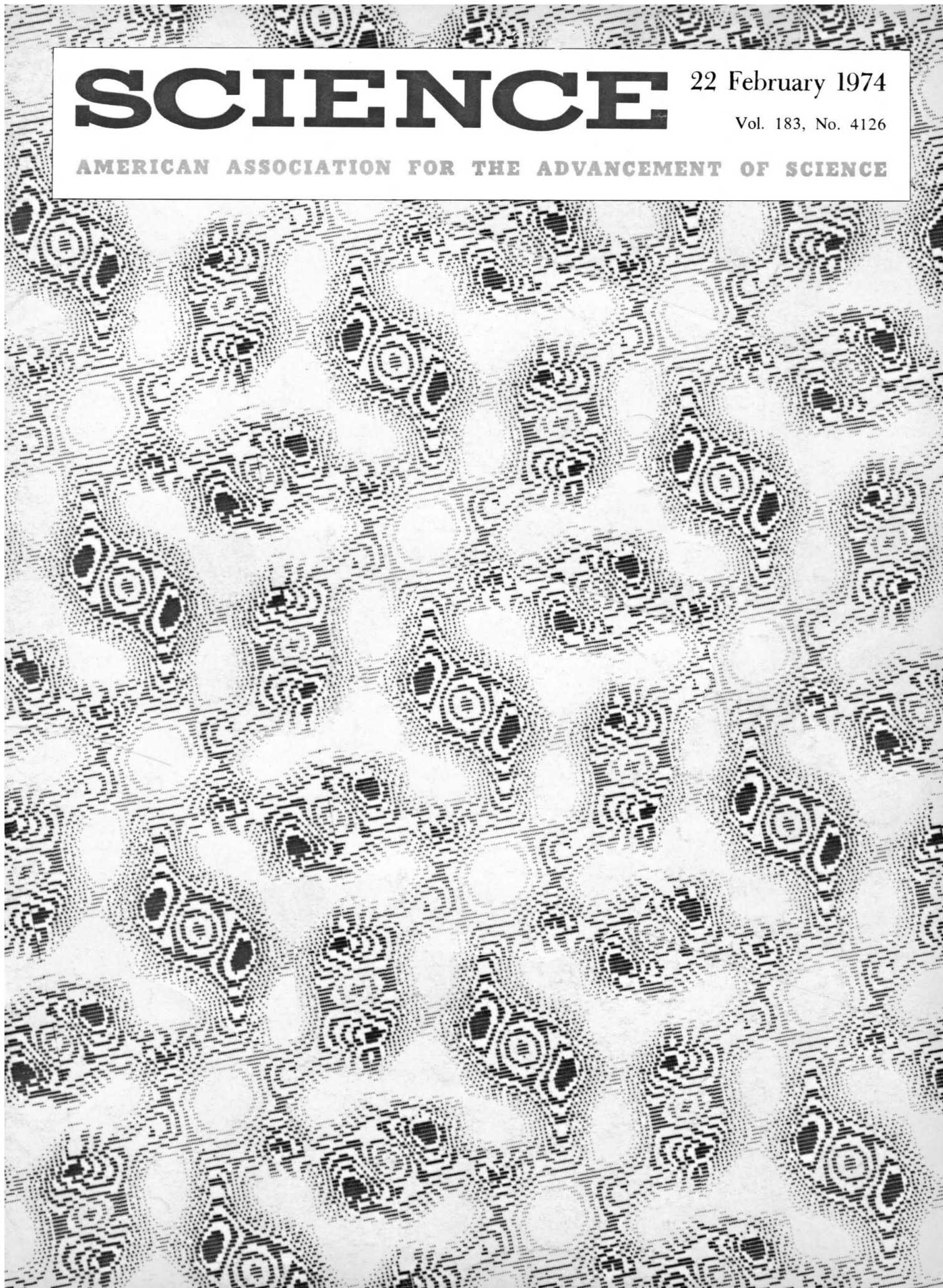


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22 February 1974

Vol. 183, No. 4126

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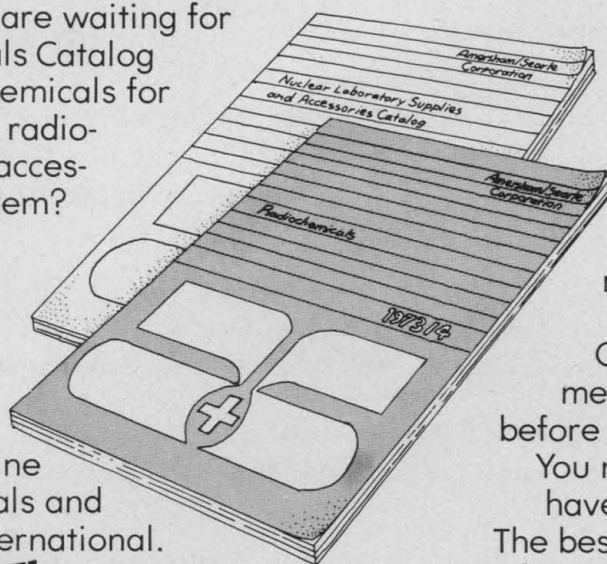
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COVER

Isodensity computer display of the capsid structure of bacteriophage ϕ CbK (1 centimeter = about 20.5 angstroms). See page 744. [J. A. Lake and K. R. Leonard, New York University School of Medicine]

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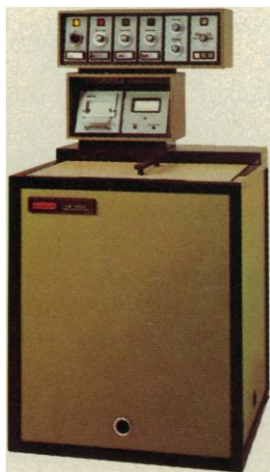
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Genetic Heterogeneity

Crops with better yield, stability in yield over the years, and resistance to diseases and insect pests are the goal of all crop farmers. The development of new Mexican wheat varieties and

improvements in agricultural technology in recent years have helped farmers realize high yields even in less developed countries. However, because an increasing amount of acreage has been planted with new wheat varieties, local genetic resources are being lost, which poses a serious problem for the future success of plant breeding. There is a growing awareness of this problem, as is reported by Judith Miller (News and Comment, 21 Dec. 1973, p. 1231). Miller deals mainly with the problems of collection and maintenance of genetic resources and with the efforts being made in this direction. This step is vital for the future of plant breeding. Analogous to this long-term problem, there is a short-term, but much more serious, problem to which I want to draw attention.

Before the broadly adapted crop varieties came into existence, farmers used to grow several varieties that were locally adapted. If any one of these varieties became susceptible to some disease, it could be either withdrawn forever or corrected by genetic manipulation so that it was resistant to the disease. In the meantime, the acreage could be planted with some other equal-

