma Congresses)	Thursday, March 5, 1987
Boston, Massachusetts	Tuesday, March 24, 1987
New York/New Jersey	Thursday, March 26, 1987
Washington D.C. (Held to coincide with FASEB 87 Show)	Sunday, March 29, 1987

Each symposium will be from 9:00 a.m. until 3:00 p.m., with a *DNA Synthesizer users meeting* to follow. In addition, an Applied Biosystems DNA Sequencer, DNA Synthesizer and DNA Extractor will be demon-

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This Week in SCIENCE

Tibetan geology

THE Tibetan plateau, a little explored, vast region above 4500 meters, sits atop roughly 70 kilometers of continental crust that thickened during the last 100 million years (page 299). Few researchers have trekked into this inaccessible region, but in 1985 a team of geologists from the United States and China completed an expedition across its northern margin in an effort to understand how the crustal thickening has taken place. Molnar *et al.* describe some geologic features of the plateau and its dramatic peak, Ulugh Muztagh or the "Great Ice Mountain" (cover). Their observations provide clues to the types of tectonic events that have shaped the region and to where and when these events may have occurred. Tibet and India are converging at a rate of about 58 millimeters per year; this rate has pertained for the past 3 million years. Crustal material from northern India is not being thrust under that of Tibet to any great extent as occurs at other plate margins; instead, fault activity, folding, uplift, and the continuous collision of India with Tibet have shortened distances between the two and have resulted in a piling up and thickening of the underlying crust.

Orienting mollusks fazed by lunar phase

MANY organisms apparently sense the earth's magnetic field and use it to orient themselves, but the neurophysiologic mechanisms for this are poorly understood (page 331). Lohmann and Willows describe one orienting organism, the marine mollusk *Tritonia diomedea*, whose simple nervous system and large, distinguishable neurons are expected to help clarify features of the electrophysiologic basis of orienting. Mollusks placed in experimental tanks were subjected to the earth's ambient magnetic field or to an imposed field and received no other sensory cues that could be used in orienting. They aligned their bodies in response to the magnetic field, varying

their orientation with the phase of the moon; when presented with a Y-shaped maze, they moved into the arms differently depending on field and lunar phase. It is not known whether similar orienting occurs in the mollusks' natural habitat and if so what purpose or purposes it serves: movement in a direction that takes them into shallow waters at the time of the full moon might bring groups of mollusks together to reproduce, or periodic shifts in position may assist the organisms in foraging.

What's the catch?

IT is not easy to pry open clams and oysters because their shells are held shut by a muscle that has a "catch" mechanism that works for long periods of time to sustain tension and resist stretching (page 334). The molecular basis of catch has been studied by Castellani and Cohen, who used a specialized muscle of the edible mussel *Mytilus edulis*. When calcium is added to the muscle preparation, the muscle contracts; removal of calcium locks the muscle into the catch state; addition of cyclic adenosine monophosphate produces relaxation. Studies of inhibitors and analogs of various components of the catch and relaxation processes suggest that dephosphorylation of contractile proteins maintains catch and that phosphorylation of these proteins unlocks catch and produces relaxation. Myosin from these mussels' muscles is unusual in being phosphorylated in the rod portion. This phosphorylation may be related to the molecular basis of the catch mechanism.

Burns treated with growth factors

SECOND degree burns, the so-called partial thickness burns, are routinely treated with antibiotic creams to prevent infection; when certain growth factors are added to these salves, the burns heal more rapidly (page 350). Schultz *et al.* tested the effectiveness of four growth factors—

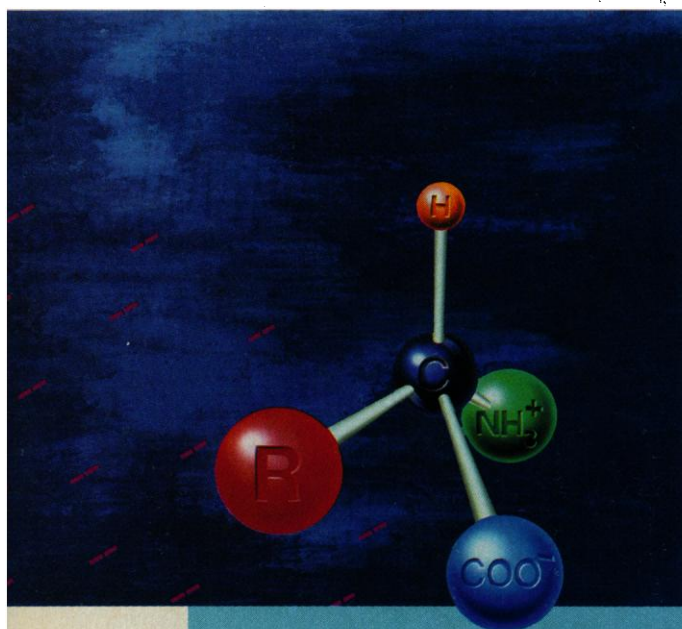
epidermal growth factor, synthetic preparations corresponding to rat and human transforming growth factor- α , and vaccinia growth factor—in healing burns on the backs of pigs. These factors stimulate proliferation of epidermal cells, thereby assisting in the regeneration of the skin's epithelial layer, are structurally similar, and bind to the same receptor on skin cells. Wound healing was accelerated when growth factors were topically applied. The effect was produced with very low concentrations of certain of the factors. (Animals have always used this wound-healing strategy—licking their wounds with saliva which contains epidermal growth factor.) Inclusion of growth factors into salves could greatly improve burn treatment strategies and perhaps treatment of other types of tissue injuries.

