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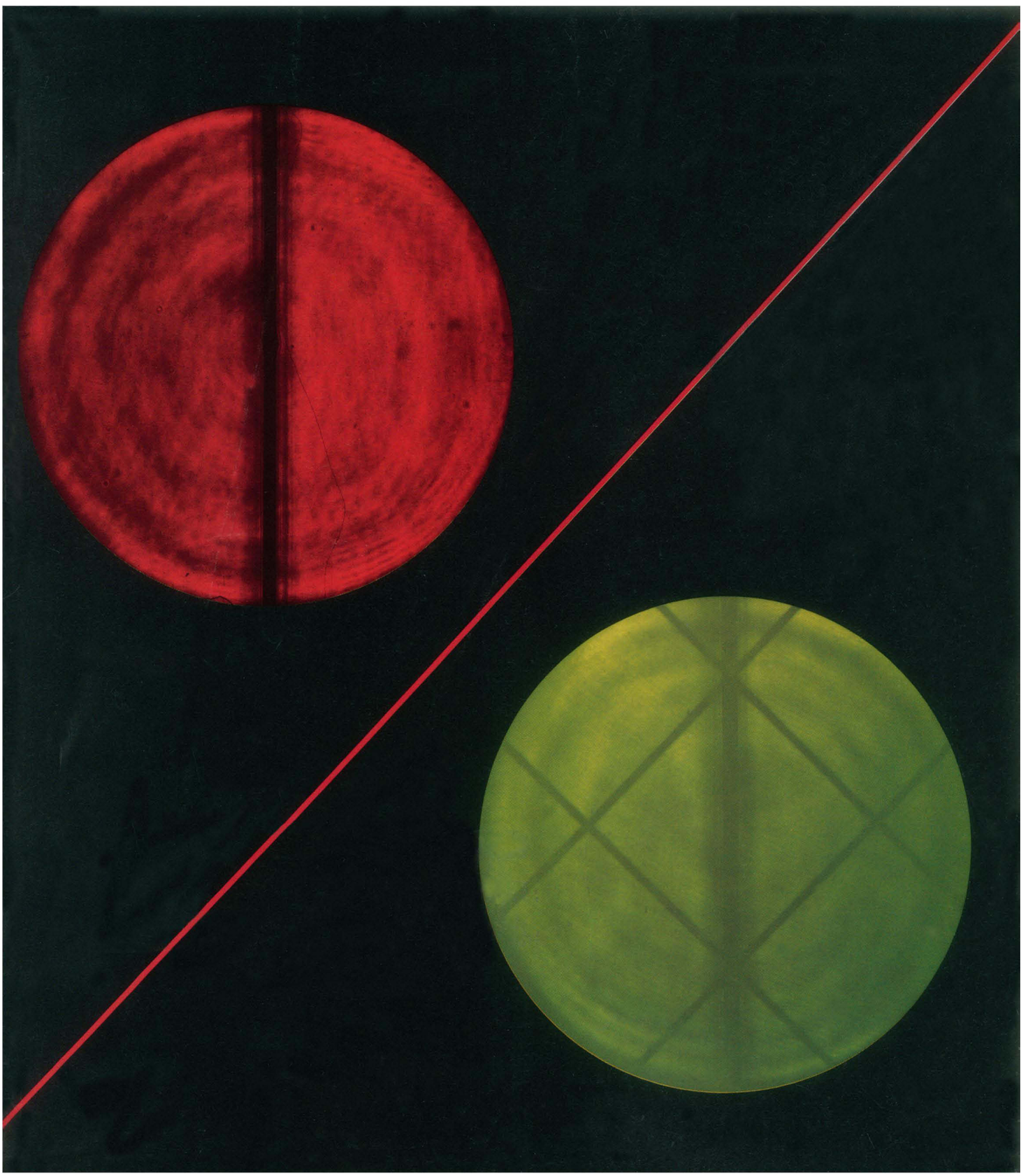

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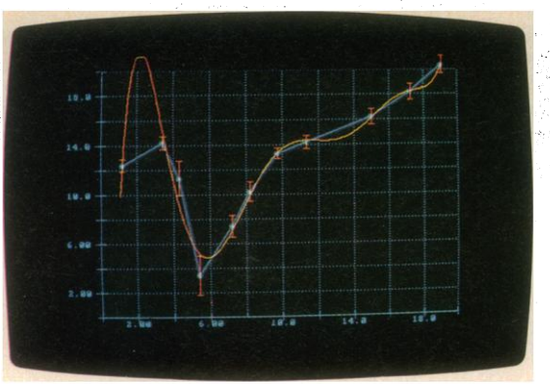

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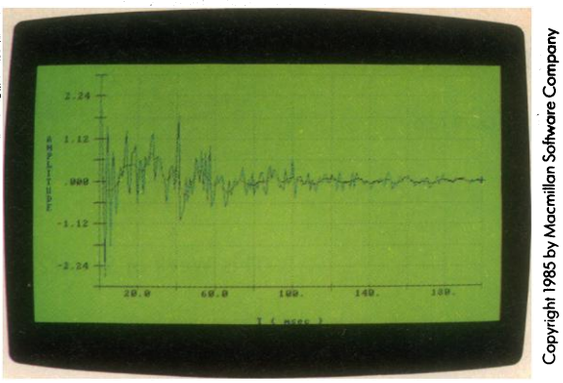

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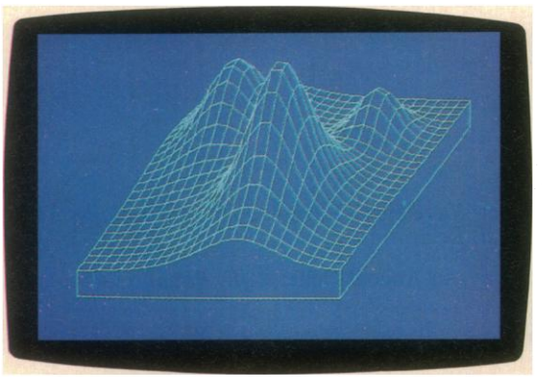