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
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
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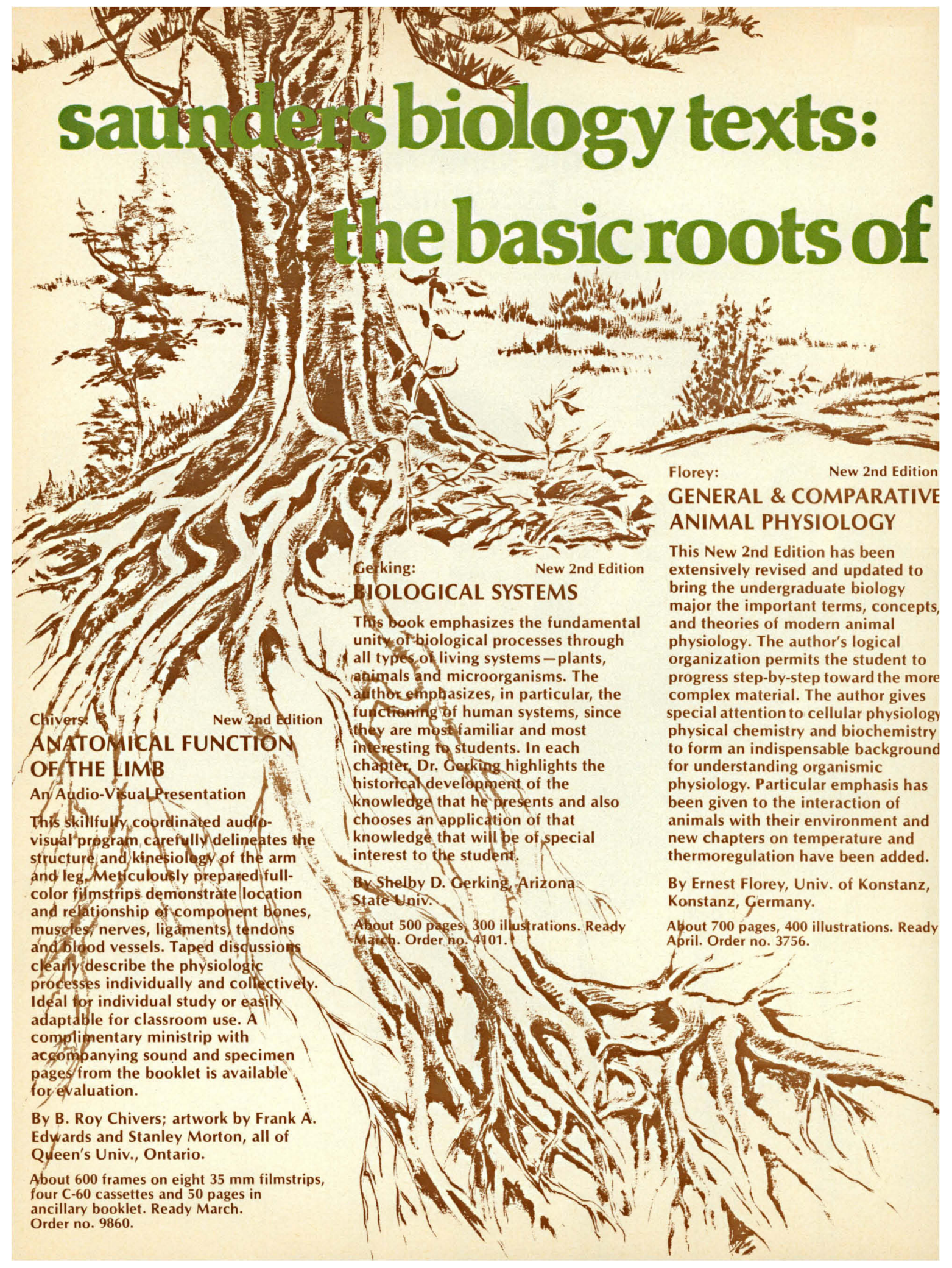
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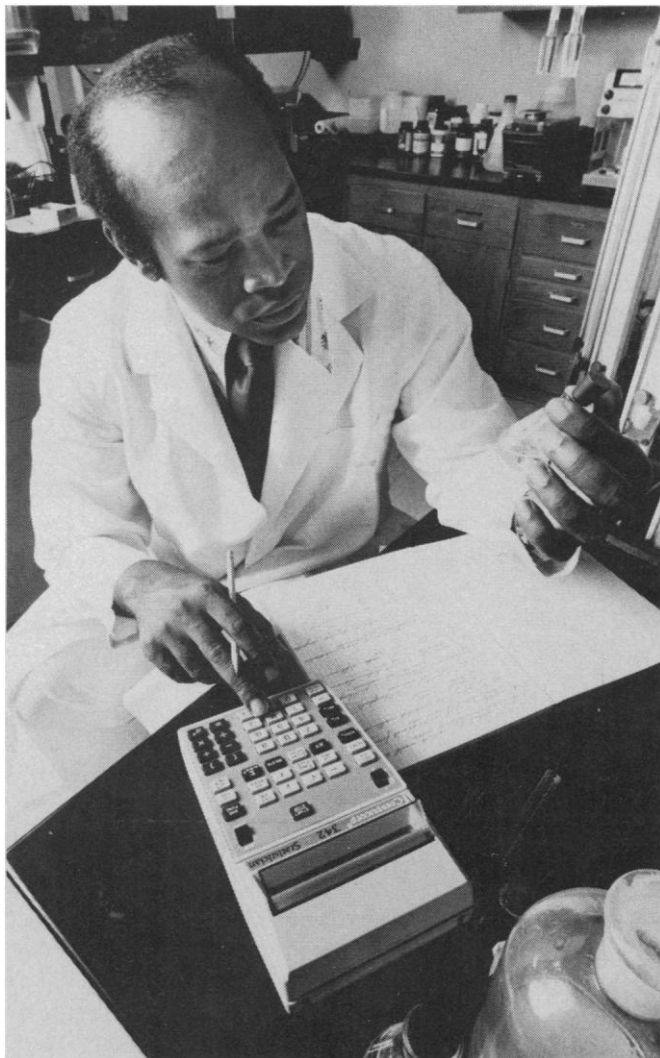
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Out of the Energy Crunch by 1976

At the moment, the chief hope for an amelioration of the energy crisis lies in an easing of the oil embargo, but valves that can be opened can be closed. Solemn agreements with the oil producing and exporting countries, ostensibly valid for decades, have been scrapped in weeks. The public and the economy cannot long tolerate the uncertainties of being a Yo-Yo in the hands of others.