Light lifts winter depression

EXPOSURE to bright light early in the morning may prevent the seasonal depression that some people experience in wintertime; exposure to similar strong light at night does not have the same ameliorative effect (page 352). Lewy *et al.* describe studies of eight patients who suffer from winter depression. Their depression was measured with a standard psychological test and their daily (circadian) rhythm was followed by measurement of melatonin, a hormone that normally rises at night and falls during the day. Previous studies had shown that only bright light (four to five times as bright as ordinary indoor light) is capable of suppressing human nighttime melatonin levels. Patients' baseline melatonin cycles were found to be phase-delayed compared to the cycles of controls; patients' cycles could be shifted to an earlier phase by the bright morning light. The light also brought about a change in their affect—to a nondepressed state like that of the controls. Similar antidepressant results were not achieved with nighttime exposure to lights, while intermediate effects were achieved when light was used both in the morning and at night.

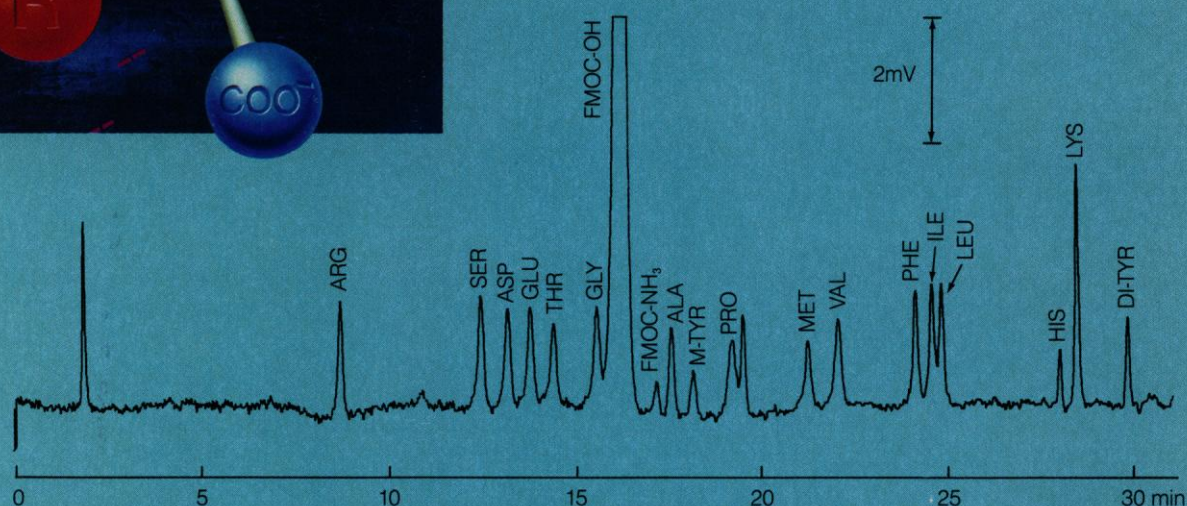
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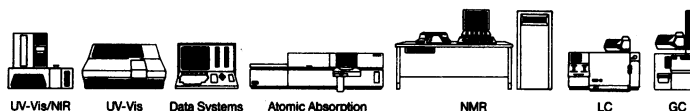


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Managing Technology

Many thoughtful people are concerned about the future of this country. They are uneasy about loss of technological competitiveness, a mounting trade imbalance, and the probability that the nation is living beyond its means and may face the need to accept a lower standard of living. They have long been troubled by reports of deleterious side effects of technology. Their discomfort is enhanced by a feeling that they are helpless to have even a slight impact on events. Most of those who would like to influence decisions about the future do not know how. They have little knowledge about how society and its political and communications systems work. Edward Wenk, a veteran of the national political scene and an engineer, has produced a book that will interest them.* This volume provides insightful perspectives on how technology interacts with the various segments of society and notes that the key decisions in the grand issues involving technology are made by public policy, not in the marketplace.

Pollsters have determined that television programs are exposed an average of 7.5 hours a day in American households. Accordingly, one of the realities of the present is the great impact that the media can have on popular opinion, rendering it volatile. In turn, the media recognize that if they do not produce excitement, they will lose their audience. The offerings tend to concentrate on disasters. Complex issues and important matters affecting the future get little attention. Correspondingly, as Wenk points out, pressures transmitted by the public "tilt the legislative process to favor what is urgent rather than what is important." Wenk further states: "Most issues seem propelled by either crisis or pressure. Legislative histories generally confirm this pattern, although there are exceptions. Some issues are also driven by a tidal wave of popular sentiment where people lead their leaders."

In what follows, the scene of the political action is described. Washington and the surrounding metropolitan area are largely devoted to politics and to attempts to influence legislation and the regulations pertaining to the laws. More than 45,000 lawyers are licensed to practice in the District of Columbia. The government is, of course, the largest employer of personnel, but thousands of professional and trade associations together rank second. For many years, the region has had a great building boom with tens of millions of square feet of office space added. The complement of federal employees in the Executive Branch has expanded somewhat, but the great increase has been in congressional staffers. In the last two decades, their numbers have increased about fivefold, and they now total nearly 40,000. Washington seethes with activities of major and minor players—perhaps 100,000 of them—intent on influencing events. Trying to monitor the most exciting developments is a press and electronic media corps that totals more than 5,000.

One way or another, most of the issues being dealt with have to do with money, power, and influence. They also often have a substantial content of technology. The political system seems to find it difficult to legislate simply about technology. In the last two decades, the average number of pages devoted to each law has tripled, as has the number of pages in the *Federal Register*. Last year, nearly 50,000 pages were devoted to new or amended and proposed or final regulations. The regulations are often so complex that those affected, though professionals, find it difficult to comprehend the language.

