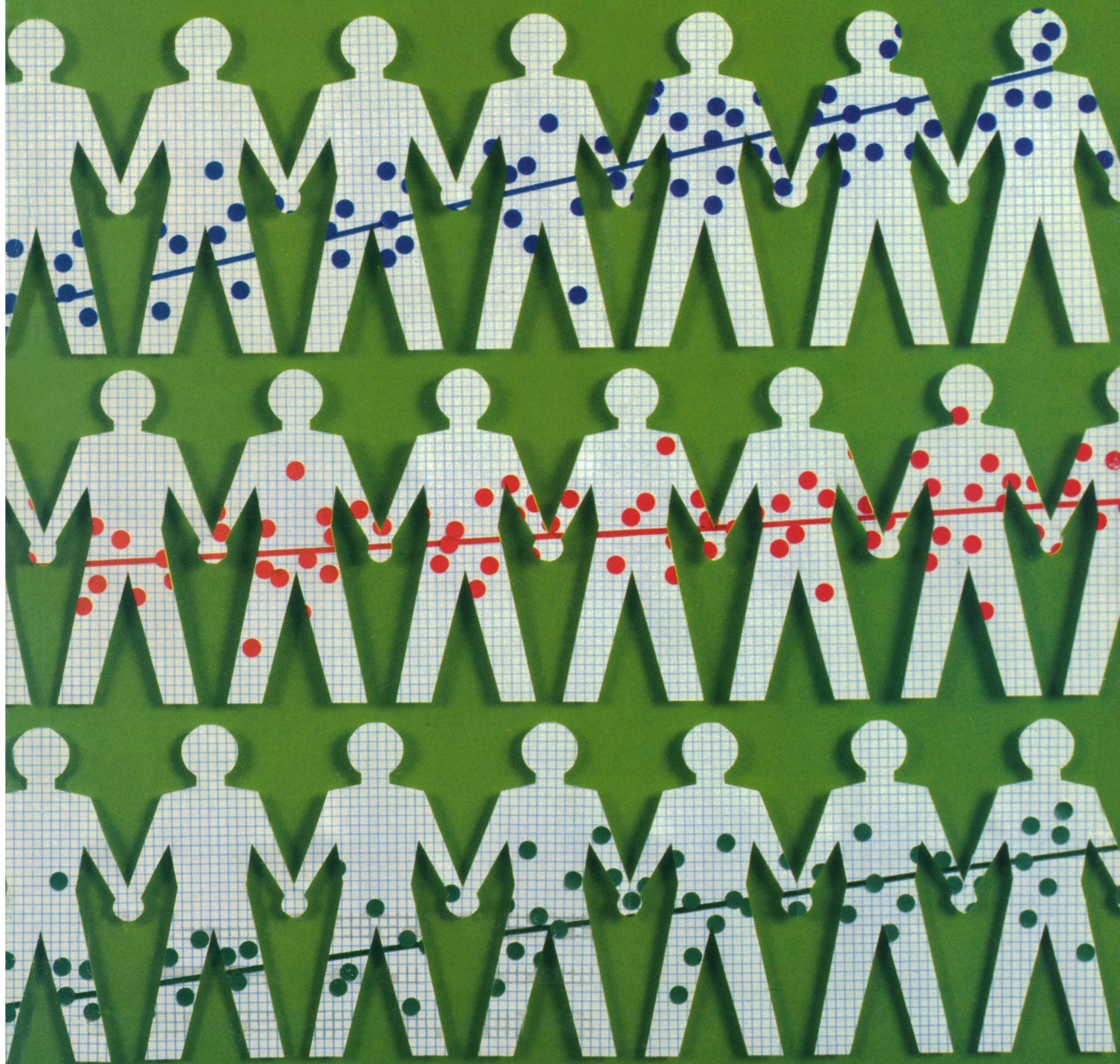


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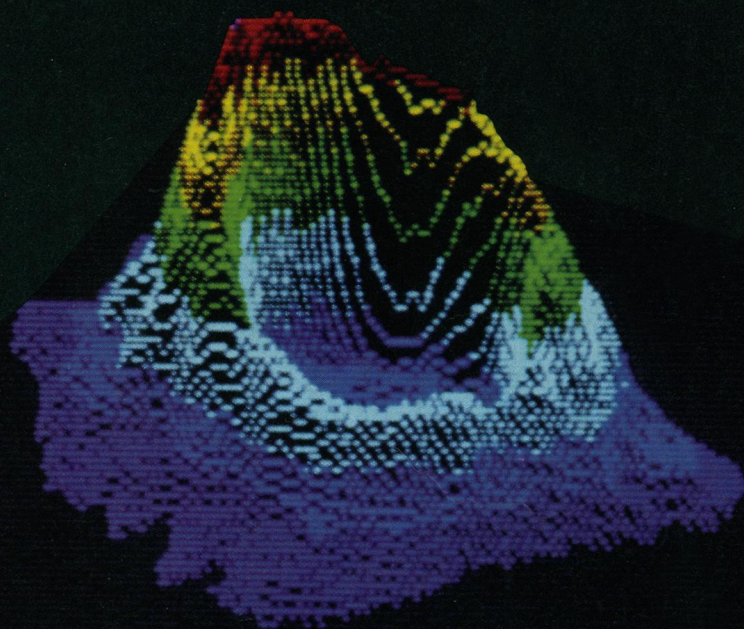
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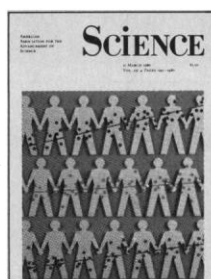
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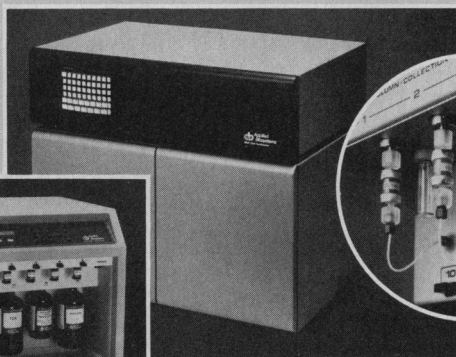
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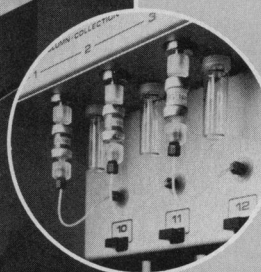
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This Week in SCIENCE

AIDS epidemic

THE AIDS epidemic is considered the most serious epidemic of the last 50 years (page 955). The disease has been reported in 74 countries, and several million people are thought to be infected with the AIDS virus worldwide. In this special issue on epidemiology (see cover, articles on pages 951–979, and Koshland's editorial, page 921), Quinn *et al.* describe epidemiologic studies carried out in central African countries; the discovery in the early 1980's of Africans with AIDS who were living in Europe suggested that the disease might be endemic in Africa. The earliest evidence for the AIDS virus in Africa was found in serum that had been collected for a hepatitis study in 1959; only in the late 1970's and early 1980's was a marked increase in cases noted. The epidemiologic pattern and the clinical picture are different in Africa from the patterns in the West. Prevention and control of AIDS are costly pursuits that will require a major international effort in developing countries. Some cooperative efforts toward these goals have been initiated by the African Regional Office of the World Health Organization.

