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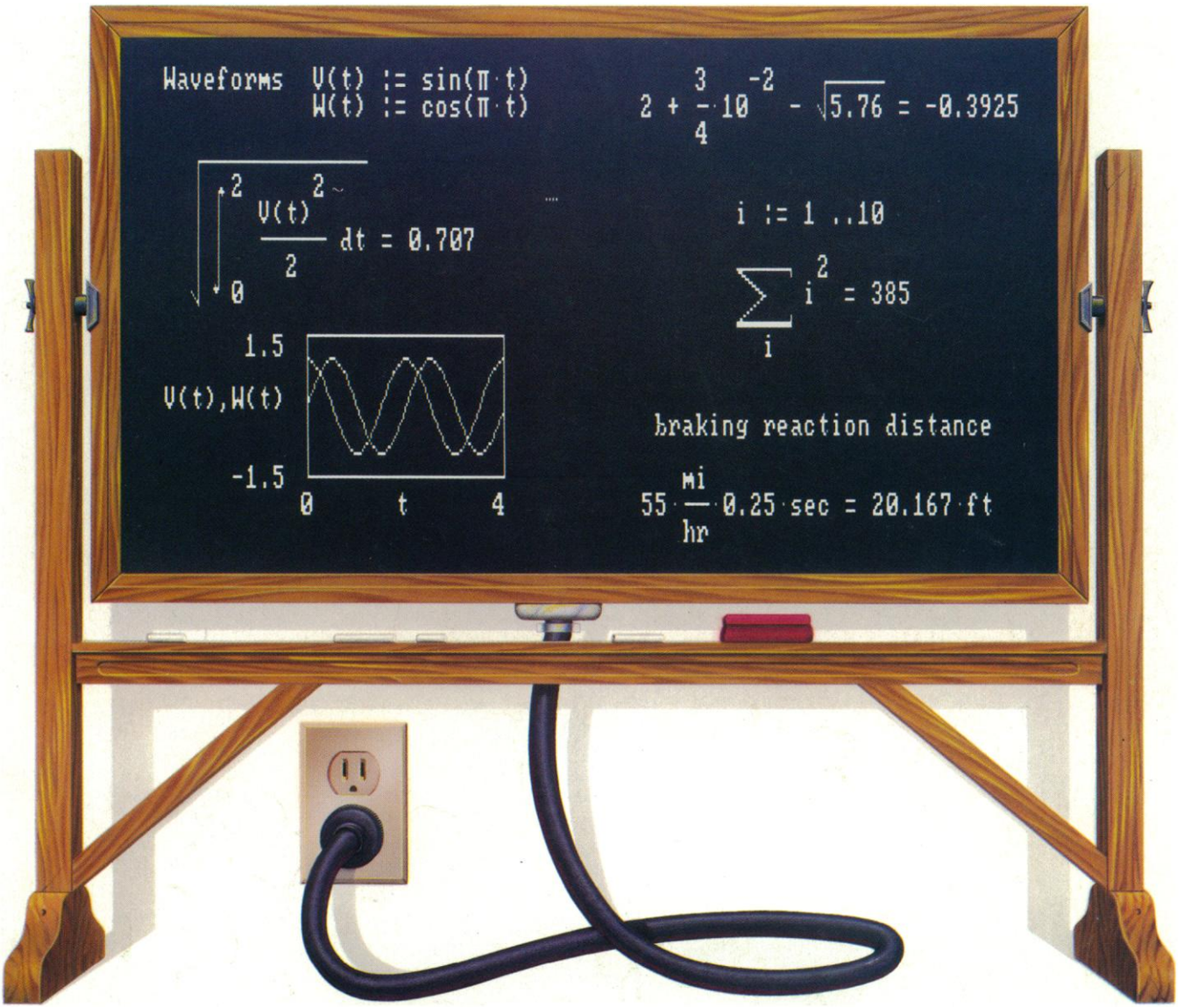