Members of Congress are in general conscientious and well meaning, but they have little free time for contemplation while in Washington. Each serves on an average of more than seven committees or subcommittees. They must manage staff, be available for key constituents, deal with the media, and attend innumerable social functions.

In view of the frenetic atmosphere in Washington, scientists and engineers in the hinterlands should consider the advantages of activities in the home states and districts. On visits home, politicians may be more receptive to well-considered positions from a group of constituents than they would be elsewhere. By the nature of their professions, scientists and engineers tend to be alert to developments that may affect the national and global future. They could provide a perspective for politicians that is missing in Washington.

—PHILIP H. ABELSON

*E. Wenk, Jr., *Tradeoffs* (Johns Hopkins Univ. Press, Baltimore, 1986).

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1. C. Burks *et al.*, *Comp. Appl. Biosci.* 1, 225 (1986).

"Toxic Torts"

I appreciated Eliot Marshall's article "Immune system theories on trial" (News & Comment, 19 Dec., p. 1490) since it accurately documented studies supporting the existence of chemically induced immune

dysregulation. I must however object to the description of the manner in which I reach my conclusions.

My assessments of immune system damage are based on abnormalities in phenotypic distribution of cells of the immune systems in exposed populations and clinical symptomatology such as recurrent infections, autoimmune diseases, increased incidence of cancers, and organ toxicity in the affected populations. This diagnosis is based on medical history, physical examination, and laboratory analysis. Although literature citations documenting immune system abnormalities associated with such chemicals support these conclusions, clinical manifestations provide the best assessment of immune system function and they are supported by the laboratory data.

My objectives in presenting my data first in the courtroom are to establish a framework within which manufacturers of toxic substances can ensure their safe use as well as to provide an impetus for funding research programs in immunotoxicology. I have placed this in the public record as often as possible. The results of these efforts are gratifying. I have never seen a vehicle of social change work as fast and as effectively as the "toxic tort" arena.

We now have data on clinical symptomatology and immune cell phenotype profiles in several large populations exposed to different immunotoxins. These data support my conclusions. My scientific colleagues should be aware that all of my data on population studies are a matter of public record and are available on request.

ALAN S. LEVIN

*450 Sutter, Suite 1138,
San Francisco, CA 94108*

SDI Goals

The negative response to the Strategic Defense Initiative (SDI) in a poll conducted among National Academy of Sciences (NAS) members (News & Comment, 14 Nov., p. 816) was predictable because of how the survey questions were phrased. An effective SDI system need only satisfy two goals: (i) a defense against ballistic missiles aimed at U.S. military assets and (ii) a functional capability that appears credible to a prospective aggressor. The comprehensive Ballistic Missile Defense system envisioned by SDI critics that would "take out more than 99 percent of incoming warheads" is not necessary for the first goal, nor is large-scale empirical testing required for the second goal. In short, the purpose of SDI is not, as the poll stated, to "provide an effective

defense of the U.S. civilian population" but instead to preserve a U.S. capability to retaliate in the event of a Soviet nuclear first strike.

The threat of massive U.S. nuclear retaliation has stabilized the world for decades. It is now eroding. The Soviets have installed land-based missiles that can deliver megaton explosions to a target the size of a football field. These missiles are designed to destroy hardened military silos hidden under tons of U.S. earth. This magnitude of explosive power and accuracy presents the nearly 8000 Soviet nuclear missiles as a force for first-strike destruction and not an attack deterrent. The latter goal would have emphasized submarine missiles which, by comparison, are inaccurate but difficult to find (in-flight correction is 7 years off). Since a Soviet first strike can destroy about 95 percent of top-priority U.S. targets, under 12 percent of our 900 Minuteman III missiles would survive to retaliate. Thus only 10 percent of the 4000 top-priority Soviet targets would be at risk from our land-based Mark 12A warheads. As a practical matter, the number is considerably lower due to an extensive Soviet defense system supported by at least 16,000 SAM-2 missiles.

Soviet air defenses are prodigious and no longer penetrable by our B-52 bombers. These numbered 1300 in the early 1960's, but now total under 350. They are older than the pilots who fly them. If we consider how the Strategic Arms Limitation Treaty (SALT) limits the range of Cruise missiles, the sole deterrent against a Soviet first strike appears to be U.S. retaliation from nuclear submarines. This means that each new development in submarine detection brings the world closer to nuclear destabilization. Current U.S. nuclear strategy arose from two unthinkable alternatives: mass suicide and surrender. Now SDI offers a third: mass intercept with time to rethink retaliation. More than that, sharing SDI technology would give the Soviets incentive to jointly work toward making a practical umbrella for them as well. The neglect of these and other factors indicates NAS members were polled on a system dissimilar to the one needed to satisfy the goals of SDI.

R. GANGE

*Post Office Box 1536,
Princeton, NJ 08540*

Erratum: In the editorial by Philip H. Abelson "The International Geosphere-Biosphere Program" (7 Nov., p. 657), the reference to T. F. Malone's article in *Environment* should have included the month (October 1986).

Erratum: In Table 1 (p. 351) of the report "Structure-activity studies of interleukin-2" by F. E. Cohen *et al.* (17 Oct., p. 349), reference 15 was incorrectly cited for the entries for the 1-29, 30-49, and 100-133 deletion mutants. For all three entries, the reference should have been (16).