Bacterial resistance

PENICILLIN, tetracycline, chloramphenicol, and other antibiotics have been effective for controlling bacterial diseases since the 1940's; however, bacterial strains are emerging at increasing frequencies that are resistant to antibiotics, and epidemics of antibiotic-resistant bacterial infections are becoming more common (page 964). Cohen and Tauxe describe the recent resurgence of diseases caused by resistant strains of *Salmonella*; the problem in some instances has been traced to the routine use of antibiotics for therapy and for improving growth and productivity of animals used for food. The animals' flora, subjected to continuous antibiotic pressures, becomes resistant to the antibiotics, and food contaminated by the bacteria then can cause infec-

tions. Epidemiologists can actually trace an organism—sometimes from the original cow, through the slaughterhouse, through the hamburger, to the first victim, and then to secondary victims—by the organism's antibiotic-resistant traits and other features. People being treated with antibiotics are generally the most susceptible to infection by resistant organisms. Recommendations include more prudent selection and use of antimicrobials in animals and more restricted use for therapeutic and prophylactic purposes.

Drug abuse

SOME 20 years ago, the case was made for heroin addiction being a communicable disease: the drug could be considered the infectious agent, the drug user was both host and reservoir, and a drug-using peer was the vector that transmitted the disease (page 970). Epidemiologic methodology has since been applied to analyses of drug abuse in this country. Because drug abuse is illicit, data are not easy to come by. Two periodic surveys (one of high school seniors, the other among household members over age 12) provide data on drug usage; to these data are added reports from drug treatment centers, emergency rooms, and coroners. Kozel and Adams discuss trends in abuse of marijuana, heroin, and cocaine; there are estimated to be 62 million one-time or more marijuana users and 18 million recent users, 400,000 to 600,000 heroin addicts, and 5.8 million recent cocaine users.

Radon in homes

SOIL, stone, and water contain radium that decays to radon, a noble gas, that in turn decays to a series of short-lived isotopes that emit α particles (page 992). These radioactive isotopes cause lung cancer in miners heavily exposed in underground uranium and other types of mines; the contribution of radon to non-occupationally related cases of lung cancer is current-

ly of interest. Radon is trapped in homes and other enclosures; concentrations are higher indoors than outdoors. Nero *et al.* collated and analyzed data on the levels of radon in some single-family homes in the United States and estimated the frequency distribution of radon concentrations in such homes. The arithmetic mean concentration in homes sampled (1.5 picocuries per liter of air) presents a 0.3% lifetime risk of developing lung cancer, or 10,000 cases of radon-induced lung cancer per year in the United States. There may be a million homes with concentrations of radon above 8 picocuries per liter; for residents of these homes, there is an estimated 2% lifetime risk of developing lung cancer. Occasional homes have concentrations of 50 to 100 or more picocuries per liter, where the risk of lung cancer is extraordinarily high. Statistically designed surveys of U.S. homes can test these estimates directly; changes in building codes and other guidelines will be needed to help reduce the risk of radon-induced cancer in the future.

How leeches swim

EXACTLY how sensory input (stroking, pinching, or other strong mechanical stimulation) is converted to motor output (swimming) in the medicinal leech has been determined (page 1002). Four types of neurons were previously known to be involved in the neuronal network. Using staining techniques and intracellular electrical stimulation, Brodfuehrer and Friesen identified the missing link, the trigger neurons (Tr1), and defined their position in the chain of events. When Tr1 cells are activated by sensory neurons that have responded to pressure or pain, they excite swim-gating neurons; these send signals to the oscillator neurons that then excite the motor neurons. The net effect is rhythmic contraction of the dorsal and ventral muscles and a leech that undulates through the water. This is the first complex rhythmic behavior for which every step has been identified from a stimulus to a response.

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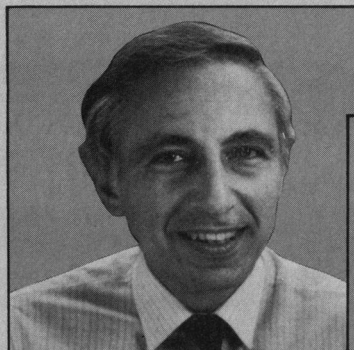
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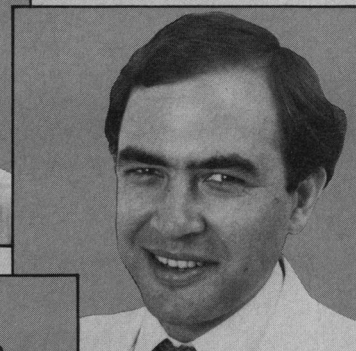
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The Epidemiology Issue

The word "epidemic" conjures up a picture of the Black Death sweeping across Europe in the 14th century. That epidemic is estimated to have reduced the population by a fourth and destroyed economies and village life. Ironically, the disease was so devastating that it also stopped wars, lowered rents, and brought some fluidity to an ossified society. Epidemics in the Middle Ages were often facilitated by unsanitary water conditions, insect or animal vectors, and such human contacts as sneezing and sexual intercourse. Improved sanitation has made it possible to protect water supplies. Knowledge of insect and animal vectors and the use of insecticides have vastly reduced the second major route for spreading disease, and human interchange can be localized in the modern world. Thus the threat of another epidemic like the Black Death seems unlikely. Nevertheless, the ancient dangers still exist in much of the developing world, and new varieties of epidemics occur in the developed world. Epidemics may threaten a smaller fraction of the total population than in the past, but the increased world population today means large numbers of people are affected. This issue of *Science* focuses on some recent problems in widespread diseases and modern techniques for combating old enemies.

In the first article, Roger Glass discusses the basis of the new epidemiology, now defined more broadly to include all the major causes of death. In the traditional way of accounting for leading causes of death in the United States, heart disease and cancer are in first and second place, with practically no other cause in the same quantitative category. However, if one looks only at the causes of premature death ("premature" meaning any death before age 65), the list becomes unintentional injuries, cancer, heart disease, and violence (suicide and homicide), in that order.

AIDS is an epidemic in the classical tradition, affecting only a small fraction of the population at present, but growing steadily. It is already a major health problem, and it clearly figures in the premature death category. In this country its transmission has been identified predominantly with homosexual males and drug users, but Quinn, Mann, Curran, and Piot point out that, in Africa, AIDS is linked predominantly to heterosexual practices. The reasons for the difference are significant and may be important in helping prevent the spread of this quite terrifying disease.

A modern twist on an ancient battle is the emergence of drug-resistant bacteria. As one strategy in the unending warfare between the species, humans abandoned boiled water and developed antibiotic missiles. The bacteria then initiated a strategic defense based on an impenetrable—or almost impenetrable—shield of antibiotic resistance. As described by Cohen and Tauxe, this battle has been complicated by the widespread use of antibiotics in food animals, which has, in turn, led to new strains of *Salmonella* now resistant to the drugs needed to treat human infection.

Drug abuse would not have been considered a disease in ancient times, but the current widespread use and increasing number of innocent victims clearly justify study in epidemiologic terms. Kozel and Adams report that peak marijuana use among high school seniors occurred in 1978 when the perception of risk was low (35 percent saw great risk from regular use). Use in 1985 has declined significantly when the perceived risk has risen to 70 percent. Thus education campaigns can diminish drug abuse.

Classical epidemics exist today in the less wealthy tropical countries. Malaria is endemic—annual acute cases numbering about 100 million—in areas inhabited by 365 million people. Controlling it and the less prevalent leishmaniasis is hampered by difficulties in culturing the organism and laborious diagnoses. Wirth and her co-authors describe the development of DNA probes, which make it possible to diagnose directly from lesion tissue, a great advance.

The evolution of the science of epidemiology is probably no more dramatically illustrated than by comparing the topics in this issue with those that might have been funded by a Disease Control Foundation in the Middle Ages. They would illustrate how far we have come, not only in saving lives, but also in elevating the human spirit because the ravages of the Middle Ages generated mysticism, xenophobia, and prejudice. We have our problems today, but at least we are not burning witches to stop the spread of disease.