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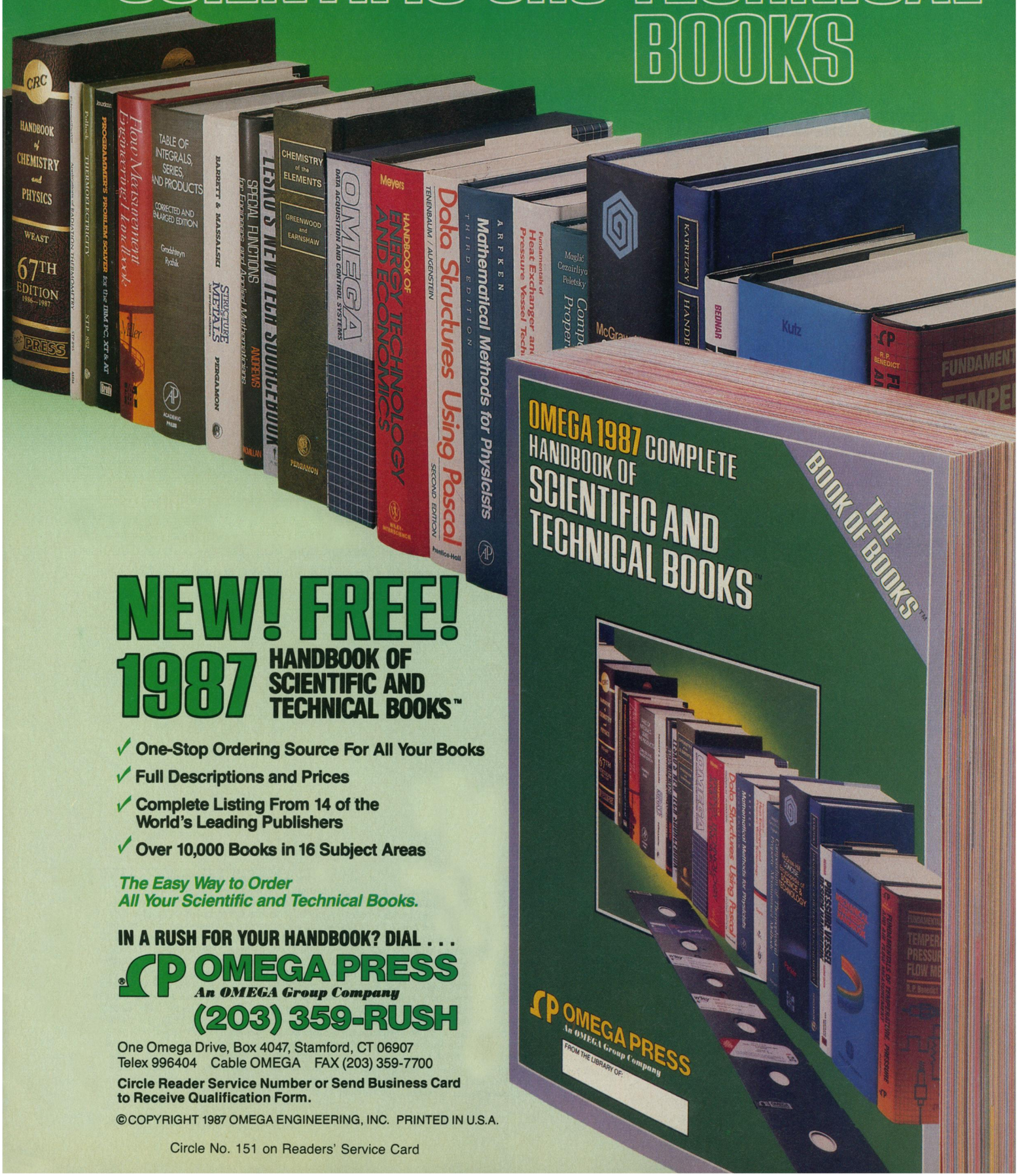

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COVER Foliar symptoms of verticillium wilt in cotton, characterized by chlorosis and necrosis between the main veins. Cotton seedlings that had been exposed to spider mites were less likely to develop symptoms of verticillium wilt than unexposed control seedlings. See page 678. [Jack Kelly Clark, Cooperative Extension, University of California, Davis 95616]

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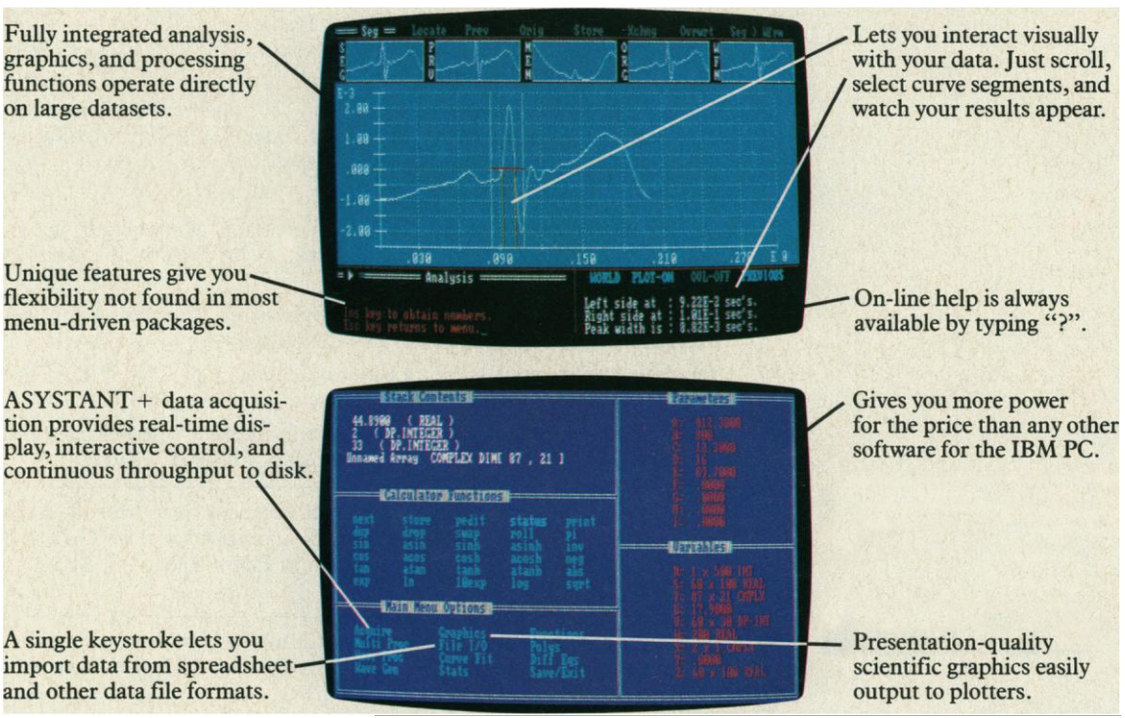