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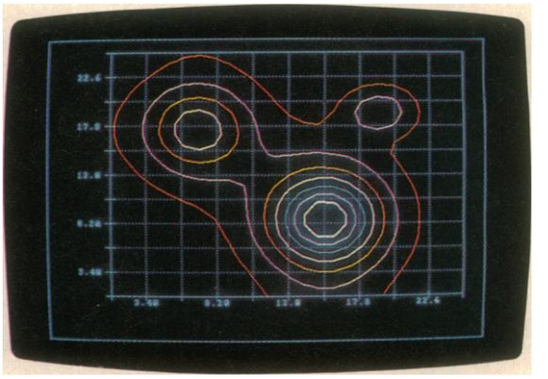

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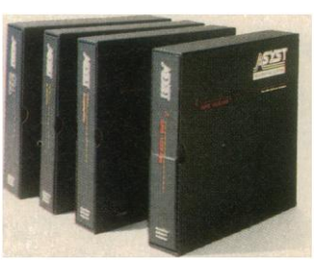

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866 Third Avenue, New York, NY 10022

ISSN 0036-8075

13 September 1985

Volume 229, No. 4718

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SCIENCE is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, D.C. 20005. Second-class postage (publication No. 484460) paid at Washington, D.C., and at an additional entry. Now combined with **The Scientific Monthly®** Copyright © 1985 by the American Association for the Advancement of Science. Domestic individual membership and subscription (51 issues): $60. Domestic institutional subscription (51 issues): $98. Foreign postage extra: Canada $24, other (surface mail) $27, air-surface via Amsterdam $65. First class, airmail, school-year, and student rates on request. Single copies $2.50 ($3 by mail); back issues $3 ($3.50 by mail); Biotechnology issue, $5 ($5.50 by mail); classroom rates on request. **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of $1 per copy plus $0.10 per page is paid directly to CCC, 21 Congress Street, Salem, Massachusetts 01970. The identification code for *Science* is 0036-8075/83 $1 + .10. **Postmaster:** Send Form 3579 to *Science*, 1333 H Street, NW, Washington, D.C. 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

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COVER

(Top, left) A 10-terawatt, 1.05-micrometer infrared laser beam from the Novette laser (red is false color from a black-and-white negative). (Bottom, right) A 6-terawatt, 0.53-micrometer beam converted from the Novette laser beam by a "mosaic" array of potassium dihydrogen phosphate harmonic crystals (green is false color from a black-and-white negative). See page 1045. [R. Speck and K. Mans, Lawrence Livermore National Laboratory, Livermore, California 94550]

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Improved lasers

The high-power lasers of the 1960's made it possible to heat matter to temperatures characteristic of the cores of stars, but the early experiments were conducted with wavelengths too long and targets too small to reveal much about the behavior of matter at such temperatures. The Novette laser operates at wavelengths that are short enough and can be focused on targets that are large enough so that Holzrichter *et al.* have overcome some of the limitations of those early experiments (page 1045). Plasma instabilities that interfere with efficient energy transfer between the laser light and the target were damped, thereby clearing the way for successful fusion experiments with high-density thermonuclear fuel. Stimulated soft x-ray emission, a long-sought goal of laser technology, was also achieved. With the Nova laser, five times as powerful as Novette, knowledge of the physics of high-energy matter should continue to expand.

Continental breakup

The record of the breakup of the ancient landmass of Gondwana and separation of the Antarctic and Australian continents is preserved at the margin of east Antarctica (page 1082). Eittreim *et al.* studied that record by seismic reflection and refraction, gravity, and magnetics. The Mohorovičić discontinuity, the boundary between crust and mantle, can be followed across the structural boundary between continent and ocean and shows that the continental crust thinned from a normal thickness of 35 kilometers to as little as 2.5 km before sea floor spreading began. A prominent seismic reflector may be a flood basalt poured out before the sea floor separated; it was then covered with sediments that were deposited rapidly. Distinct unconformities in the sedimentary section mark the beginning of rifting and the initiation of breakup. The east Antarctic margin, with thin sediment cover and few strong acoustic reflectors, is a good site for studying the structure of continental margins and the early history of continental breakup.

Long-range hydrophobic force

When long double-chained acetate surfactants are dissolved in water and are adsorbed onto sheets of mica, an electrically neutral hydrophobic surface is formed (page 1088). Pashley *et al.* measured the hydrophobic force between pairs of such surfaces and found it to be 10 to 100 times as strong as expected from van der Waals theory. The force, which acts over a distance of several nanometers, is caused by the long-range influence of the hydrophobic surface on the structure of water. Such forces are important in biology as well as in such processes as mineral flotation, coagulation, and the action of detergents.

Precursor of TRH

Thyrotropin-releasing hormone (TRH) is a neuropeptide that, in mammalian brain, regulates the release of thyrotropin from the anterior pituitary. It is a product of cleavage of a precursor protein analogous to one described in frog skin (page 1097). Jackson *et al.* used an antiserum to a synthetic peptide to show the presence of the precursor to TRH in neuronal cell bodies in the hypothalamus and medulla of the rat brain. The precursor was not present in axons, having apparently already been converted to the biologically active TRH before leaving the cell body. Early reports had suggested that TRH was synthesized enzymatically, by a process similar to that used in the synthesis of glutathione or the small neural peptide carnosine. Knowledge of its origin as a product of a precursor may help clarify the biochemistry of this important hormone.

Parasites defeat controls

Leishmaniasis is a parasitic disease of humans caused by infection with a protozoan carried by various species of sand flies. The host cells for these parasites are macrophages, the very cells normally involved in defense mechanisms (p. 1099). Mukkada *et al.* found an adaptation of *Leishmania donovani* parasite forms that allows physiological activities to be carried out in the very acidic environment of the infected macrophage. Respiration, incorporation of precursors into macromolecules, and catabolism of glucose were all determined to have their highest rates at a *p*H of 4 to 5.5, in the same range as that in the interior of macrophages. Thus the parasitic forms are adapted to live and multiply in the cells that are supposed to kill them.