—DANIEL E. KOSHLAND, JR.

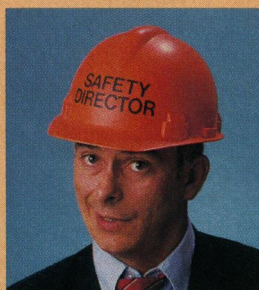
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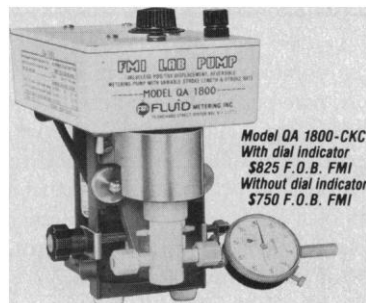
Model 3710 Complies with NFPA 56C and 45, OSHA 29 CFR 1910.106; UL listed for storage of flammable materials

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begins in Washington, D.C., with events (or nonevents) that transpired in Foggy Bottom in the late winter of 1984. The mystery is not what happened, but why.

Several U.S. government agencies were formally invited to join the Vinogradov Expedition at least 1 year before the ship left port at Nakhodka (Vladivostok, U.S.S.R.), on 15 June 1986, but they failed to act on the invitation. At least one U.S. Geological Survey marine geologist received a personal invitation but was denied permission to attend by the USGS. It was he who started the chain of communications that led to my invitation to participate. In my search for travel funds, inquiries at two National Oceanic and Atmospheric Administration offices, the Minerals Management Service, and the Manganese Crust Project Office in Honolulu, and elsewhere brought the same response: "Vinogradov Expedition? Never heard of it!" The story was the same at the International Programs Office of the National Science Foundation.

As a geologist committed to and involved in international scientific cooperation since my tour with Harry Truman's Point Four Program in the Philippines in the 1950's I deplore what appears to be a hidden bottleneck somewhere in Washington, D.C., that results in the failure of international scientific projects and can even prevent usually cognizant government agencies from knowing that opportunities exist. I hope that this letter will arouse righteous indignation in the right quarters and that this bottleneck can be broken. Where are the champions of international scientific cooperation who believe in the role of scientists as forces for good in a world sadly in need of goodwill on all sides? Let us not miss golden opportunities like the Vinogradov Expedition again.

RONALD K. SOREM
*Department of Geology,
Washington State University,
Pullman, WA 99164-2812*

Symbiosis

Once again, and with customary wit and eloquence, Daniel E. Koshland, Jr., has, for the most part, put biological allusion to effective use in his analysis of science policy, in this case concerning the sources and sinks of university research funds (Editorial, 31 Oct., p. 525). However, in the interest of clarifying terminology, some comment on the sense in which he uses the word "symbiosis" is in order. As any ecologist worth his or her salt will, of course, recall, "symbiosis" refers to an intimate association between

(usually) two organisms, frequently involving the acquisition of food, and encompasses three major types of interaction: "commensalism," in which one partner gains while the other neither benefits nor loses in the relationship; "mutualism," in which both partners benefit; and "parasitism," in which one partner benefits at the expense of the other. Therefore, the phrase "The shift from symbiosis to parasitism . . ." is not only imprecise but constitutes a redundancy, since parasitism is a symbiosis. In keeping with the overall sense of the essay, "mutualism" would seem to be meant here rather than "symbiosis." This misappropriation of the latter, more general term appears to be rather widespread in both popular and professional publications.

THOMAS W. CULLINEY
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Basic Energy Research

Mark Crawford, in his News & Comment article "R&D budgets: Congress leaves a parting gift" (31 Oct., p. 536), shows that "Most basic research programs have emerged from the agonizing budget drama in good shape." Included in those cited is the budget for the Basic Energy Sciences program of the Department of Energy, as follows: "Basic energy research expenditures also are rising—to \$536.67 million, \$33 million above the level recommended by the House Appropriations Committee and far above the \$441.3 million recommended by the Administration."

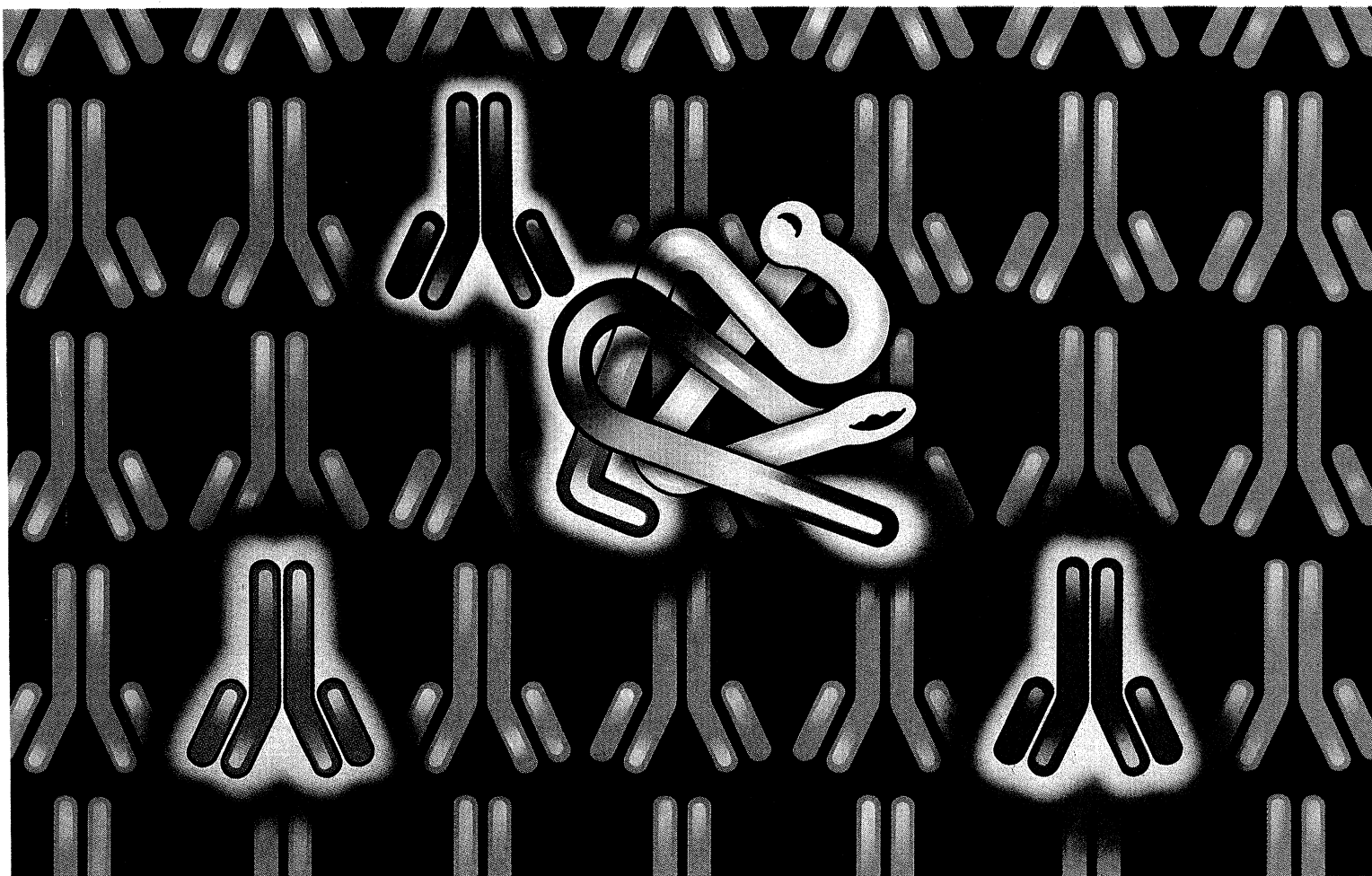
Referring only to the budget bottom lines without attention to the internal details can be misleading. In its final action on the Basic Energy Sciences budget, Congress provided \$102 million for projects, mainly university buildings, not requested by the Administration; reduced Administration requested items by \$6.7 million; and specified the expenditure of an additional \$11.4 million for purposes not included in the Administration's request.