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Economic effects of immigration

AMONG the questions raised when the benefits of immigration are assessed against its costs are the following. Do immigrants to the United States take jobs away from native workers. Do they drain public assistance funds. Do they have a reasonable chance of being fully assimilated into the labor market (page 645). Borjas and Tienda discuss a number of factors that play a part in determining how immigrants and immigration policies affect the U.S. economy. For example, in 1965, amendments to the Immigration and Nationality Act shifted the policy on immigration away from discriminatory national quotas toward one favoring family reunification; this had the effect of bringing in immigrants with fewer marketable skills. Meanwhile, because more than half of all immigrants live in four states (California, New York, Texas, and Florida), local patterns and immigration effects cannot be generalized to the national workforce. To further complicate the analysis, the role of illegal immigrants cannot be readily assessed because their numbers and activities are not accurately known. Balancing political, economic, social, humanitarian, and philosophical considerations remains a major difficulty facing the development of the U.S. immigration policies.

Protein kinase C and sphingolipidoses

METABOLISM of cellular lipids is known to be aberrant in a number of genetic diseases; how metabolites may be linked to the dysfunction and degeneration of cells in the central nervous system and elsewhere in the body may now have been determined (page 670). Hannun and Bell found that both in vitro and in an intact biologic system (platelets), the sphingolipid metabolites called lysosphingolipids inhibited protein kinase C activity and phorbol diester binding to the enzyme. They suggest that in the genetic diseases in which sphingolipid metabolism has apparently gone awry (such as Krabbe's disease, in which galactosylsphingosine accumulates, and Gaucher's disease, in which glucosylsphingosine accumulates), once the lysosphingolipid accumulates in cells, protein kinase C activity could be continuously inhibited. Thereafter, with signal transduction blocked (protein kinase C is important in transmitting signals instrumental in both neuronal function and cellular differentiation), cells stop developing and functioning properly and may die. This may explain how organs enlarge and stop working and how progressive mental and neurologic dysfunctions proceed in these and similar diseases.

Plant defenses

SPIDER mites and verticillium fungi both attack cotton seedlings, but after one organism has attacked and damaged a cotton plant (cover), the other is less likely to do so even though they use the plant in different ways (page 678). Plants were exposed to the spider mites and then inoculated with the fungus. Karban *et al.* found that signs of wilting, chlorosis, and necrosis—characteristics of fungal infection—were much less severe in plants previously exposed to mites. If the plants were first exposed to fungi and later to the mites, mites grew more slowly, and growth of fewer mites was supported on the plants. Plants respond both physically and chemically to damage caused by pathogens and herbivores. At least part of the response may be relatively nonspecific since, in this example, the first attacker elicits a protective response to a second attacker quite unlike itself.

Population dynamics of Caribbean reefs

IN 1983, more than 98% of *Diadema antillarum* sea urchins in the Caribbean died, probably killed by a current-borne pathogen (page 687). These sea urchins had been the most abundant invertebrates grazing on Caribbean coral reefs. They were considered keystone predators, predators that feed on organisms that are their major competitors for the available space. The fate of keystone predators (in this case, death) should therefore have profound effects on the fates of all other reef community members; their major competitors would be expected to quickly overgrow the reef. *Diadema* feeds on algae in the reef and on encrusted organisms living sequestered in crevices, under corals, and in other hidden locales. Although the demise of the sea urchins led to a severalfold increase in the biomass of algae on the reef, Jackson and Kaufmann report that there was no change in the composition of the hidden (cryptic) communities studies. The virtual disappearance of the sea urchins and the lack of change in the population composition of encrusted organisms was a surprise and indicates that the sea urchins, though major, are not "keystone" predators on this cryptic community.