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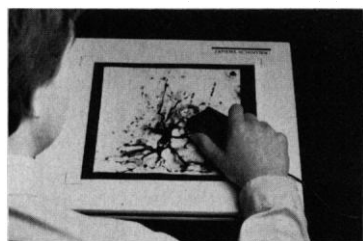


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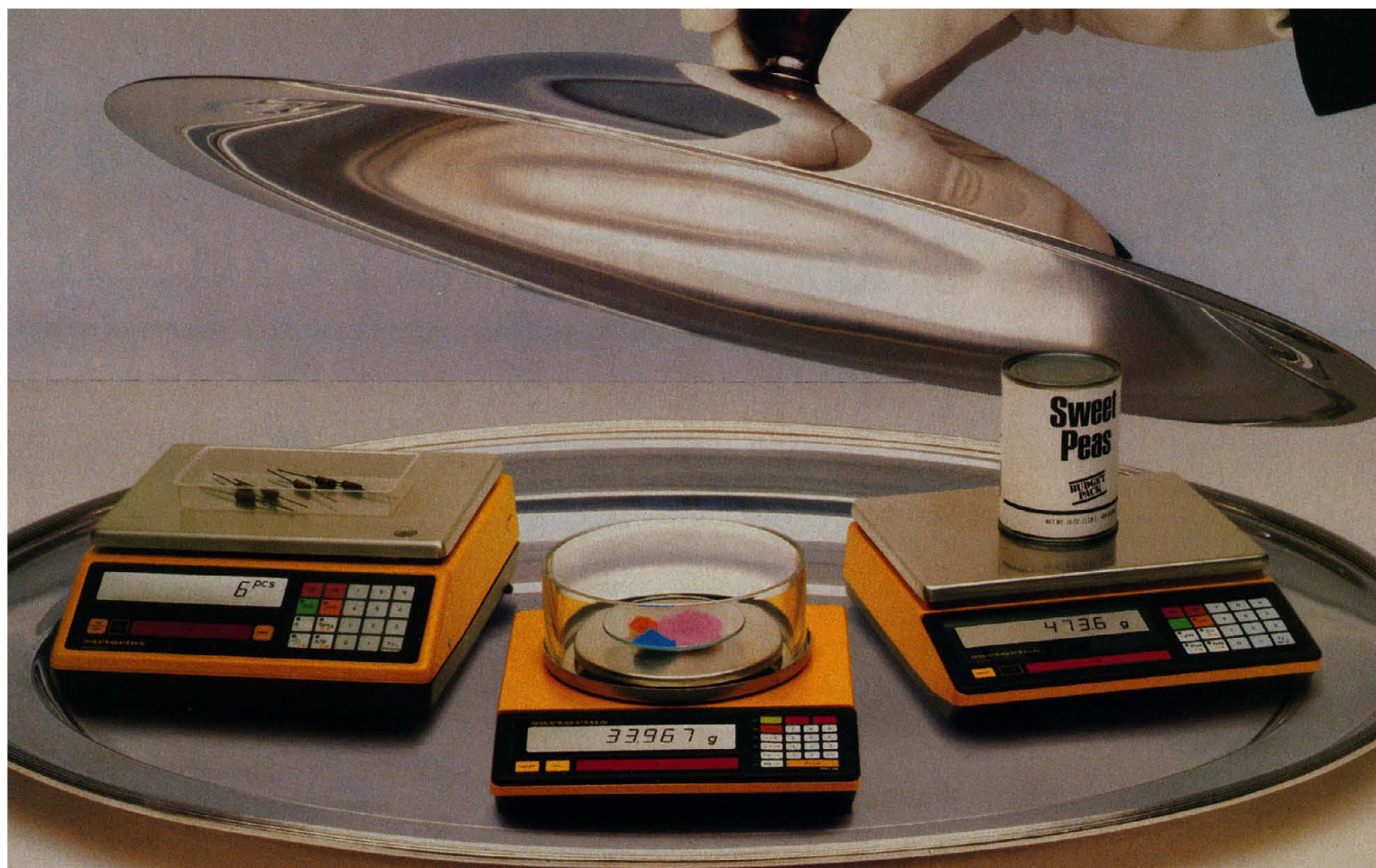