Prior to the embargo, we were importing 35 percent of our consumption. If we were to lower that to 20 percent, consumers would pay less for hydrocarbons, foreign exchange problems would ease, and we would no longer need to obtain oil from the Arabs. Such a major step to energy independence could and should be taken by 1976.

The quickest path toward balancing supply and demand is conservation combined with the replacement of use of hydrocarbons by coal. Thus far, the main burden of conservation has been carried by the public, which consumes directly only a minor fraction of the energy. The major potential for quick savings of hydrocarbons lies with industry. It is the largest consumer of energy; it has substantial technical resources; and, with costs soaring, it has incentives to seek economies. Like the public, industry generally has governed its behavior on the assumption of cheap energy. Thus it has much room for improvement.

All of industry has not been asleep. Two good examples of organizations with foresight and ingenuity are DuPont and Dow. Both companies have emphasized conservation of energy in their plant designs and operation. During the past decade, DuPont increased its volume of products 100 percent, while energy used rose only 50 percent. DuPont has advised other large consumers about conservation through a consultant service. Broad experience has shown that significant conservation at an industrial plant will, on the average, result in a 15 percent reduction in the plant's total energy consumption, and about half the saving can be achieved without new investment.*

At Dow Chemical during 1972, the company achieved a 10 percent reduction in energy used while increasing yield. The company had as its goal a like reduction in 1973.†

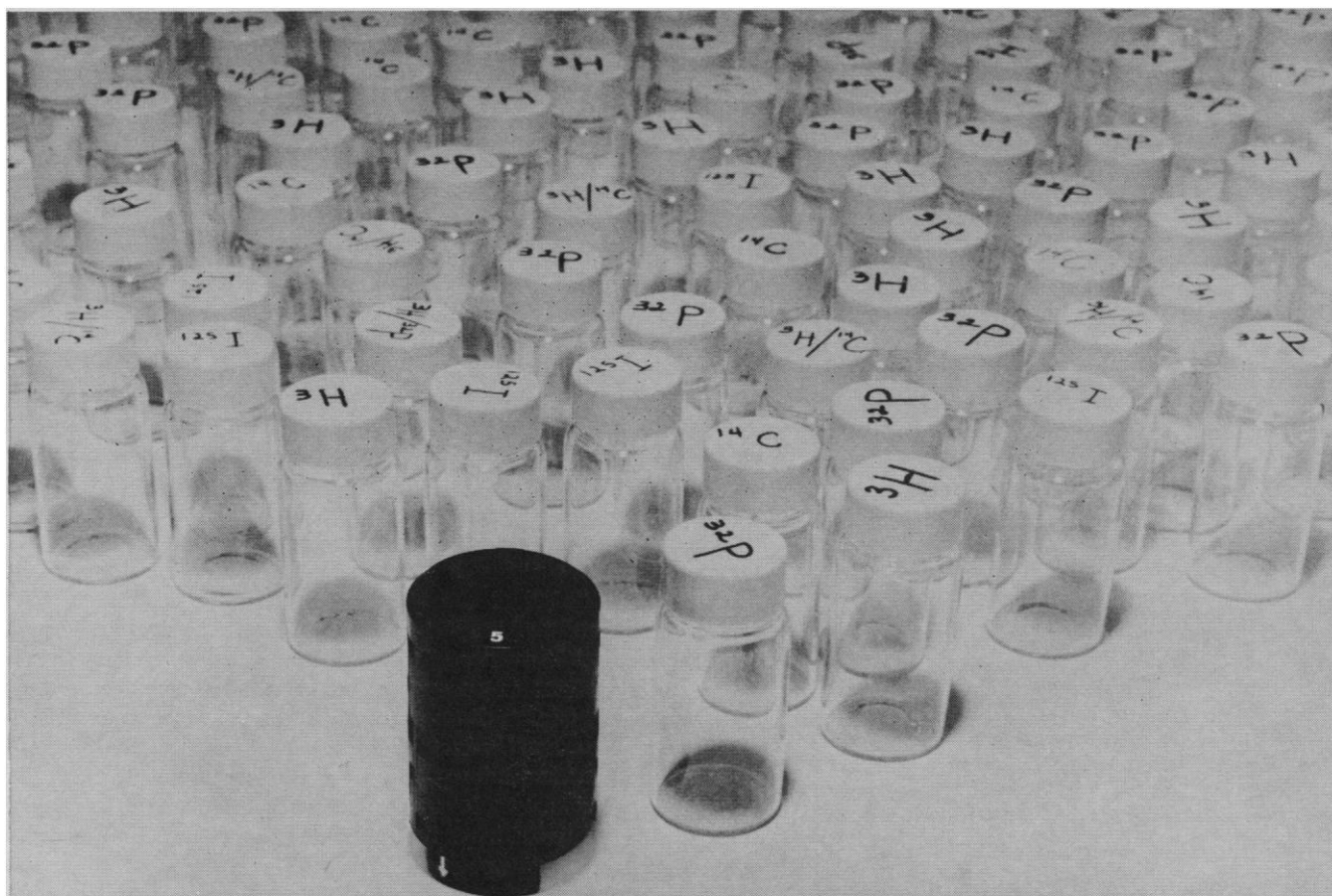
Another way of conserving hydrocarbons is to avoid burning them merely to produce heat. "One of the quickest and most effective ways to reduce short-falls in gas and oil is to substitute coal for them under electric utility and industrial boilers. Approximately 65 percent of the natural gas used goes to the electric and industrial sectors. Some 30 percent of the oil used goes to the same sectors. . . ."