Marine microenvironments

WHEN scientists in submersible vehicles shine their lights into the ocean, they see what looks like snow, "marine snow" (page 689). Particles (a few millimeters in diameter) contain phytoplankton, fecal material, bacteria, and other detritus embedded in a gelatinous matrix. Alldredge and Cohen used microelectrodes to measure oxygen and *p*H in and around marine snow and larger fecal pellets that had been collected in the Santa Barbara Channel off the California coast. Measurements were carried out for 1 to 16 hours in both dark and light conditions. Gradients of oxygen and *p*H were found, indicating that both photosynthesis and the respiration of bacteria, phytoplankton, and protozoa could occur in association with pellets and marine snow. Although only oxygen and *p*H were measured, gradients of other nutrients probably also exist. Nutrient-enriched and nutrient-depleted microzones thus exist in the sea, and around them diverse microbial metabolic activities become possible.

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SCIENCE

6 FEBRUARY 1987
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NSF's Budget and Economic Competitiveness

The nation's science and engineering enterprise must have the financial resources to do two things: remain at the leading edge of discoveries and produce the technical personnel that the country needs. Both are essential to our economic competitiveness and must be done even in times of fiscal stringency.

The President has responded decisively to this challenge by taking the unprecedented step of establishing as Administration policy the doubling of the National Science Foundation's budget over 5 years, starting with a major increase of 17 percent in 1988. There are also increases for some of the other federal agencies that support basic research at universities. This is a dramatic statement of the fact that university basic research and education deserve the continuing attention and support of the nation. It is also a major departure from the previous practices of making budgets a year at a time and will make possible the formulation and support of long-term strategies, projects, and programs.

Why this action? Basic research and education are our key assets in the battle for international competitiveness. Where we have a clear lead, we must preserve it; where we are lagging, we must catch up. Investing in basic research and education will not immediately reduce the trade deficit, but it will provide the new knowledge and technically educated people that are prerequisites for anything we do in commerce, industry, defense, or health.

This initiative comes at an opportune point in time: the ferment in the sciences and engineering offers opportunities that we cannot afford to miss. Long-standing problems that defied solutions are now within our grasp, with the use of modern instrumentation and newly developed computational techniques.

NSF is being called upon to participate, in a major way, in support of this number one policy topic, economic competitiveness. Accordingly, the budget for 1988 and the following years will focus on three major themes:

The first concerns human resources. Our people—with their creativity, skills, and education—are our most important resource. Yet too few of our best students study science and engineering, and of those who do, too few finish the Ph.D. We need to make careers in science and engineering more attractive. Better curricula, better equipment, better precollege preparation, research opportunities for undergraduates, more fellowships and postdoctoral awards are some of the approaches we need to employ.

We also need to broaden participation among women and minorities, and other underrepresented groups, as well as institutions not now participating fully, in the educational and research process. We simply cannot afford to waste their talent.

The second theme calls for establishing Science and Technology centers. Patterned after the Engineering Research centers, they will be created in appropriate areas of science. They will be multidisciplinary centers, organized on university campuses but with strong industrial participation, doing basic research that is scientifically exciting in areas that are likely to be economically significant. These centers will provide universities with new resources for research and teaching and facilitate the transfer of knowledge from universities to the marketplace.

Last, but by no means least, NSF will address the cornerstone of the foundation: grants to individual investigators. We must strengthen and provide stability for this, the traditional activity of NSF, and this activity will not be shortchanged.

All this implies change; changes in programs, institutions, and relationships. The science and engineering community must support this effort, participate in priority-setting, continue what is useful in the system, and support new approaches where they are required.

Economic competitiveness is a bipartisan issue that concerns us all, as does support for our universities, basic research, and education. Therefore I am confident that, as in the past, Congress will support this initiative.—ERICH BLOCH, *Director, National Science Foundation, Washington, DC 20550*