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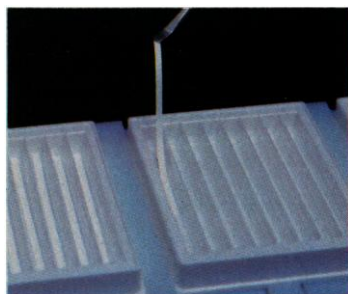
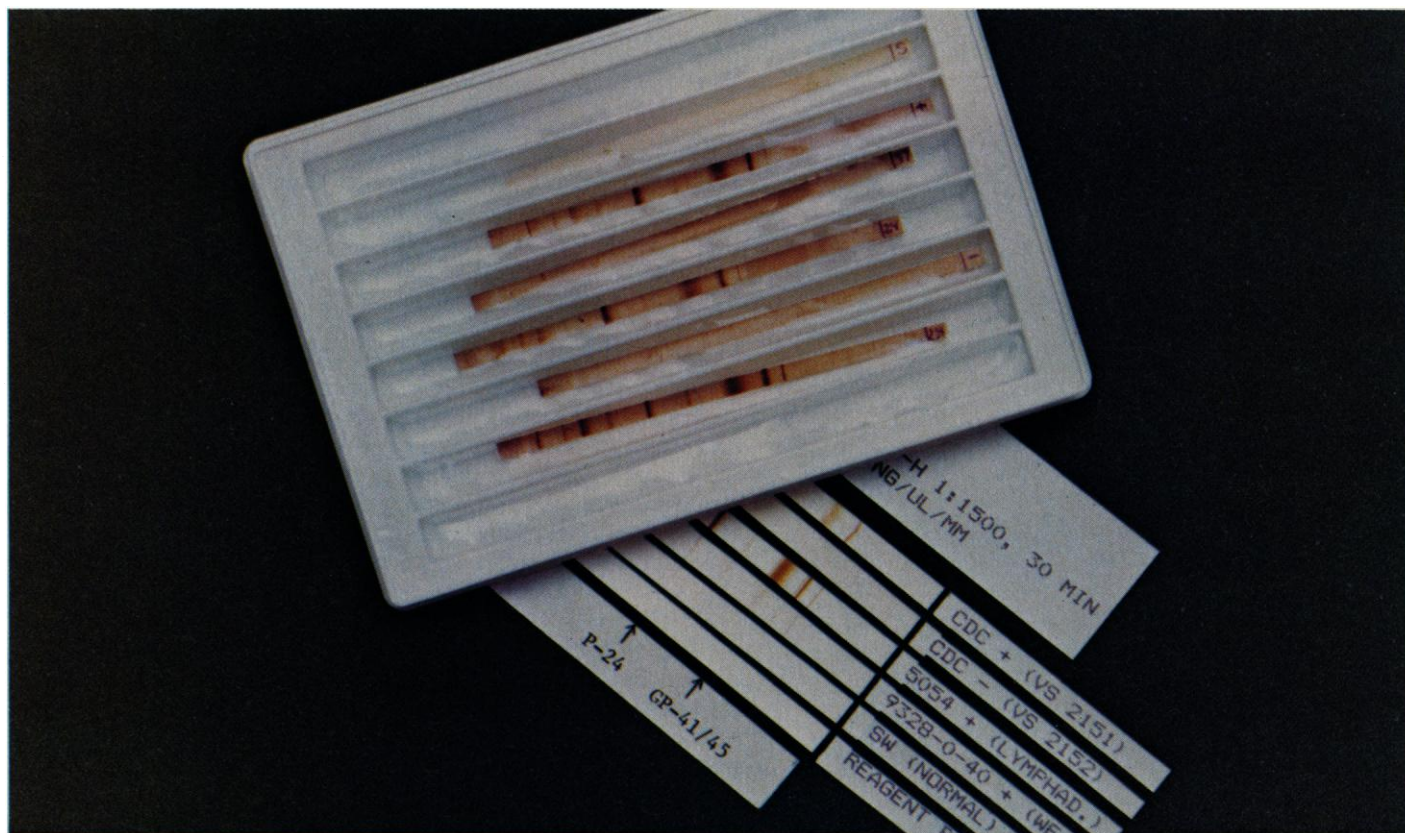
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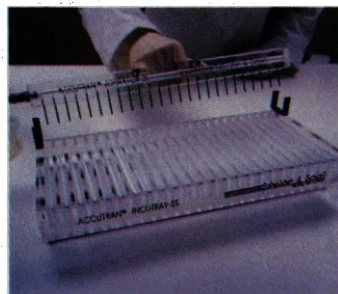