Thus far, the Administration has not been even-handed in its efforts to meet the energy crisis. The consumer has been the target of exhortations, shortages, and higher costs. Industry, and especially the utilities, which usually can pass on higher prices, have been largely protected from shortages.

By concentrating more attention on industry and the utilities, by invoking some of the can-do attitudes of World War II, by setting up a priority system to expedite procurement of scarce items, by unleashing coal as a primary energy source, and by making its use mandatory in some applications, an effective government could get us out of the energy crisis within 2 years. It could free us from any need to use oil from undependable sources, and our example and reduced imports would contribute to loosening the worldwide grip of the oil cartel.

—PHILIP H. ABELSON

* D. H. Dawson, *Context* 2, 17 (1973). † J. C. Robertson, *Chem. Eng.* 81, 104 (21 January 1974). ‡ *Report of the Cornell Workshops on the Major Issues of a National Energy Research and Development Program* (College of Engineering, Cornell University, Ithaca, N.Y., rev. ed., 1973), p. 24. The report of the Cornell workshops provides an excellent summary of many aspects of the energy problem. It was prepared for the Atomic Energy Commission. Copies can be obtained from the U.S. Atomic Energy Commission, Technical Information Center, P.O. Box 62, Oak Ridge, Tenn. 37830.



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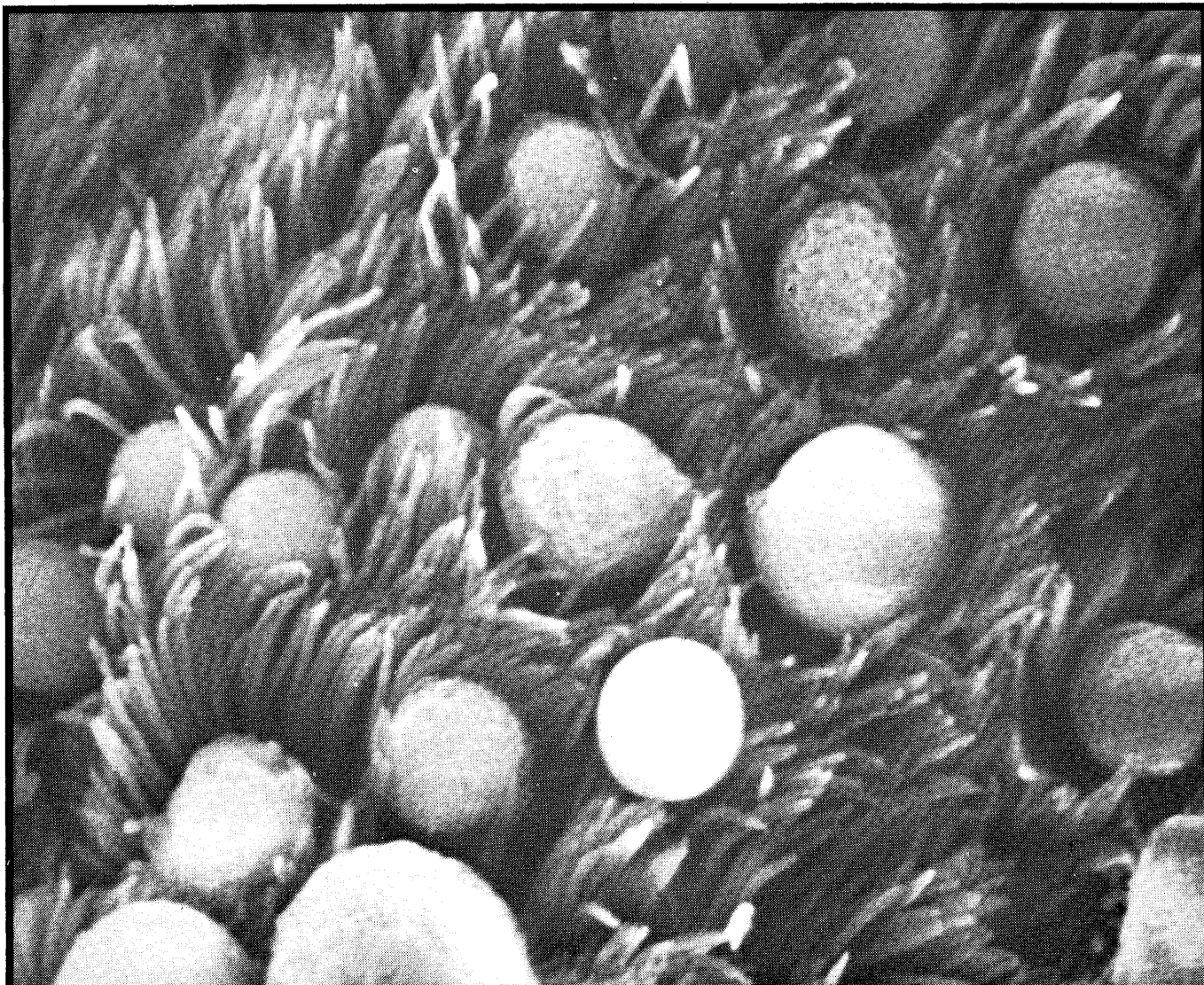
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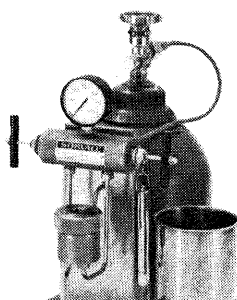