Adaptation to the dark

In the retina of the fish, horizontal cells of the outer plexiform layer modify the responses to light of other cells in the retina, including the ganglion cells that send signals to the brain by way of the optic nerve (page 1107). Mangel and Dowling found that, after a long time in the dark, the horizontal cells of the carp retina showed alterations in responsiveness to spots of light so that their antagonistic effect on the ganglion cells was reduced. This change in the organization of the retina was not related to the much faster normal switch, under conditions of reduced illumination, from cone to rod vision. Dopamine applied to the retina has the same effect as prolonged darkness. A possible source of endogenous dopamine is the interplexiform cell, which contains dopamine and may release it in the dark. Mammalian retinas have few interplexiform cells but have other types, such as amacrine cells, that contain dopamine. The interaction of retinal cells may adjust the sensitivity of the eye to very small amounts of light.

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The complete MICRO-ISOLATOR System consists of the individual MICRO-ISOLATOR housing units, the STAY-CLEAN™ Laminar Flow Workbench, and the service cart.

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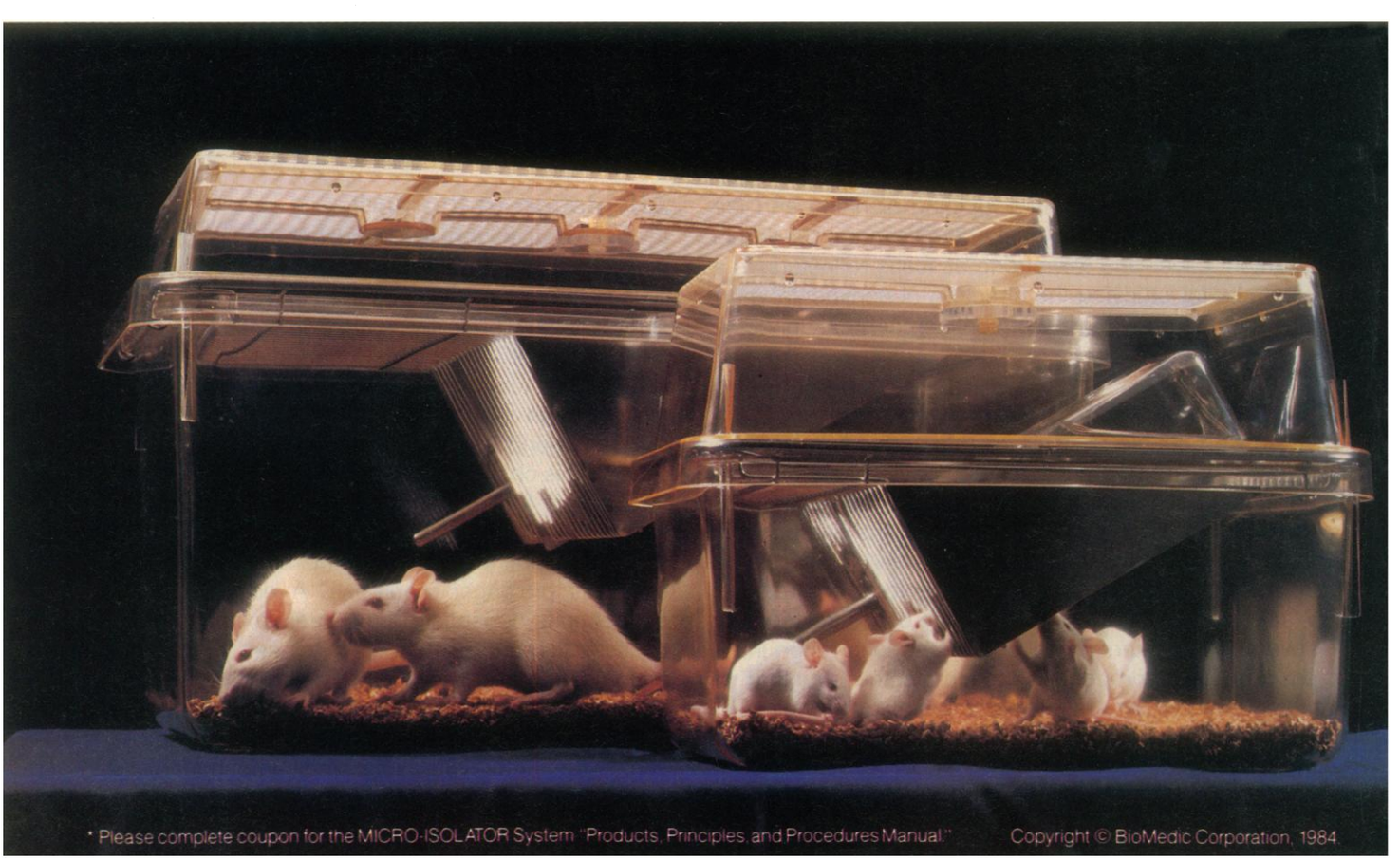

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The Service Cart

The service cart completes the MICRO-ISOLATOR System by simplifying the movement of all necessary supplies to the laminar flow workbench for servicing the MICRO-ISOLATOR units.

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Patents applied for on the MICRO-ISOLATOR units and other elements of the complete system.