The net result is not a program of research being increased by 22% compared to that proposed by the Administration, as could be inferred by the budget totals cited in the article. Nonetheless, we are pleased that in most aspects the Administration's proposed program is intact and funded so as to allow a strong program to go forward.

DONALD K. STEVENS
*Basic Energy Sciences,
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SCIENCE, VOL. 234

Oncoprotein Antibodies...

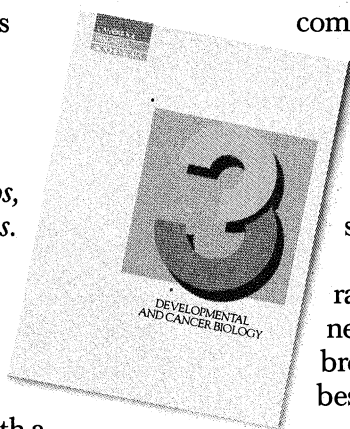


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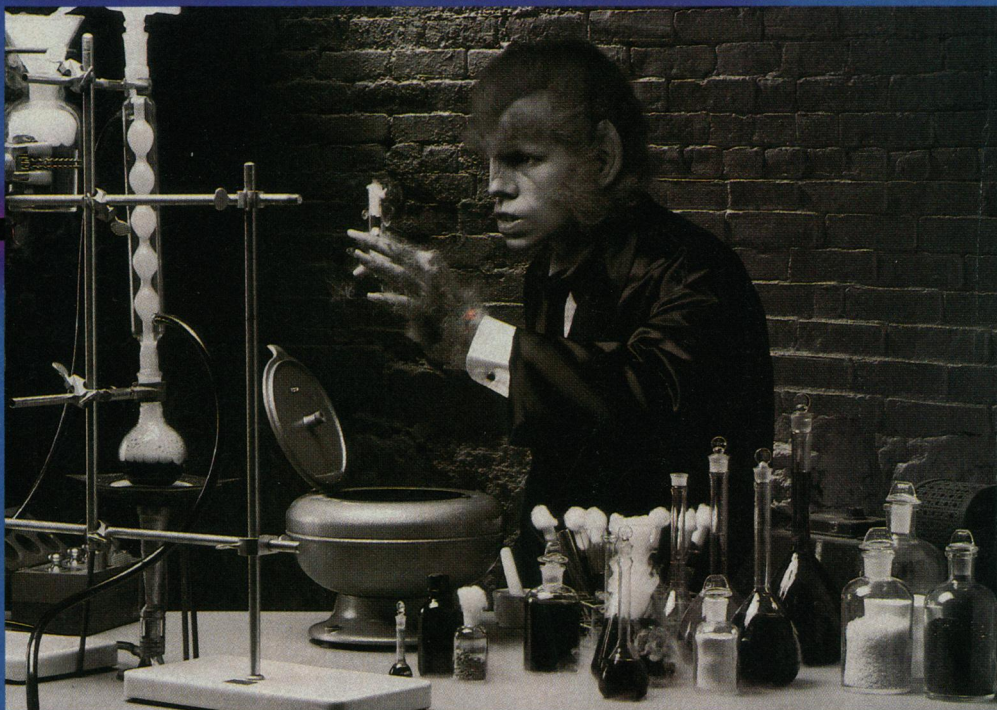
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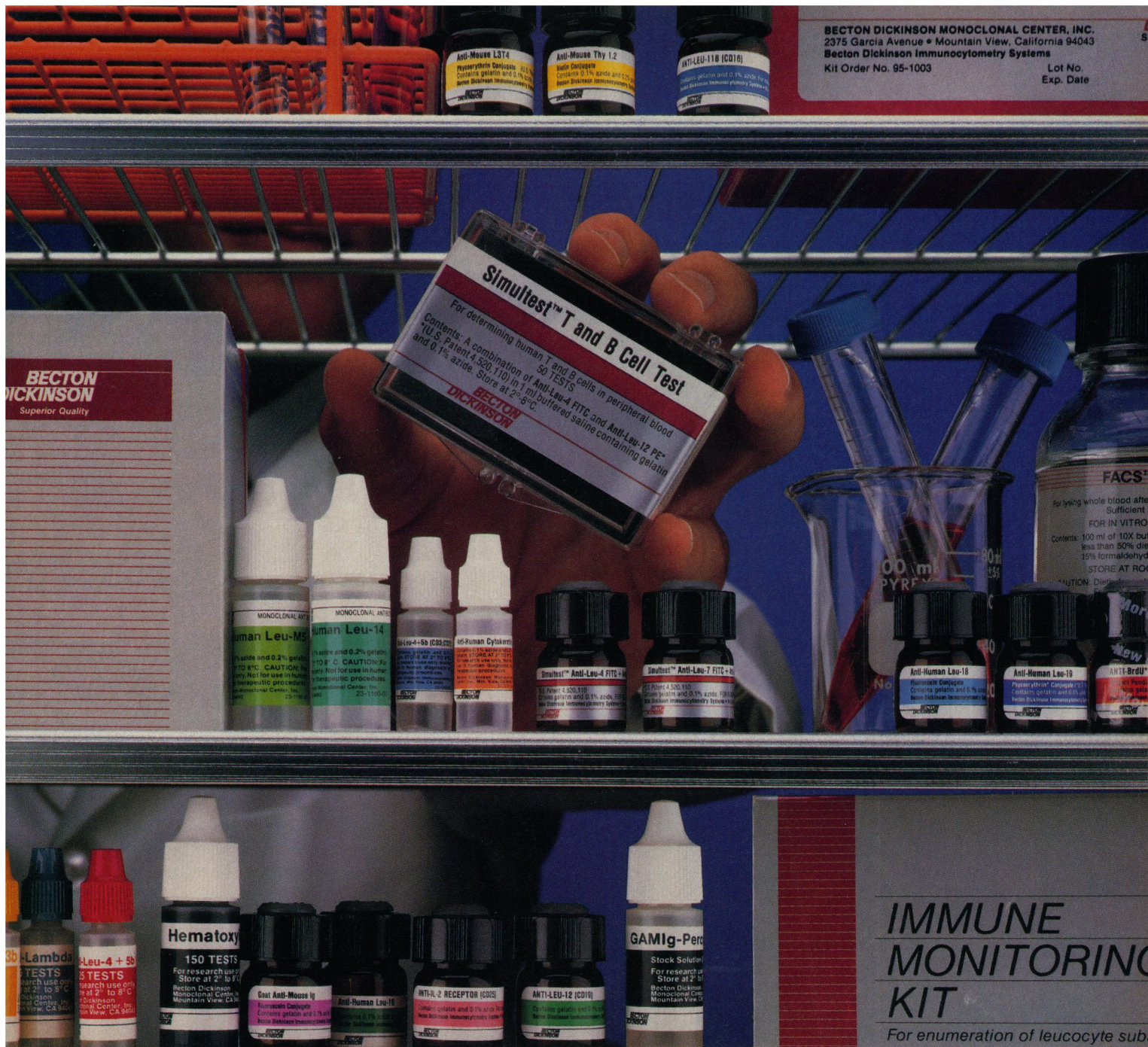
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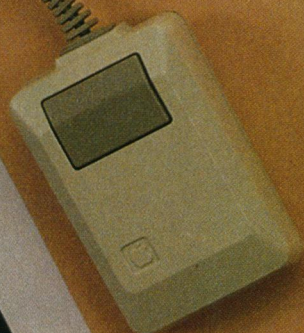
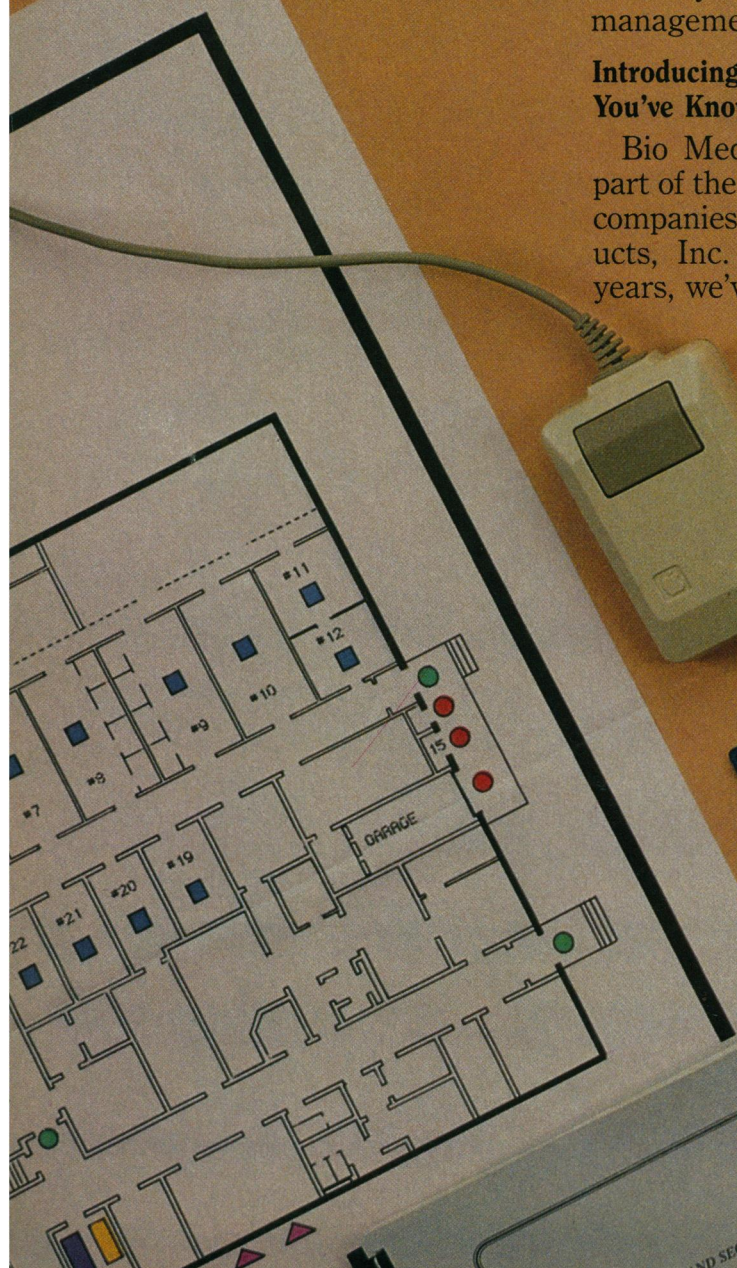
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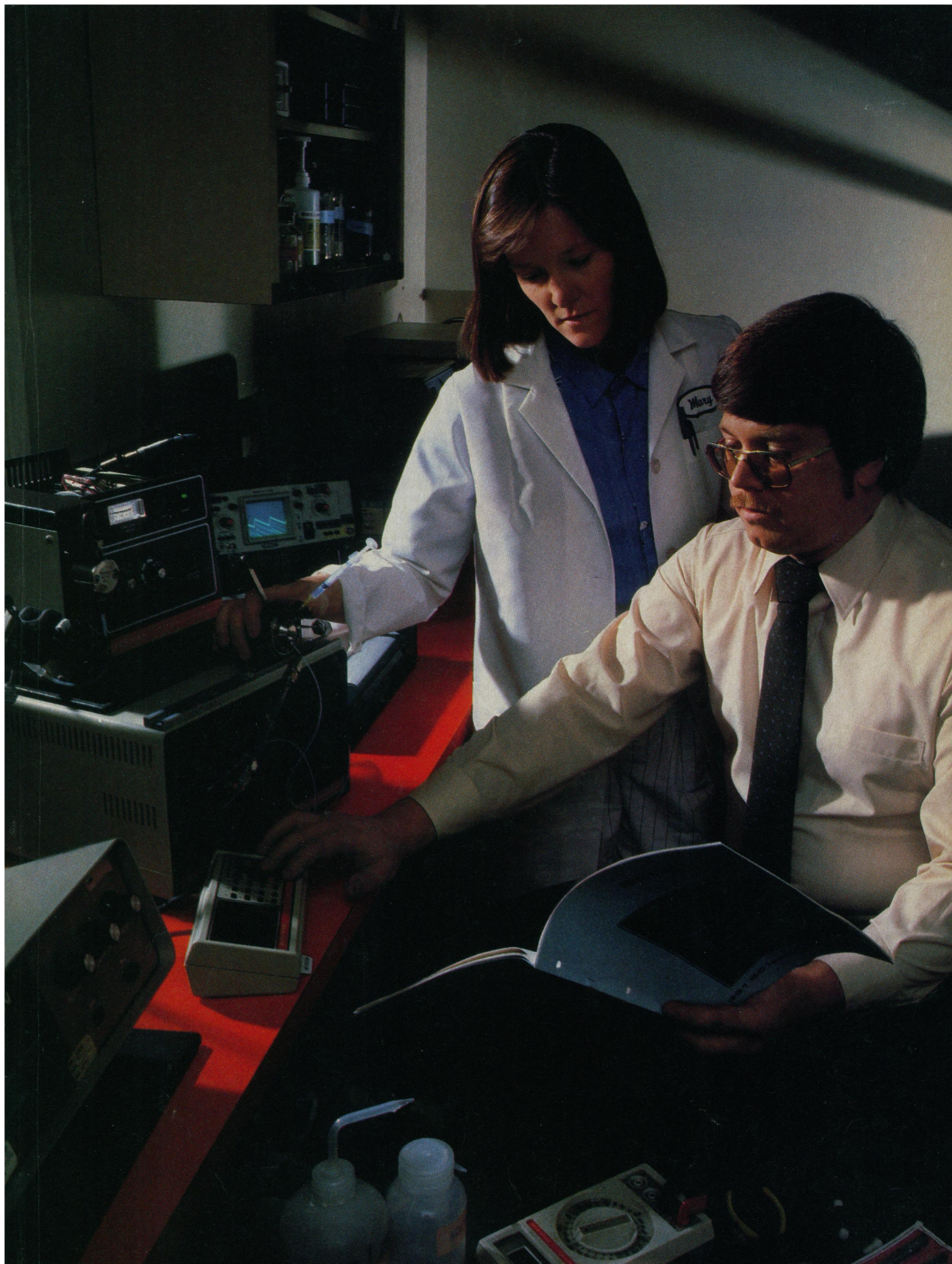
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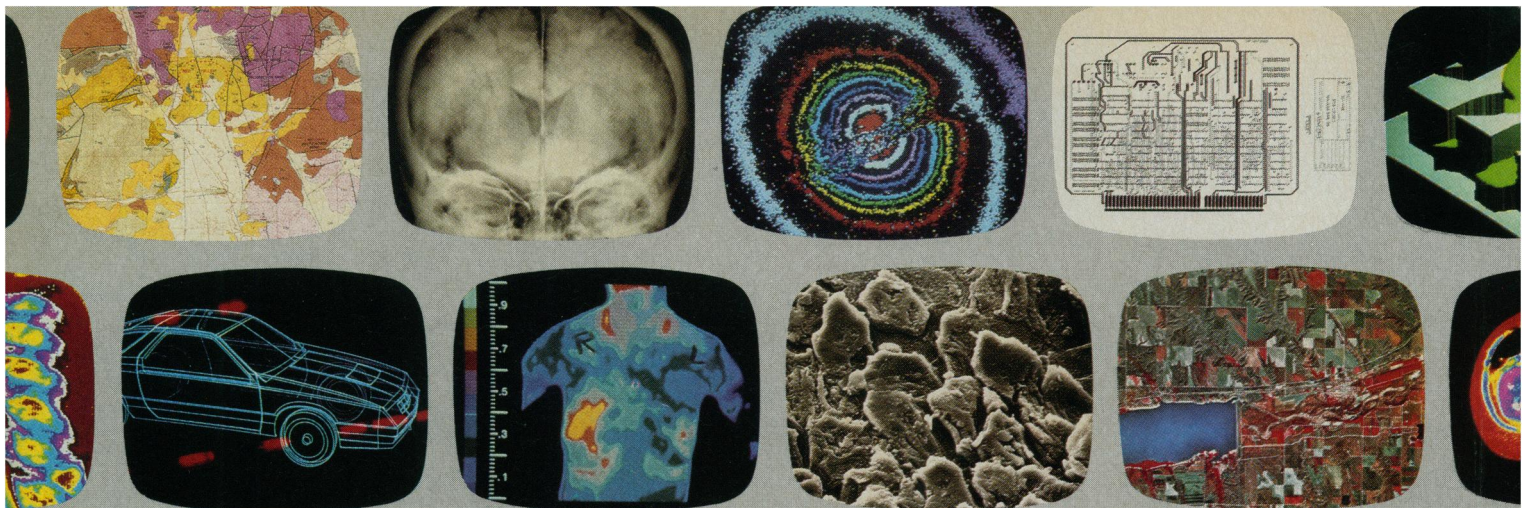
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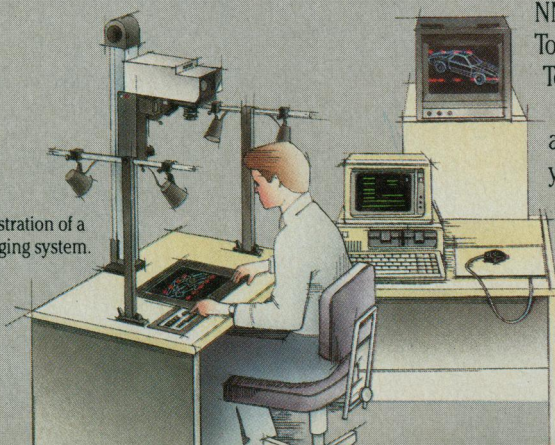