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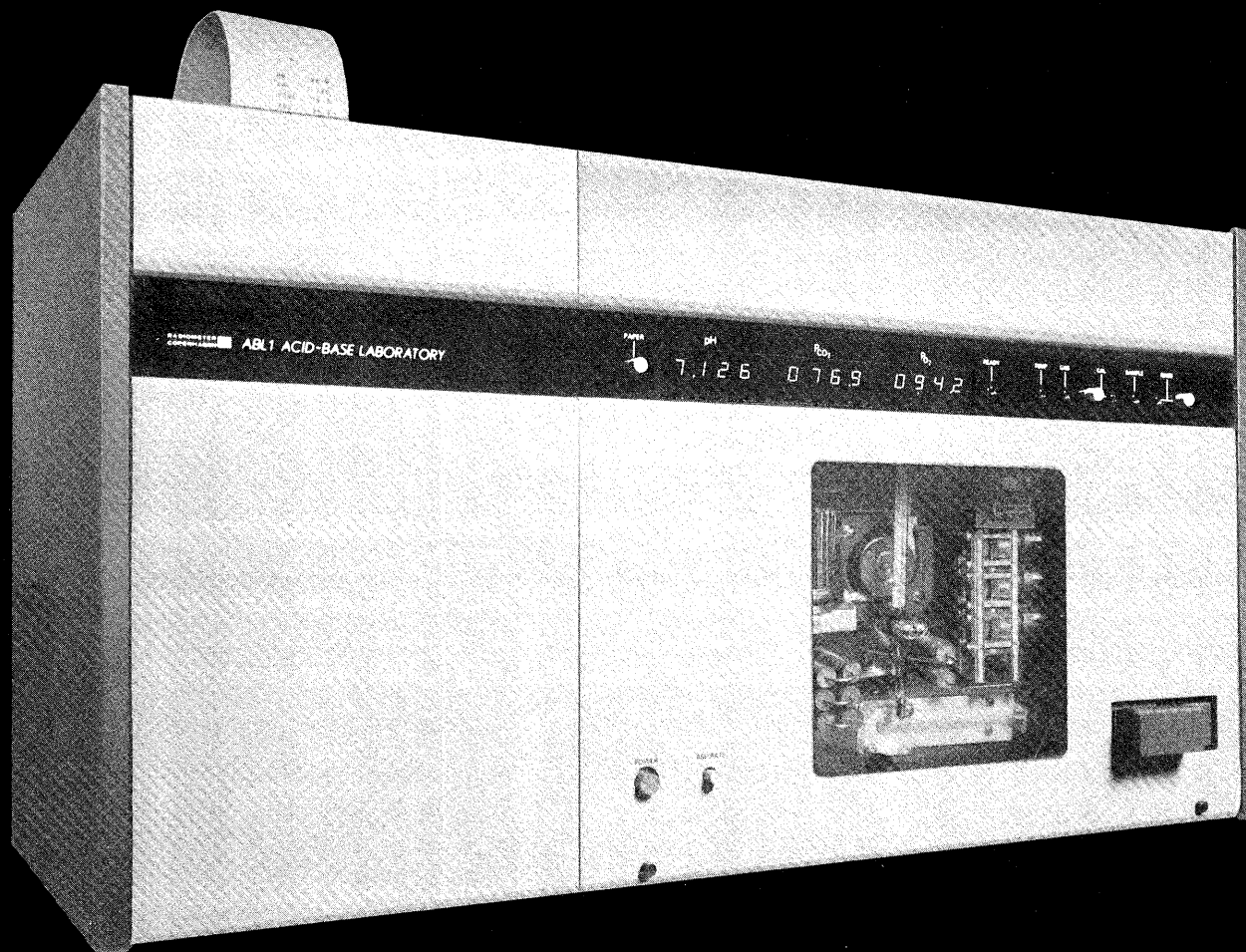
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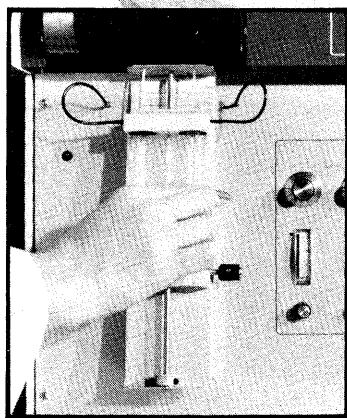
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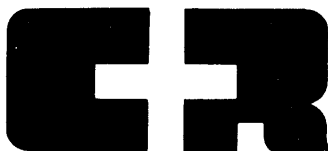
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Electron Microscopy In Pathology

NORELCO REPORTER/VOL. 20 NO. 3, 1973

by George Bridges and J. H. Martin, Baylor University Medical Center, Dallas, Texas

Introduction

Electron microscopy has become a useful diagnostic tool of the pathologist. Although its use on every specimen is impractical and, in fact, wasteful at our present level of knowledge and technical capability, the electron microscopic examination of selected surgical specimens and autopsy specimens is every bit as practical and useful as many of the "special" stains routinely employed in many pathology laboratories.

The principal developments allowing for the increased current application of electron microscopy in diagnostic pathology as we see them are: (1) the collection of specimens in a dual purpose aldehyde fixative allowing for both light and later electron microscopy on the same biopsy specimen, (2) rapid, simplified and reliable dehydration, embedding, staining and photographic techniques making

the results of electron microscopy available within twenty four hours of receiving the specimen, (3) wide-spread usage of the "adjacent" or "thick" 0.5 micron epoxy embedded and cover slipped sections for light microscopy as a selective device and bridge between conventional paraffin embedding techniques and electron microscopy and (4) the relatively recent development of excellent, reliable ultramicrotomes and high-quality, simplified electron microscopes opening the door to technologists as operators rather than highly skilled artisans.