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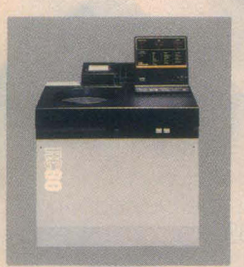

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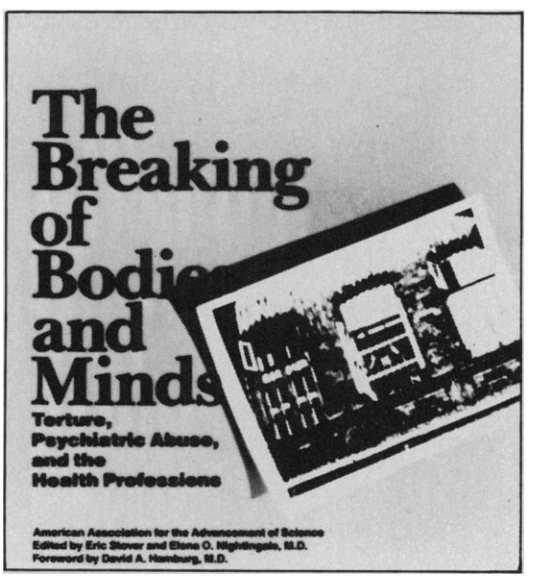
The Breaking of Bodies and Minds

Torture, Psychiatric Abuse, and the Health Professions

A documentation of systematic use and effects of physical and mental torture throughout the world

Edited by Eric Stover and Elena O. Nightingale

With a Foreword by David A. Hamburg



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The book also details the complicity of an alarming number of medical personnel in torture and psychiatric abuse and examines the ways in which governments use a medical rationale to seek legitimacy for human destruction. Finally, it describes efforts by medical and other associations both to combat offensive practices and treat victims.

Contents

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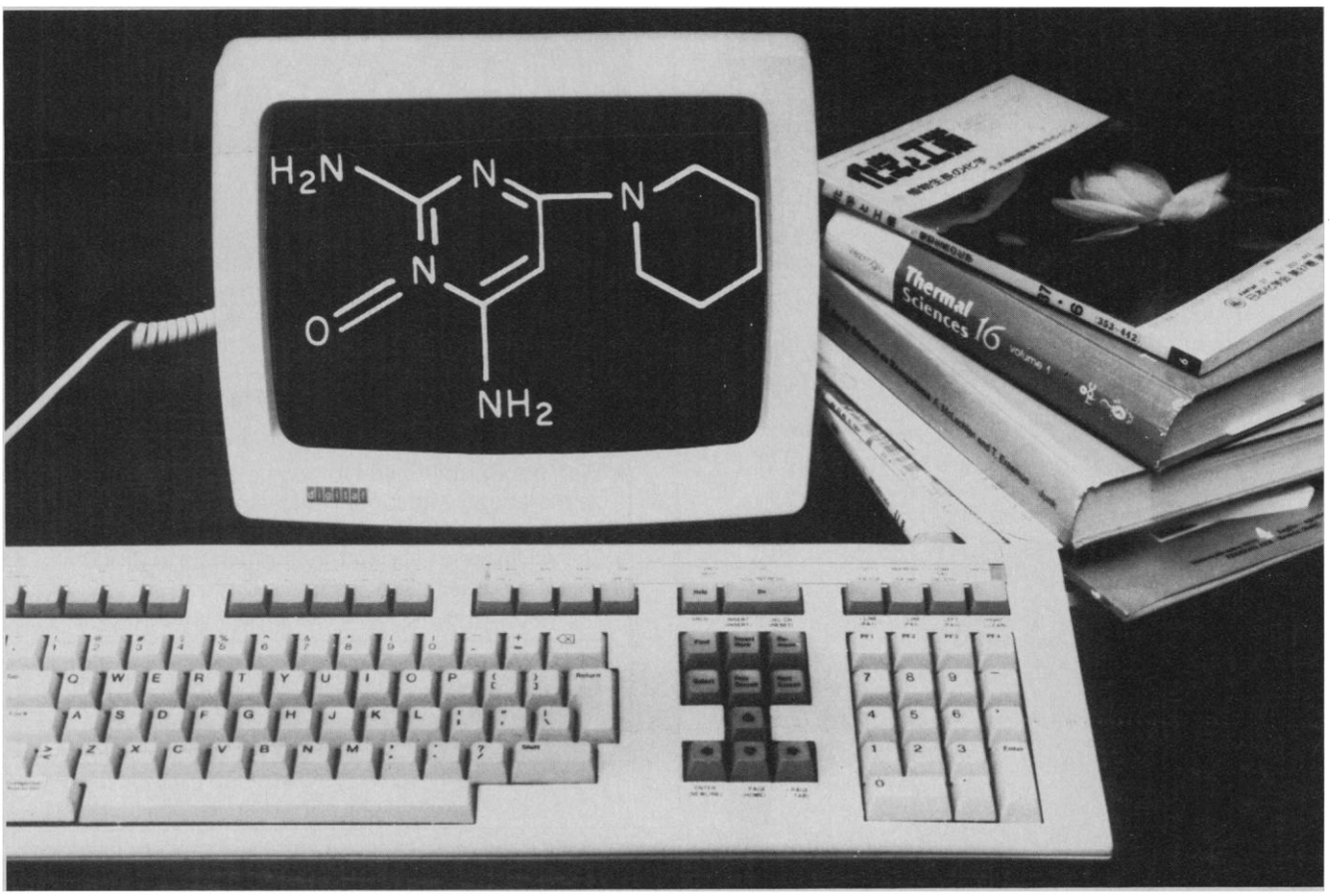