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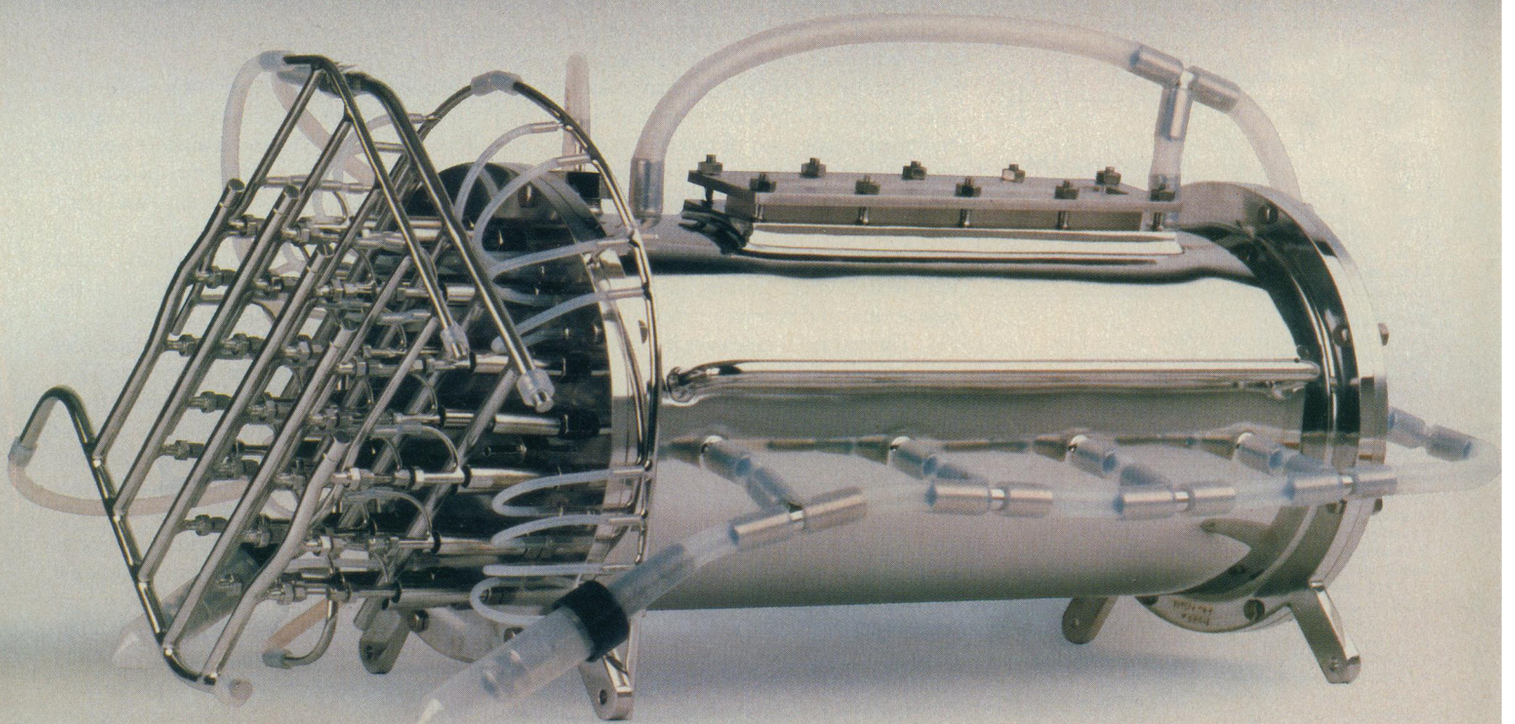

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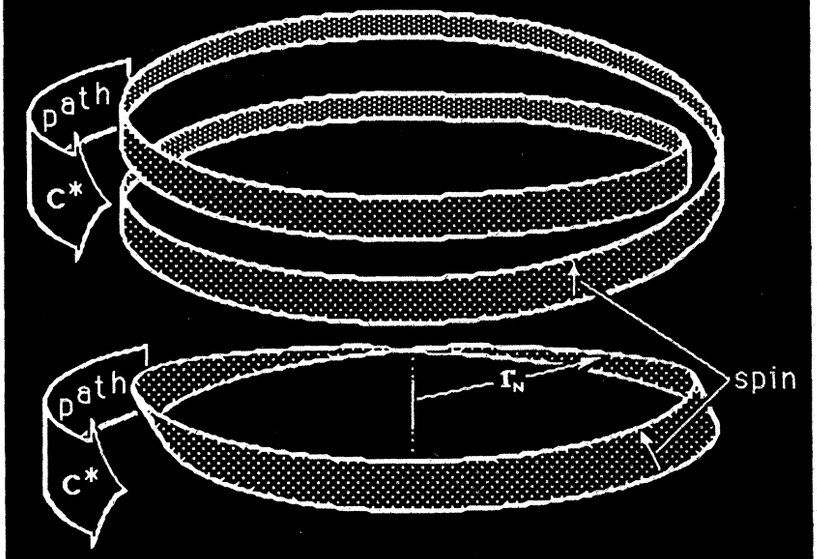