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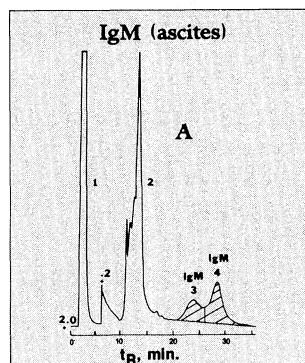
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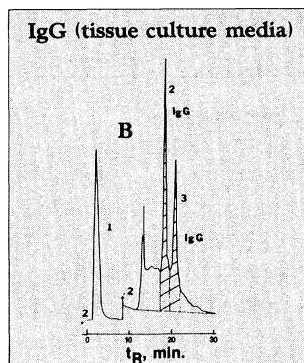


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4. IgM

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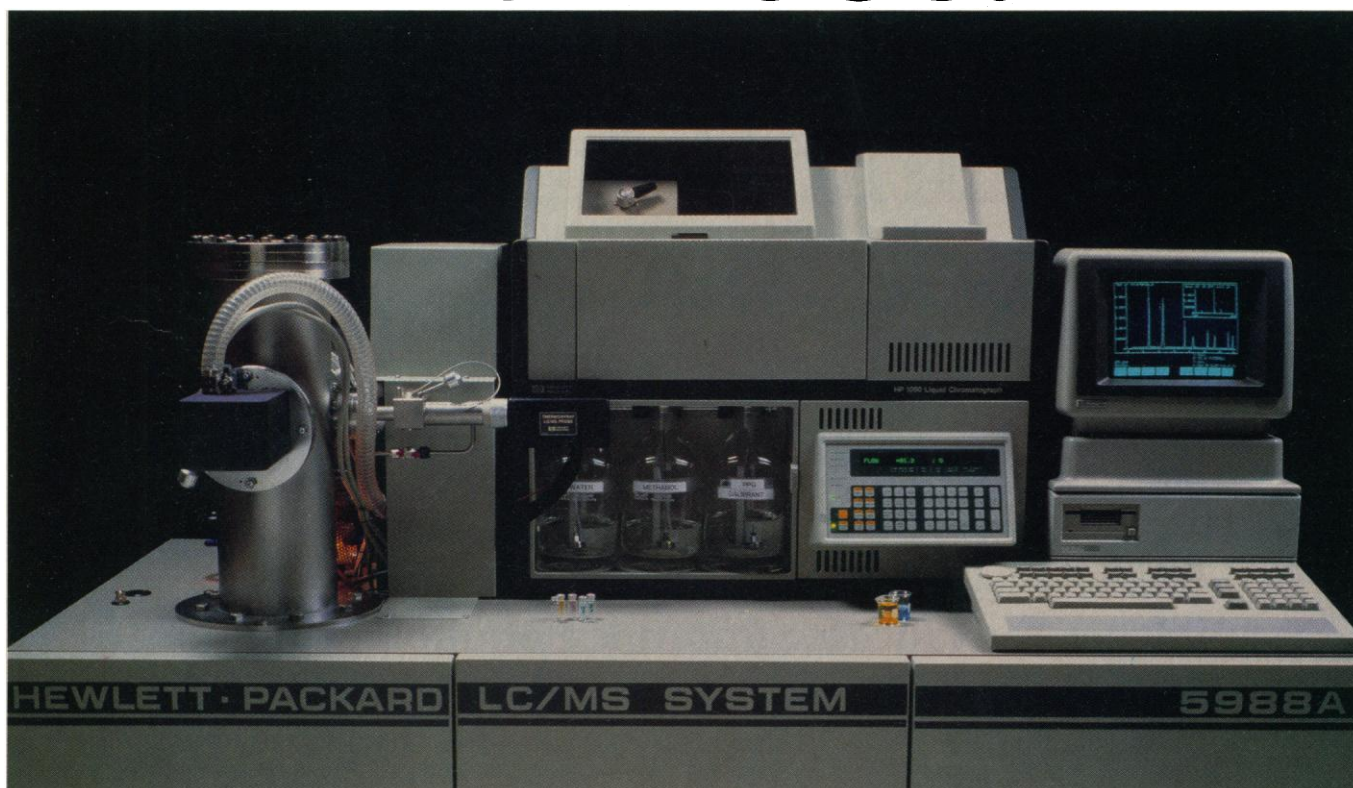
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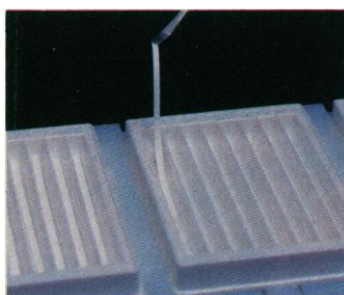
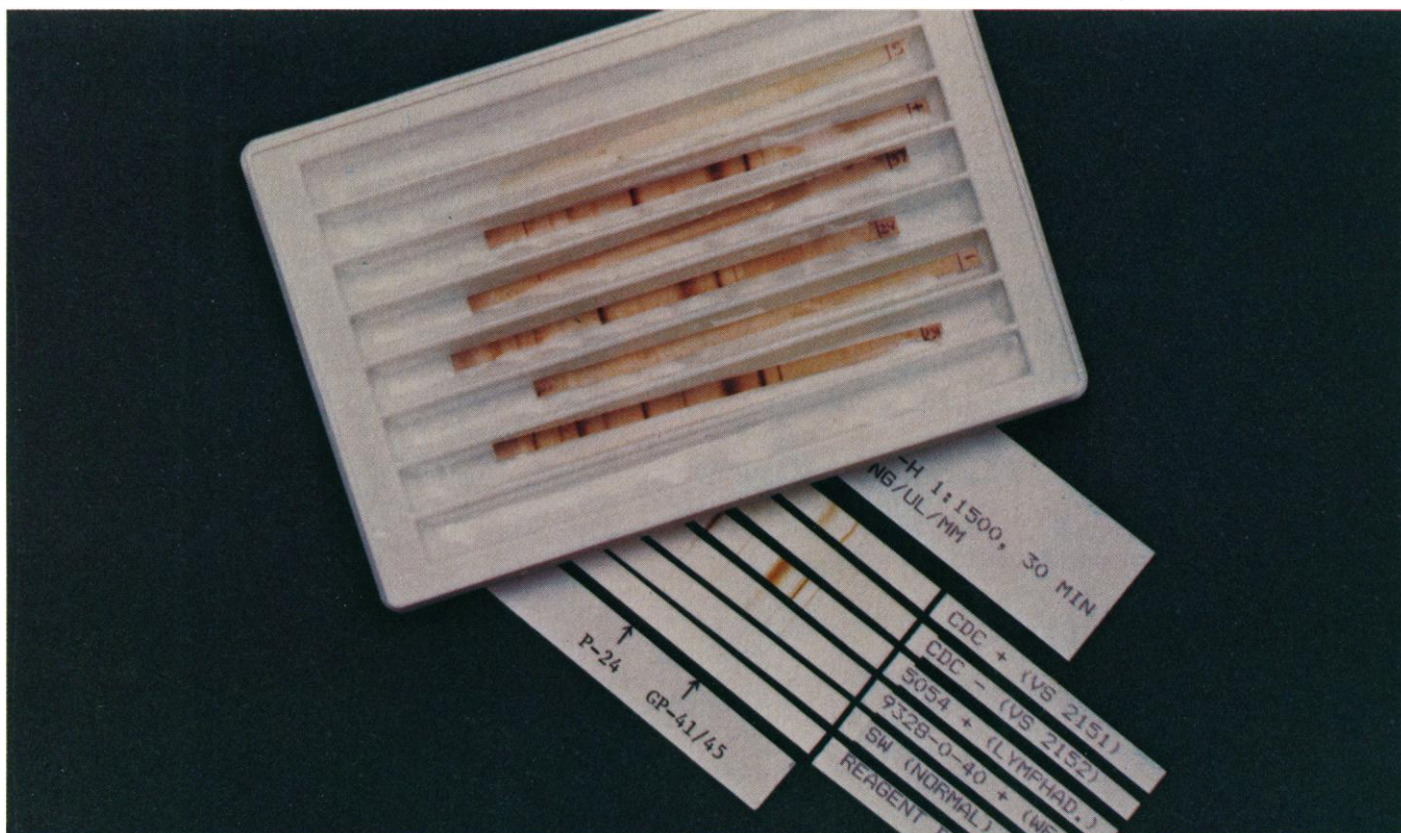
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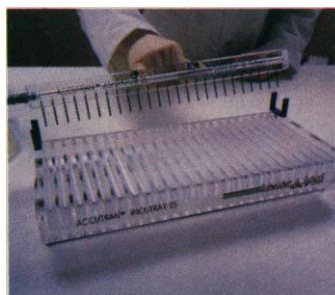
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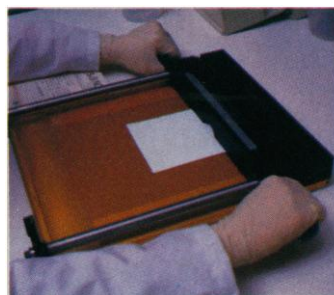