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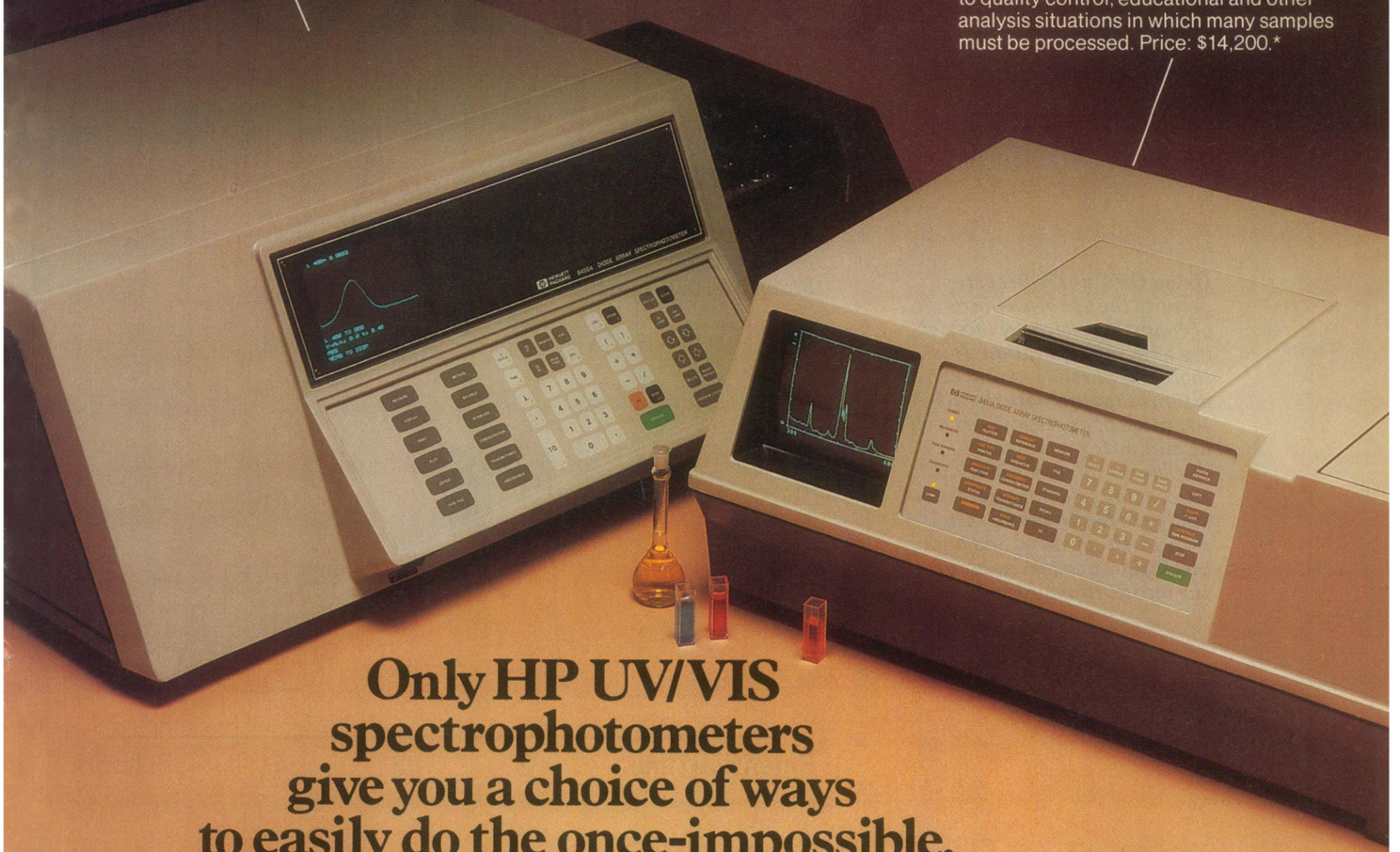

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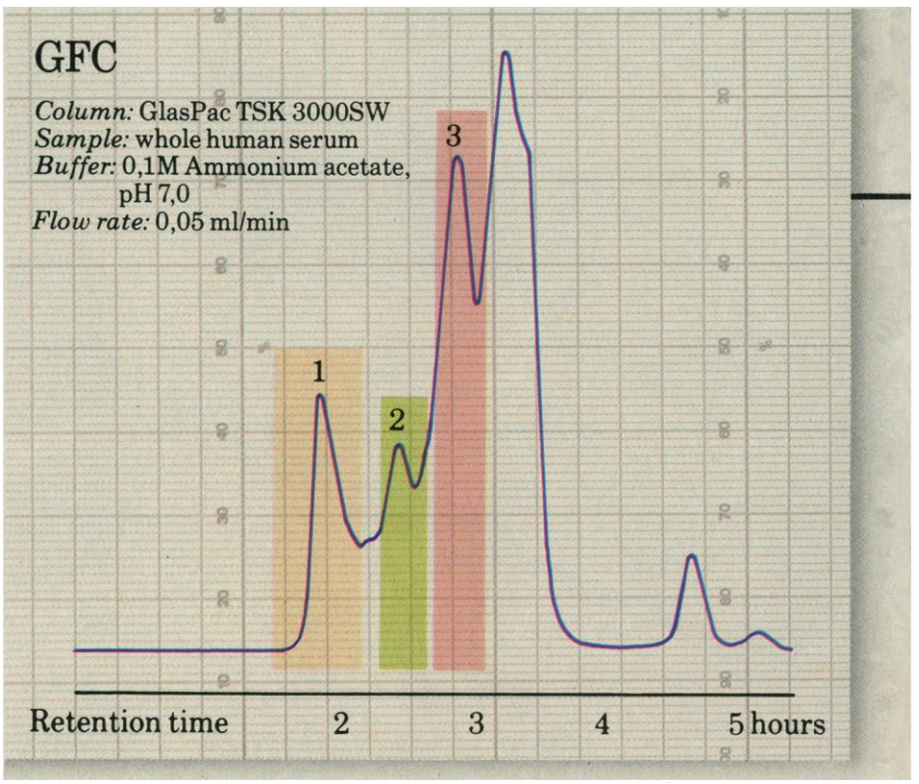