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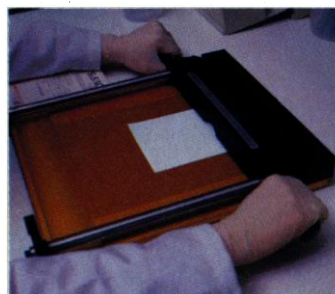
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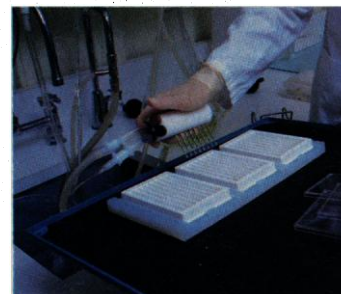
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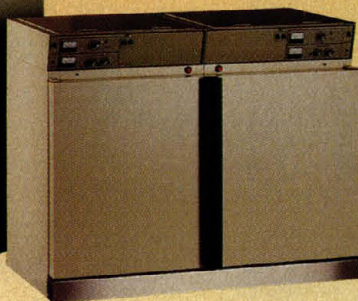
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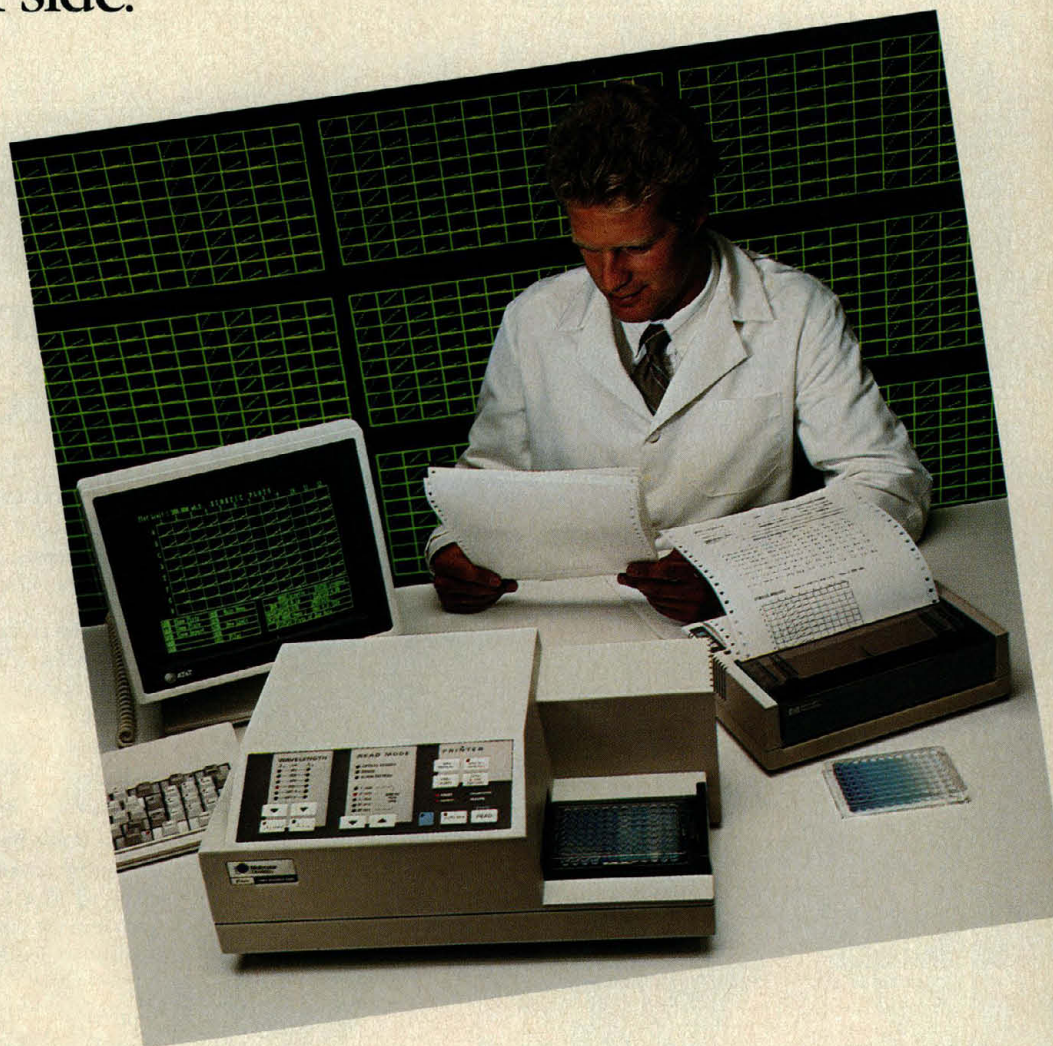
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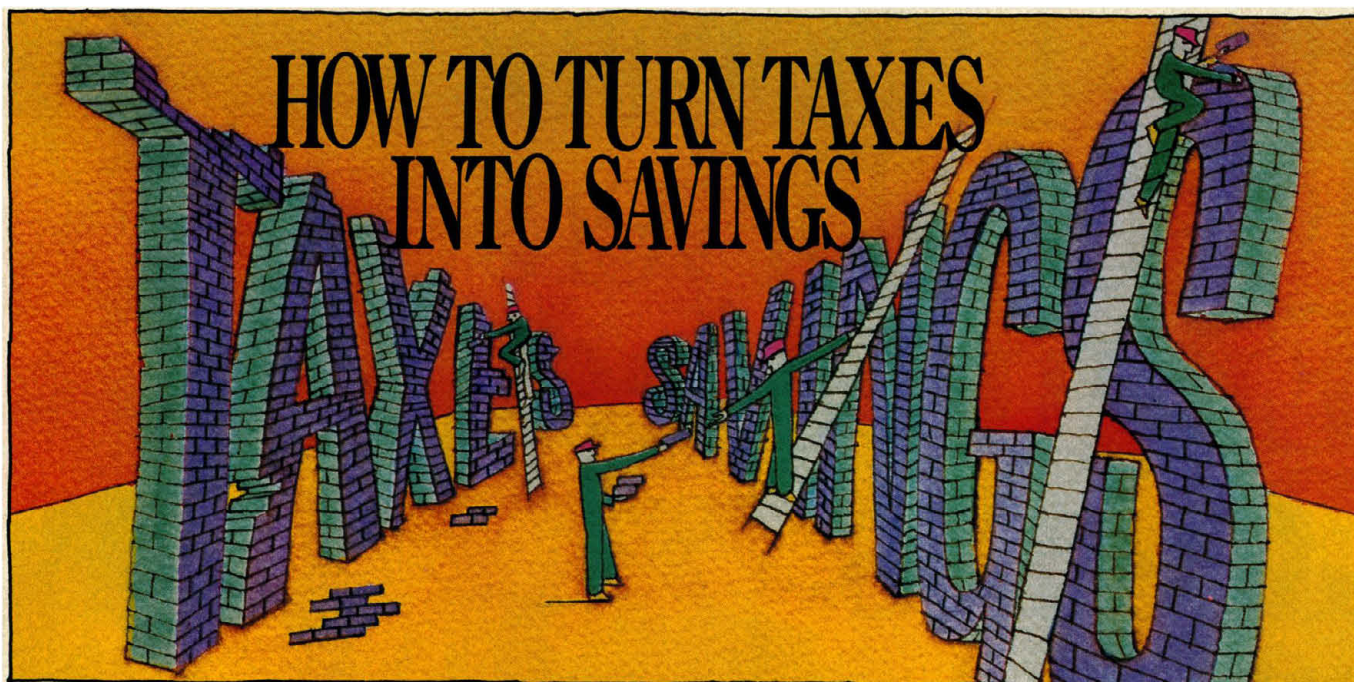
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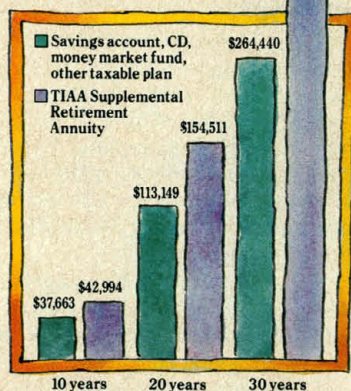