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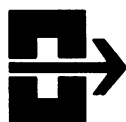
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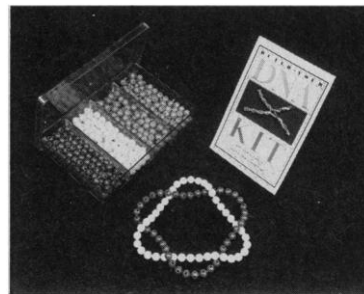
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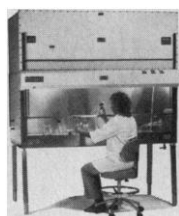
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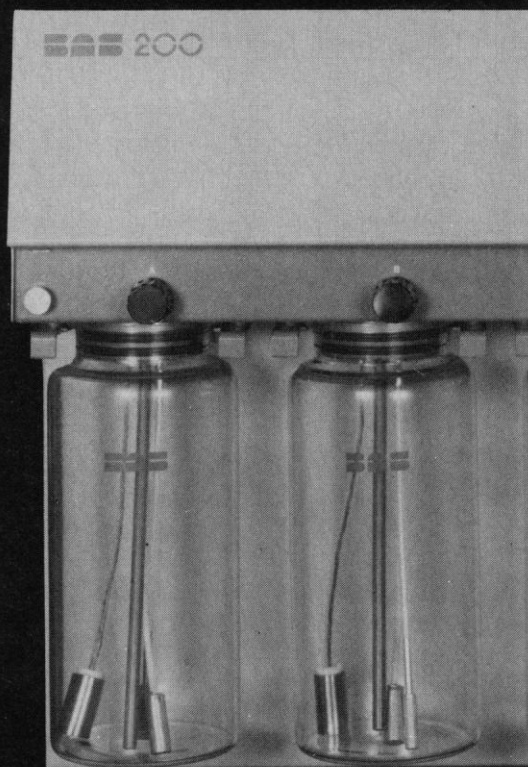
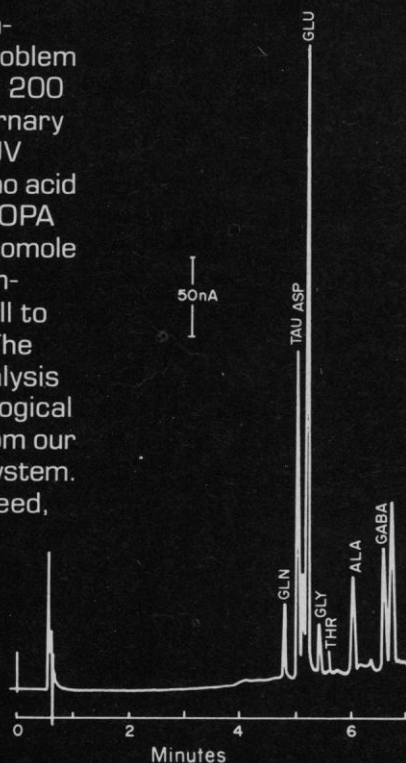
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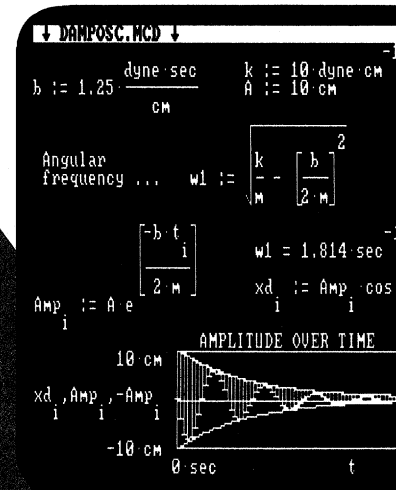
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KEYNOTE ADDRESS (Sunday p.m.) Stephen Goff, Columbia University, Alexander Rich, M.I.T.