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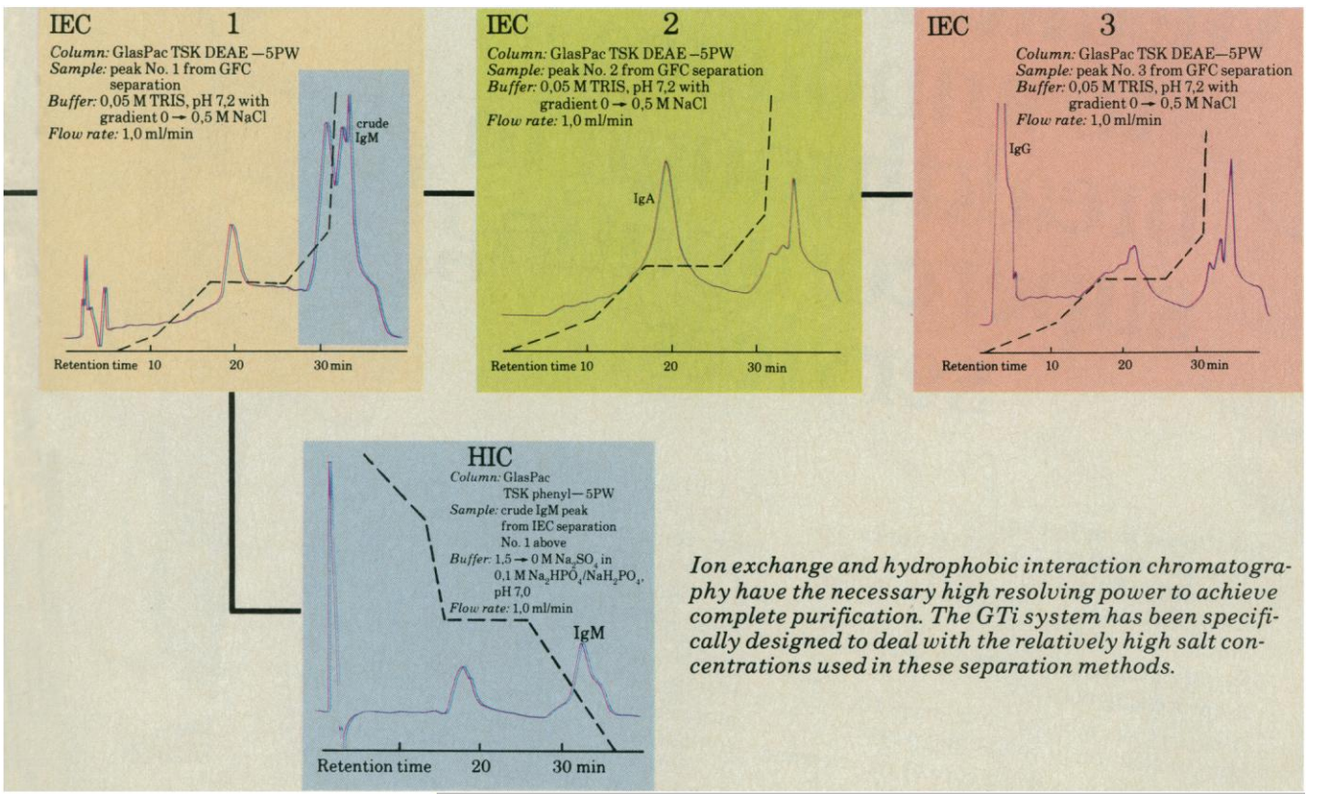

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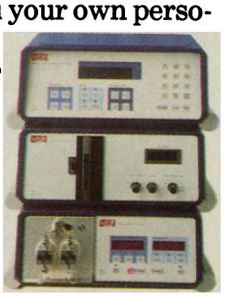

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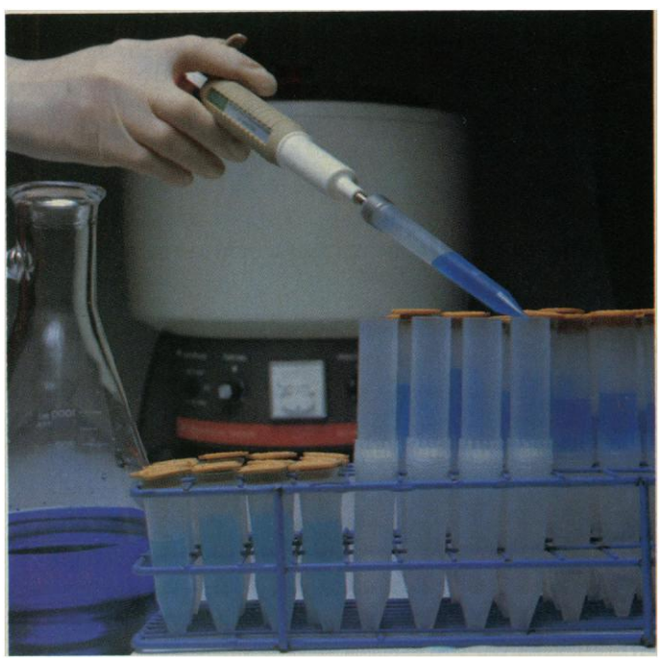

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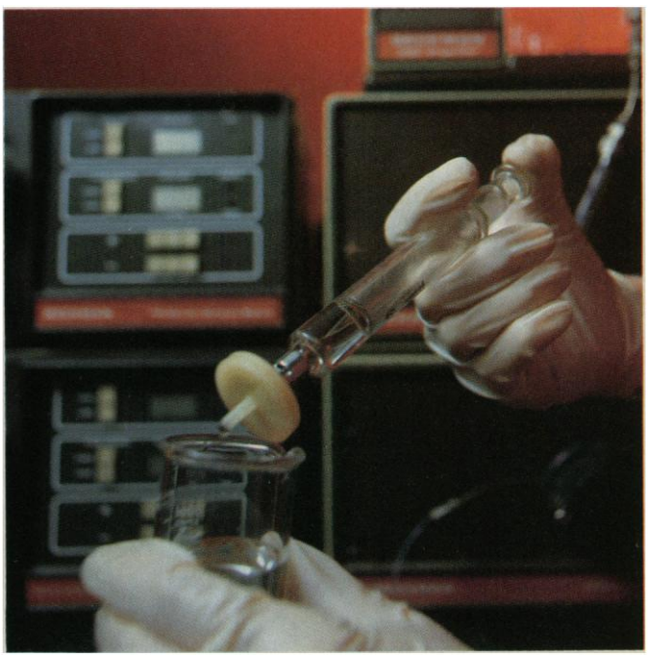

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SCIENCE/SCOPE

An electronics unit that took six years to complete will operate for 12 seconds when it plunges into the skies of Jupiter this decade. The device, called a pyro control unit, is a key element of the Galileo probe that will be launched in 1986. Armed with seven scientific instruments, the probe will penetrate the atmosphere of Jupiter and, in less than an hour, collect data that will feed scientific thought on planetary evolution for years to come. Tiny explosive bolts in the pyro control unit will fire at three intervals to deploy a small parachute, blow away the probe's aft heat shield (in turn triggering the opening of the probe's main chute), and extend the forward heat shield. The unit also will turn on an instrument for measuring the size and distribution of cloud particles. The circuitry of the unit has been built to withstand forces 10 times the pressure and 350 times the gravitational pull of Earth. Hughes Aircraft Company built the Galileo probe under contract to NASA.