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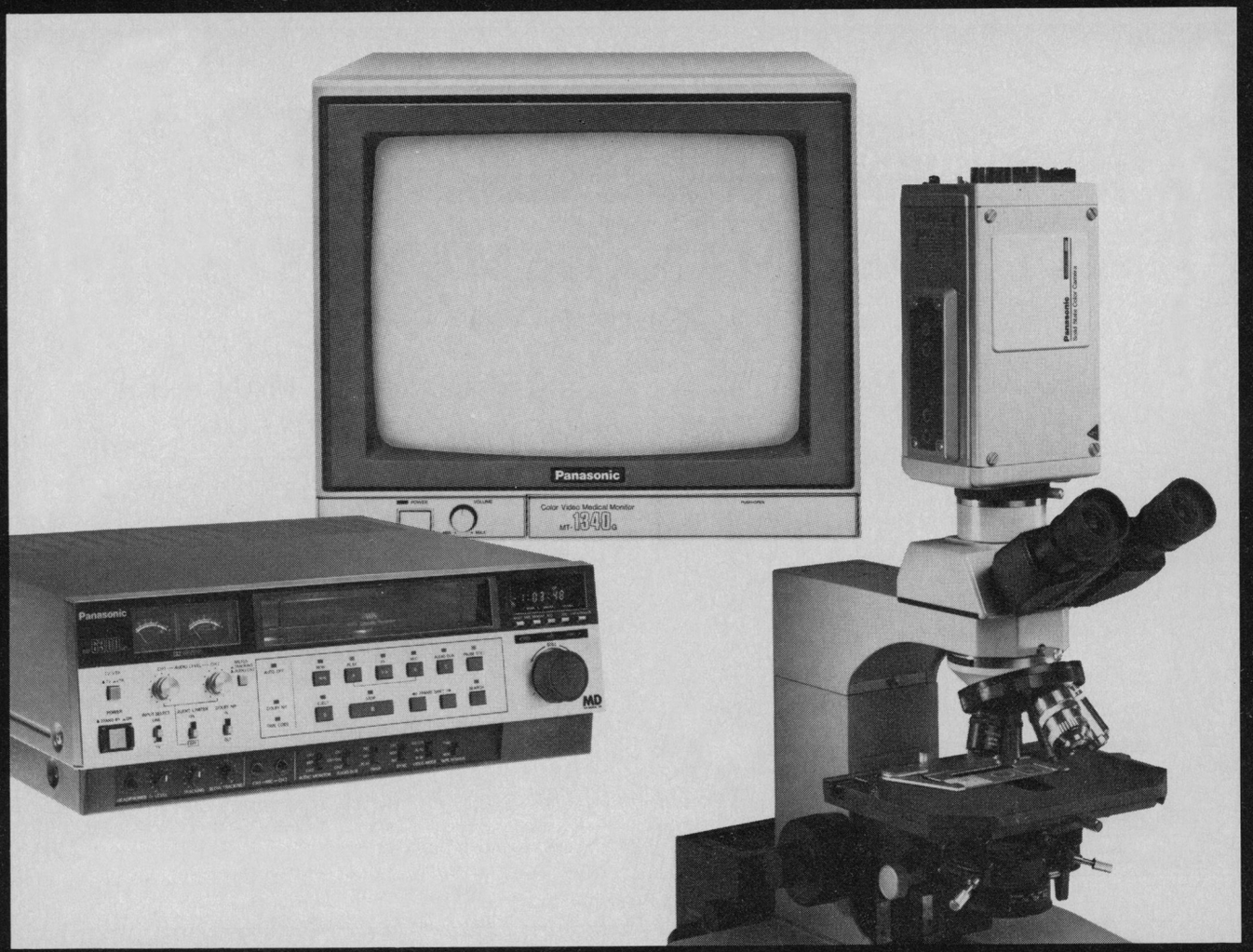