ACQUIRED IMMUNE DEFICIENCY SYNDROME (AIDS)

Chairman: Erling Norrby, Karolinska Institutet, Stockholm, Sweden

(Monday a.m.)

IMMUNOPATHOPHYSIOLOGY OF AIDS

Luke Montagnier, Paris

HTLV-III AND OTHER FACTORS IN THE ORIGIN OF AIDS AND ASSOCIATED MALIGNANCIES

Robert C. Gallo, Bethesda

IMMUNOLOGIC AND MOLECULAR FEATURES OF HIV INFECTION

Jay A. Levy, San Francisco

MOLECULAR BIOLOGY OF IMMUNOSUPPRESSIVE RETROVIRUS

Simon Wain-Hobson, Paris

DEFINING THE VIRAL GENES FOR HTLV-III REPLICATION AND CYTOPATHOGENICITY

Flossie Wong-Staal, Bethesda

(Monday p.m.)

MOLECULAR BIOLOGY OF THE AIDS VIRUS

William Haseltine, Boston

RELATIVE IMMUNOGENICITY OF HTLV-III, HTLV-IV, AND STLV-III PROTEINS

Myron Essex, Boston

ENVELOPE PROPERTIES OF HIV

Robin Weiss, London

TARGETS FOR IMMUNE ATTACK IN RETRO VIRUSES ASSOCIATED WITH AIDS

Dani P. Bolognesi, Durham

USE OF VACCINIA VECTORS TO STUDY EXPRESSION AND IMMUNOGENICITY OF RETROVIRAL PROTEINS

Bernard Moss, Bethesda

DNA PROGRAM

CHROMATIN (Monday p.m.)

Chairman, Gary Felsenfeld

TRANSCRIPTION (Tuesday a.m.)

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INTRACELLULAR PROTEIN TARGETING (Tuesday p.m.)

Chairman, Harvey Lodish

NEUROBIOLOGY (Wednesday a.m.)

Chairman, James L. Roberts

DEVELOPMENTAL BIOLOGY (Wednesday p.m.)

Chairman, Peter Gruss

HYBRIDOMA PROGRAM

TRANSGENIC MICE AS TOOL IN IMMUNOLOGY (Tuesday a.m.)

Chairman, Davor Solter

ANTI-IDIOTYPE VACCINES (Tuesday p.m.)

Chairman, J. Donald Capra

THE USE OF HYBRIDOMAS IN DETERMINING CYTOKINE STRUCTURES AND FUNCTIONS (Wednesday a.m.)

Chairman, Robert Schreiber

ANTI-CARBOHYDRATE MAB'S IN THE STUDY OF

GLYCOLIPID-MEDIATED CELLULAR EFFECTS (Wednesday a.m.)

Chairman, Jan Thuring

SUMMARY

Chairman, Joseph Davie

Working Group Meetings will meet in closed sessions. The consensus reached by working groups will be presented to the whole Congress.

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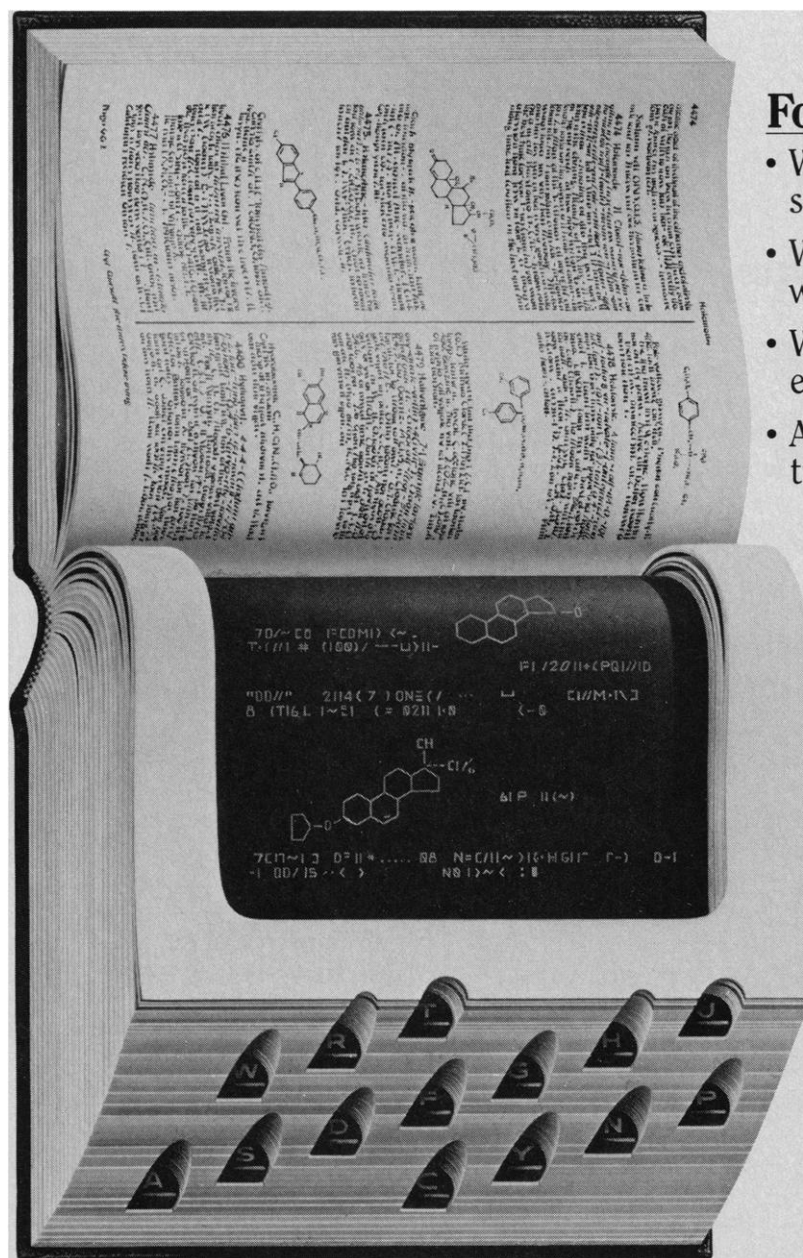
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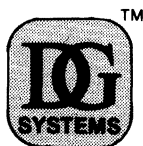
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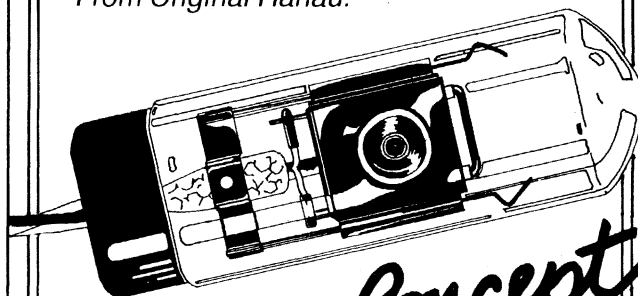
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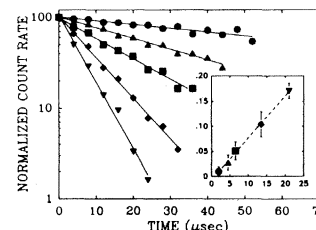
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