Efficient ways to assemble and test the Amraam missile have arisen from having manufacturing test engineers work closely with design engineers ever since the early stages of the missile development. The two groups teamed to develop common test specifications, test equipment, and testing techniques. Their efforts are expected to drastically reduce test correlation problems and to allow the missile to be produced immediately at a high rate. Hughes designed and developed the advanced medium-range air-to-air missile for the U.S. Air Force and Navy. It is in full-scale engineering development.

A state-of-the-art cable TV system will soon be carrying programs to customers in Milwaukee. The system, ordered by Warner Amex Cable Communications, Inc. (WAVE Cable), will help cut operating costs and improve the quality of service. It calls for a Hughes AML multichannel local signal distribution system, including AML-STX-141 high-power transmitters, plus receive site and upstream equipment. The system initially will provide TV programming to three hub sites, where microwave signals will be downconverted to VHF. It will incorporate long-life klystrons, automatic receiver redundancy, 450-MHz receivers with low-noise amplifiers, solid-state upstream transmitters, and a microwave line extender. At least one channel will use Hughes FM microwave equipment. The company also has AML systems in Dallas, Cincinnati, Houston, and Medford, Massachusetts.

A new generation of powerful, ultrafast semiconductor microchips can soon be produced at rates required for commercial manufacturing, using the world's most sophisticated electron beam lithography system. The system is capable of writing circuit patterns with features as small as 0.5 micrometers — about 1/200th the diameter of a human hair. It was accepted recently by the U.S. Department of Defense for its VHSIC (very high speed integrated circuit) program. The acceptance culminates four years of development by Hughes Research Laboratories and Perkin Elmer Corporation leading to the direct-write system.

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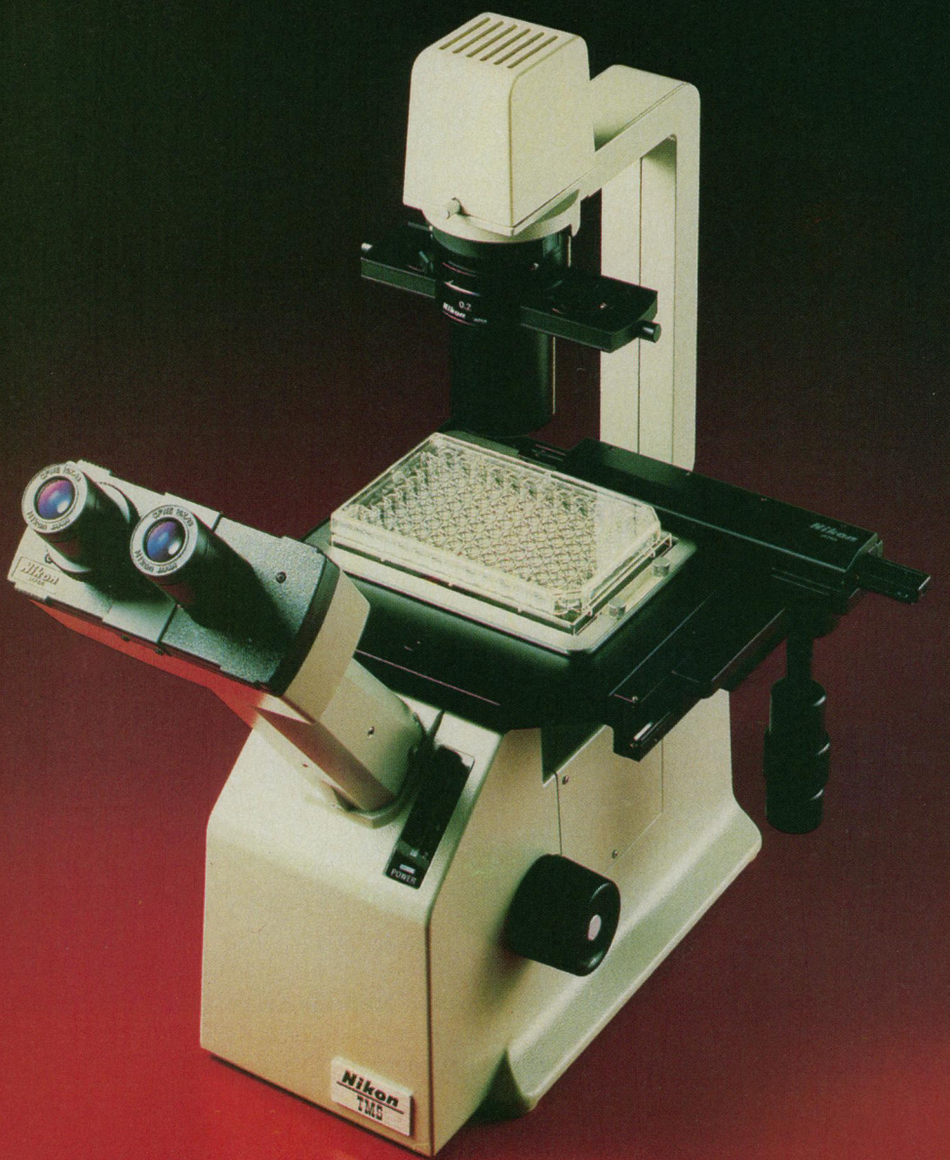

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13 September 1985, Volume 229, Number 4718 **SCIENCE**

Corporate Classrooms

Education and training within corporations of the United States is an important and growing industry.* It has been estimated that in 1981–82 annual costs were around $60 billion. This was comparable to the total spent by all of the country's 4-year universities and colleges. The number of students trained was also nearly comparable. Educational programs are more abundant and more highly developed in the large technologically active companies than in small companies.