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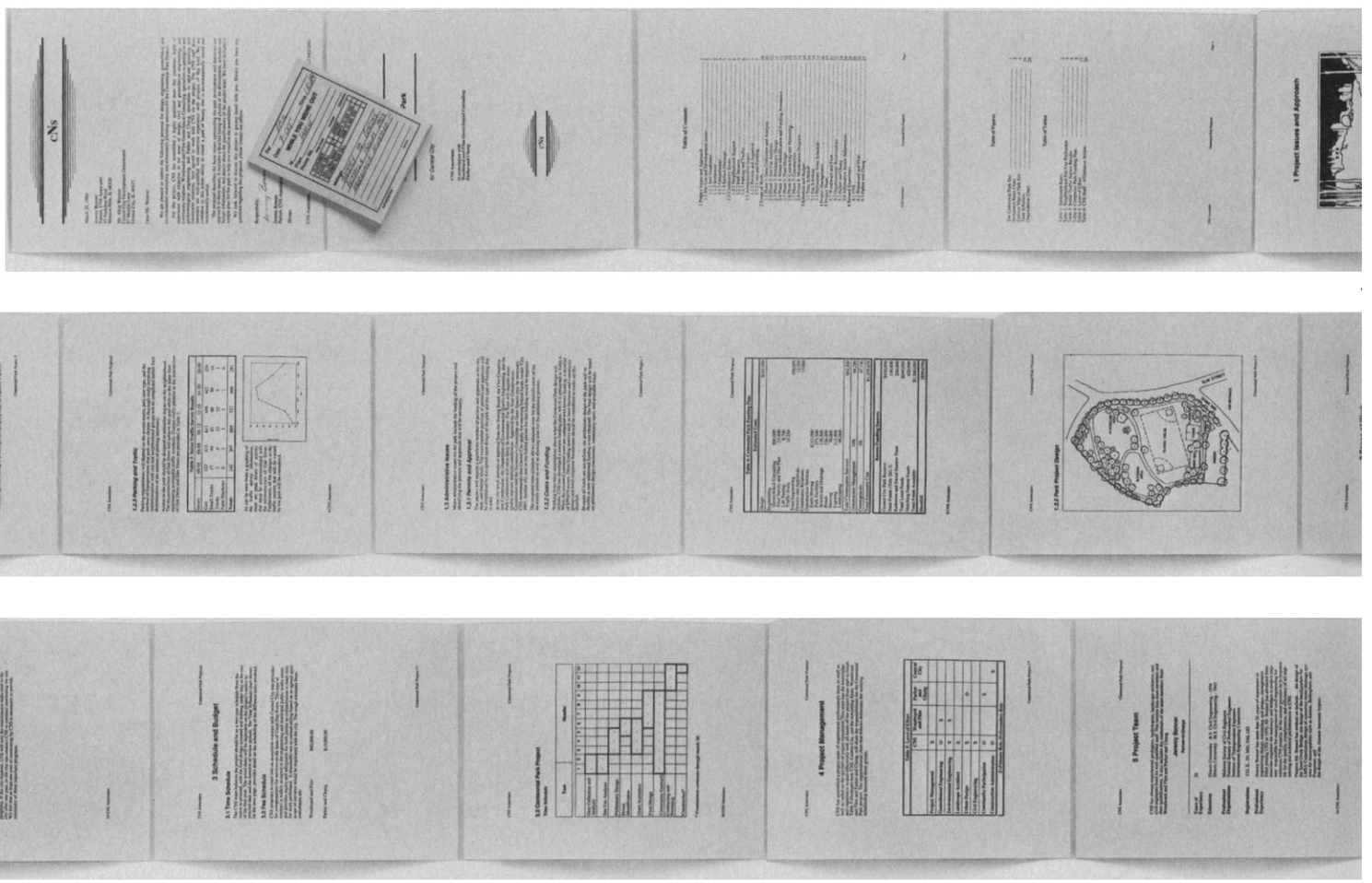

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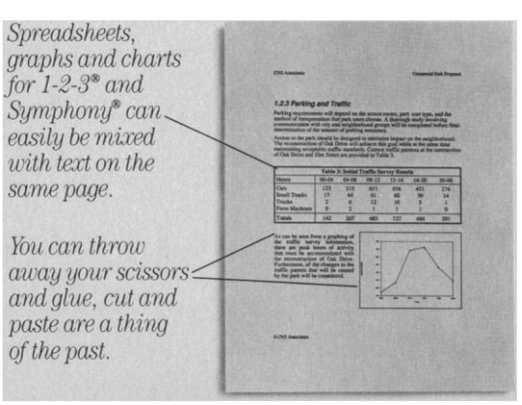