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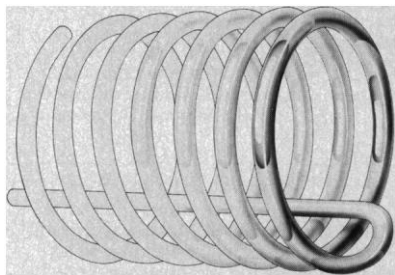
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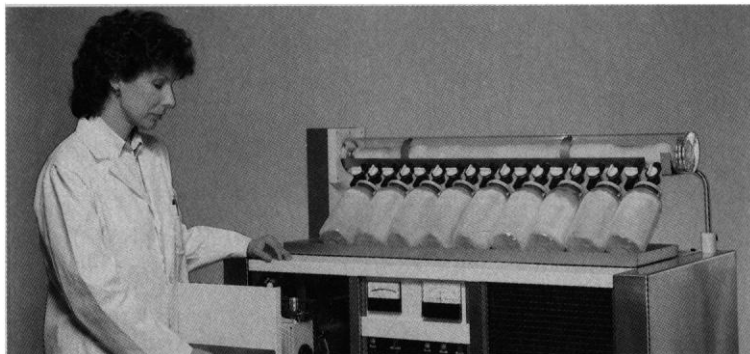
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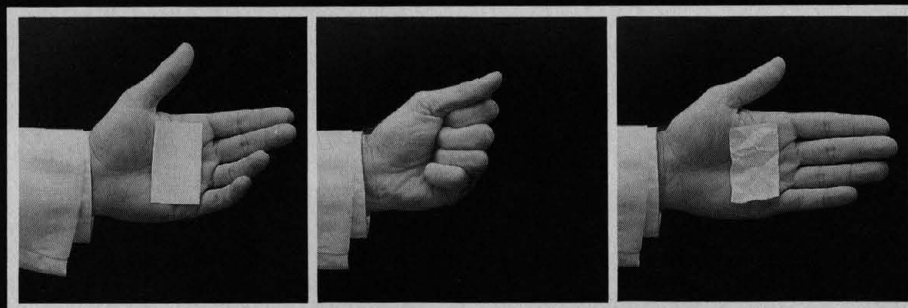
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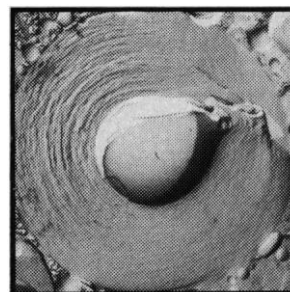
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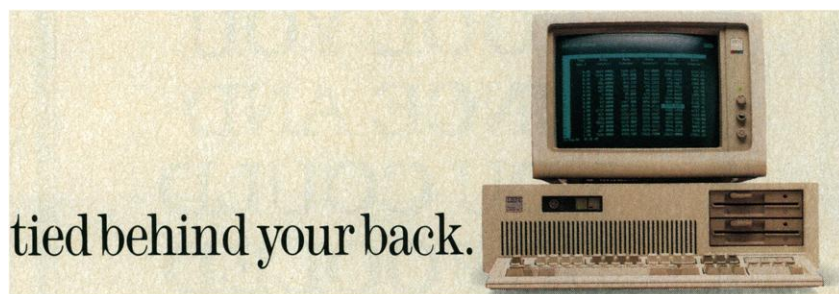
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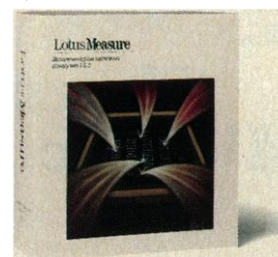