A substantial fraction of the training is for engineers who need to keep abreast of rapidly changing technologies. But all components of the work force may be involved. There is compensatory education for disadvantaged employees and courses for those in management and sales. About 70 percent of corporate education is in-house training, allowing businesses flexibility with respect to content, time, method of presentation, and making changes when desirable. Much of the training is decentralized—that is, it is conducted in the various departments and branches of the companies. However, about 400 business sites include a building or campus devoted to education. Western Electric's Corporate Education Center at Princeton has a 300-acre campus, private rooms, excellent cuisine, and lighted tennis courts. The equipment is technologically advanced and supports effective, intensive courses. The atmosphere at this and other corporate educational centers is intense but cooperative and collegial. Courses are usually short, schedules tight, and goals explicit.

Teaching methods at companies are often similar to those at universities, but more effort is devoted to increasing instructional effectiveness. Computer-assisted instruction is used extensively and films and programmed materials are employed. Computer networks that link voice, graphics, text, and audio allow personalized classrooms. As might be expected, corporations are devoting considerable efforts to improve their instructional methods. Digital Equipment officials assert that they have made notable progress. The company has a computer system called IVIS that analyzes how a particular student learns. The system provides text, voice, graphics, and audio elements and responds to student behavior. Digital says that IVIS-trained students learn up to 53 percent faster and with better retention than students taught by conventional methods.

A potential market exists for university-created videotaped instructional material for corporations. A small fraction of this market is currently being served, and demand is expanding. This demand is being met in part by 28 universities that belong to the Association for Media-Based Continuing Education for Engineers (AMCEE).† It rents or sells some 400 videotape courses on engineering and related subjects. The tapes were used at 1500 sites last year. This academic year they will be shown at 2500 sites.

A new organization, the National Technological University (NTU),‡ will grant master's degrees. It plans to use television broadcasting in real time via satellite. Some 19 universities that have television and videotaping facilities are involved, and the best of the professors will be on the air. The latest catalog includes 246 courses. A student in NTU can major in computer engineering, computer science, electrical engineering, engineering management, or manufacturing systems engineering. Students must be sponsored by their employers, who in turn support NTU. Companies involved include Eastman Kodak, General Electric, Hewlett-Packard, and IBM. Thus far, 40 companies participate and a goal is 150 or more.

The new electronics technologies have created new opportunities in education. Many of the values and procedures of the universities have stood the test of time. But as corporate classrooms expand, it is clear that universities should be alert to developments elsewhere.

—PHILIP H. ABELSON

*N. P. Eurich and E. L. Boyer, *Corporate Classrooms* (Carnegie Corporation for the Advancement of Teaching, Princeton, N.J., 1985). †AMCEE, 225 North Avenue, Atlanta, Georgia 30332. ‡NTU, P.O. Box 700, Fort Collins, Colo. 80522.

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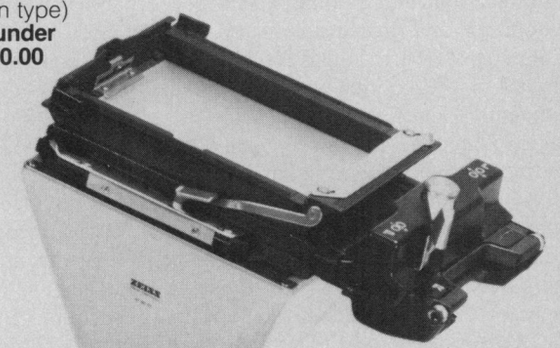

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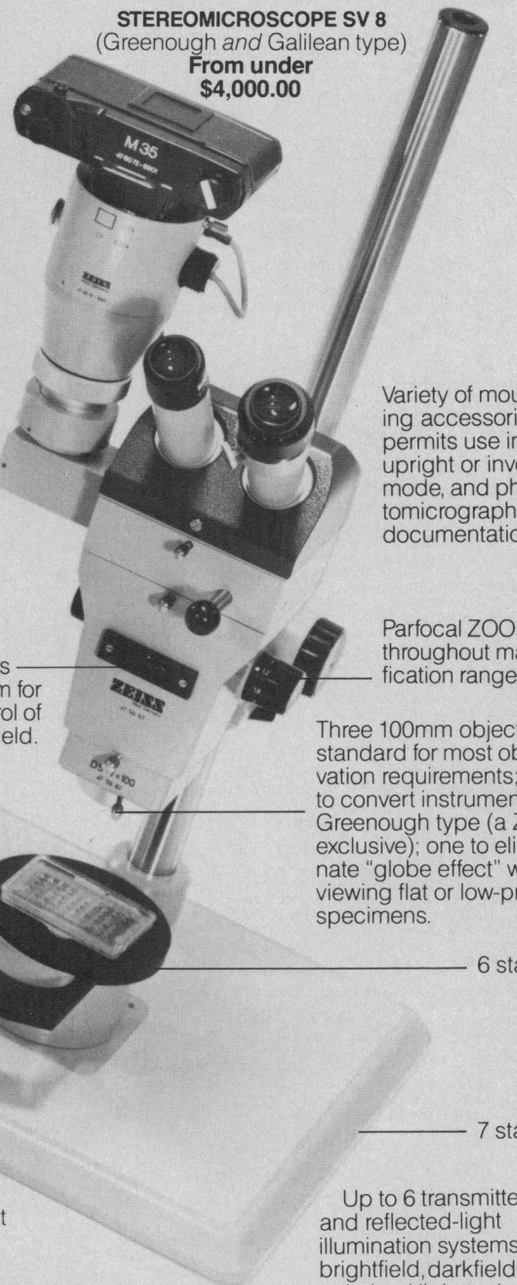

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