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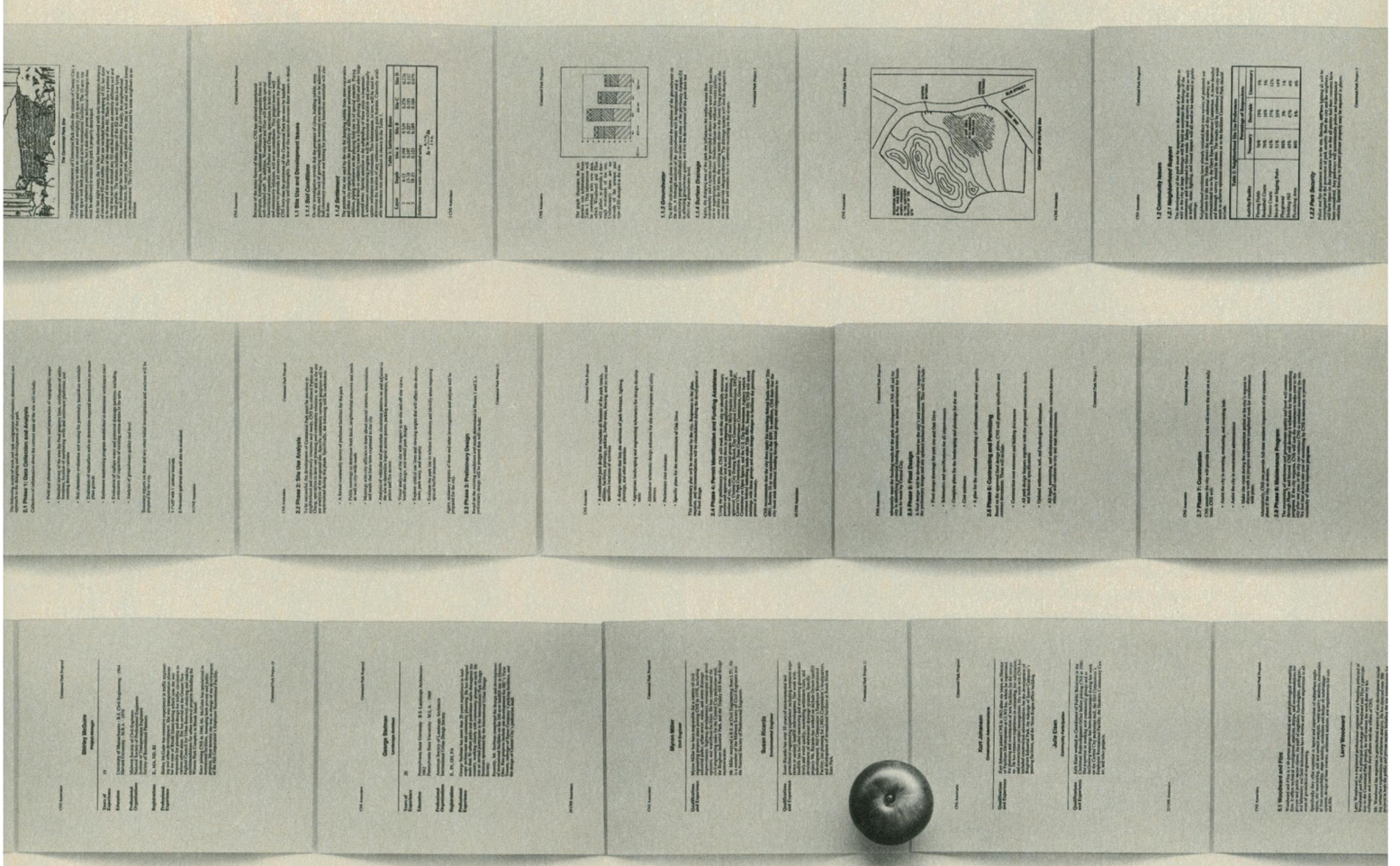

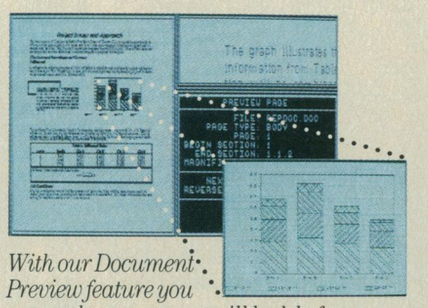

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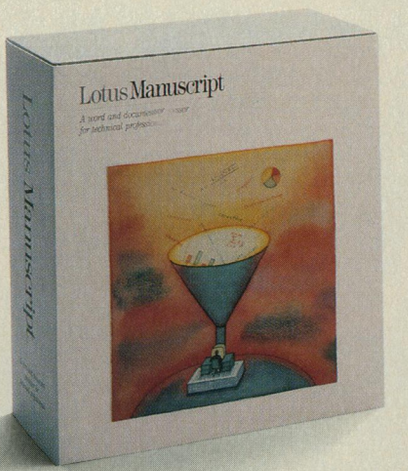

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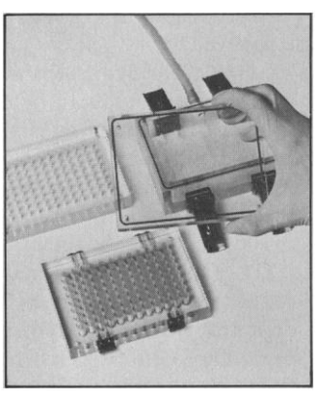

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Genetics and Biochemistry of Retroviral Replication
Stephen Goff, Columbia University, College of Physicians and Surgeons
Left-Handed and Right-Handed DNA in Genetic Recombination
Alexander Rich, Massachusetts Institute of Technology

ACQUIRED IMMUNE DEFICIENCY SYNDROME (AIDS)
(Monday A.M. - P.M.)
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Speakers: Luc Montagnier, Paris
Robert C. Gallo, Bethesda
Jay A. Levy, San Francisco
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William Haseltine, Boston
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Robin Weiss, London
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Bernard Moss, Bethesda

CHROMATIN (Monday P.M.)
Chairman: Gary Felsenfeld, N.I.H.
Speakers: Robert Simpson, N.I.H.
Harold Weintraub, Fred Hutchinson Cancer Research Center
Gary Felsenfeld, N.I.H.
John Sedat, U.C.S.F.

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Mark Darlison, Cambridge University (UK)
Alex Ullrich, Genentech
Peter Seeburg, Univ. of Heidelberg, West Germany

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