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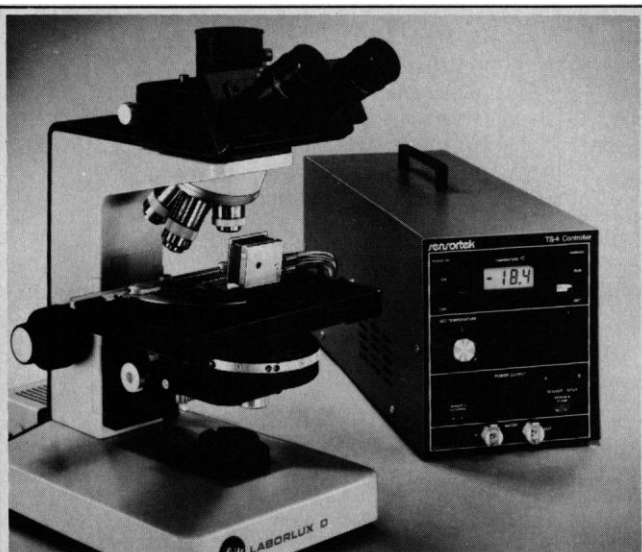
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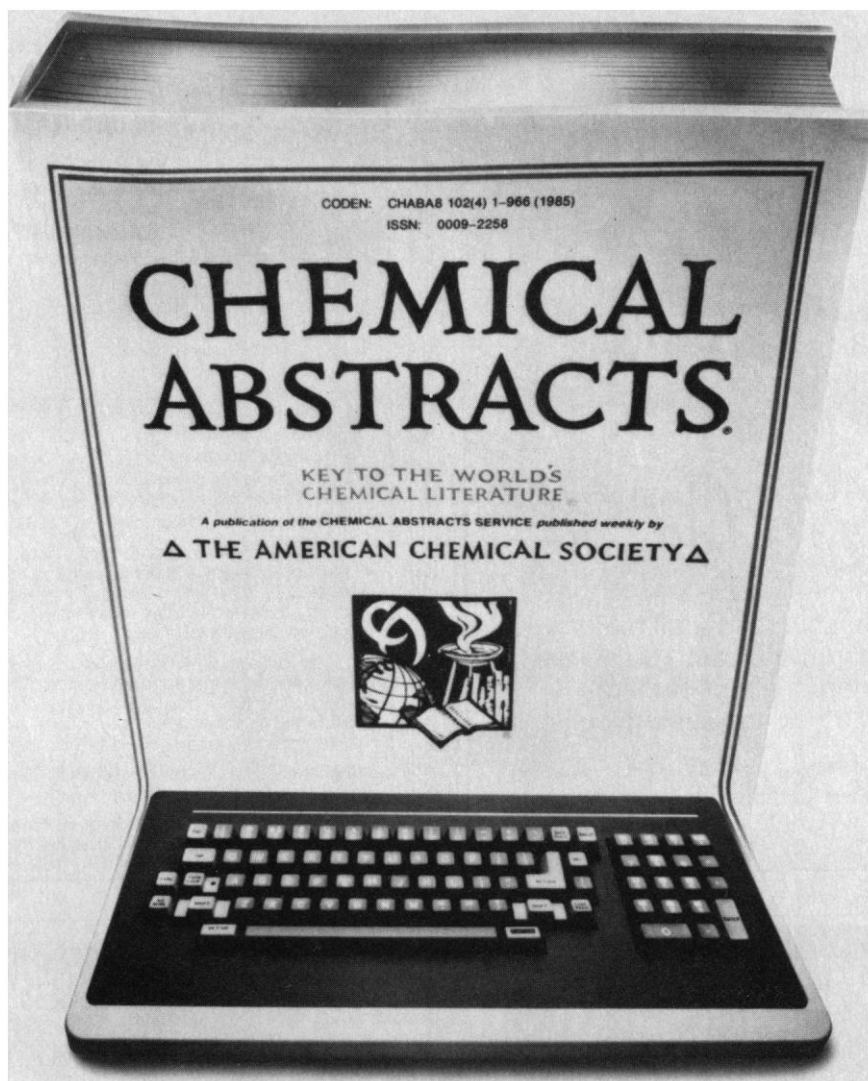
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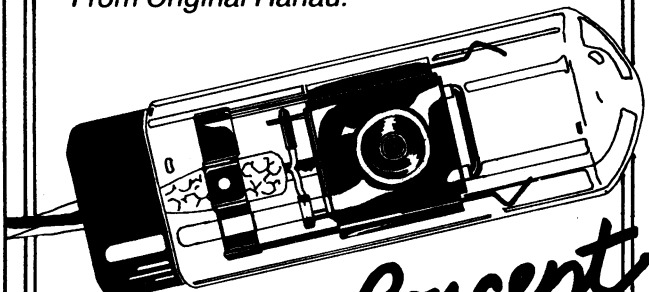
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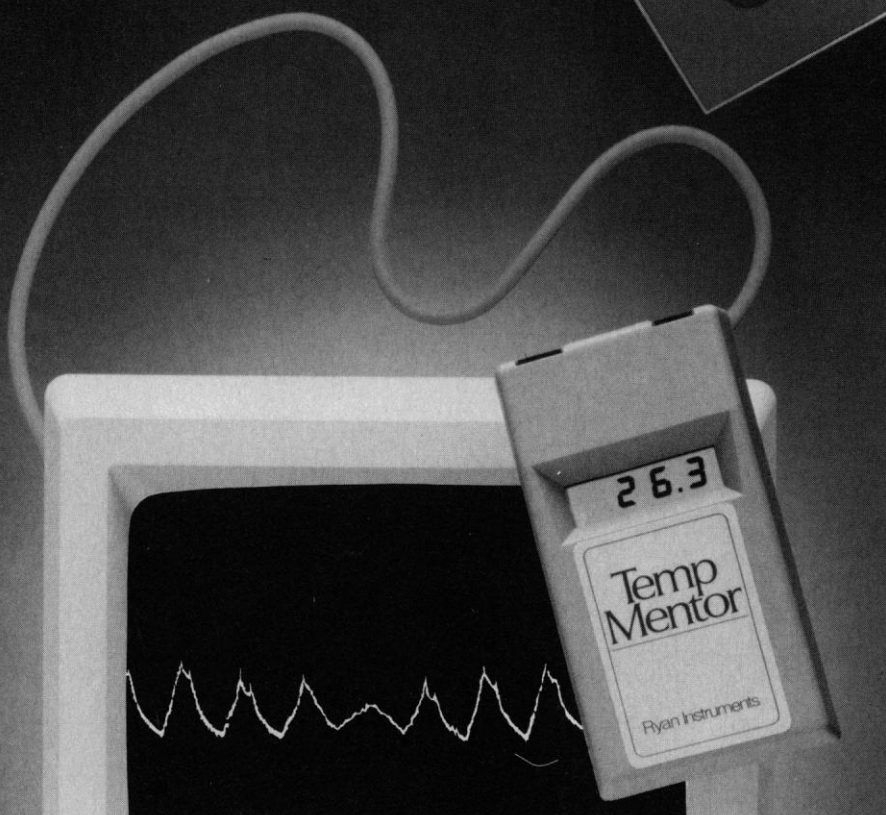
All accepted abstracts will be displayed as posters and some will be selected from each workshop category for platform presentation. Deadline for submission of abstracts—April 15, 1987. A 200-word abstract should be sent to: Dr. Ute Traugott, Department of Pathology, Albert Einstein College of Medicine, 1300 Morris Park Avenue, Bronx, NY 10461. Please indicate the workshop topic.

The conference will cover all aspects of fundamental and clinical neuroimmunology and will embrace cellular and molecular interactions between the immune and nervous systems, autoimmunity, immunotherapy and virus-host cell interactions. Prominent on the program will be plenary lectures on the latest developments in research on multiple sclerosis, myasthenia gravis, AIDS, narcolepsy, polymyositis and experimental models.

CONFERENCE CHAIR: Cedric S. Raine, Ph.D., D.Sc., Department of Pathology, Albert Einstein College of Medicine, Bronx, NY

For program and registration information: Conference Department, The New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021.

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