The purpose of this paper is to outline briefly some of these viewpoints on methodology, instrumentation, and current applications of electron microscopy in diagnostic pathology.

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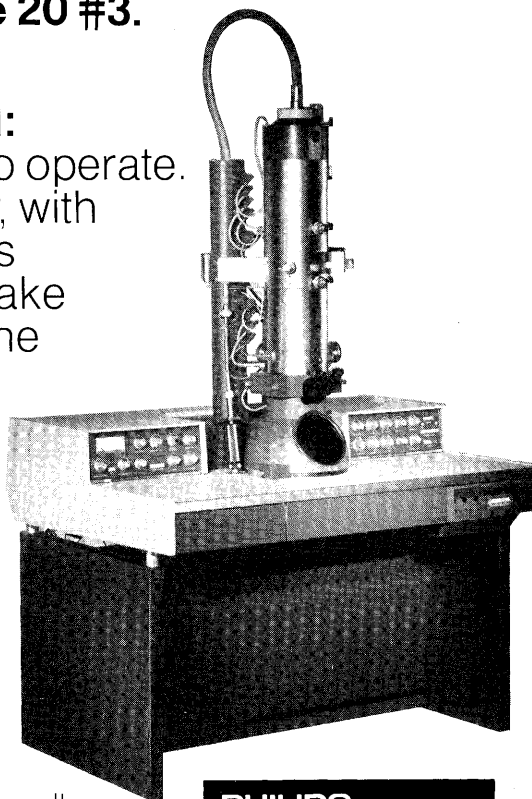
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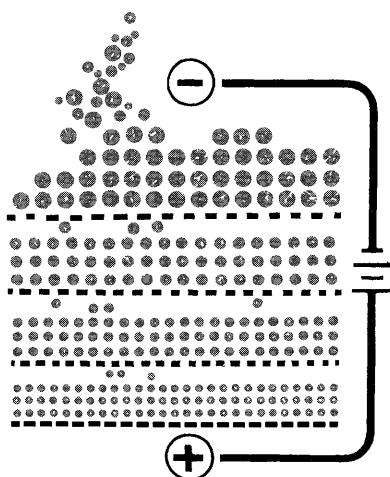
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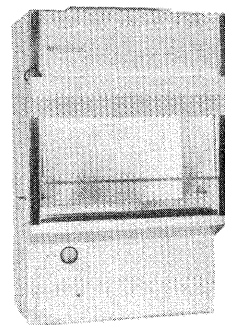
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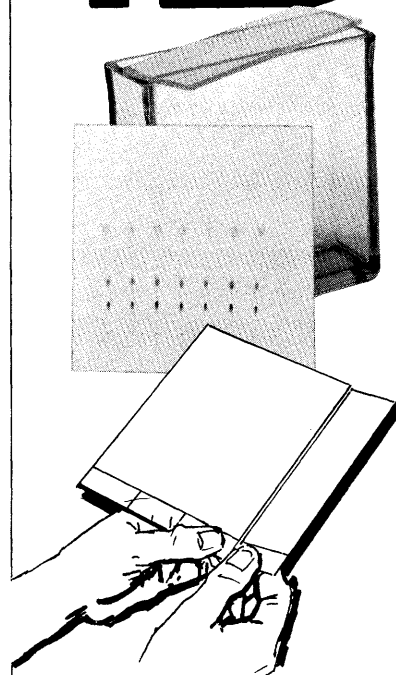
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NEW EDITORIAL POLICY

In the past few decades, the lines separating the various biological disciplines have become less distinct and there has been a growing awareness of the value of an integrative approach in the solution of major problems in the life sciences. Accordingly, there has been an ever increasing trend for researchers to cross the boundaries of different disciplines. This basic unity of the life sciences has created the need for a medium for the prompt publication of new and significant information in biology and was the reason for the creation of the Journal of Life Sciences.

In the twelve years since Life Sciences was first published, interdisciplinary boundaries have been further eroded by an outpouring of scientific information of a magnitude never before attained in the history of man. With large numbers of scientists throughout the world working on similar research projects, delay in the dissemination of significant scientific information can be frustrating to the individual scientist and costly to society as a whole.

Life Sciences has decided to enter a new phase in which its original scope is not only reaffirmed, but greatly extended. The Journal is now prepared to accept papers in biochemistry, bio-organic chemistry, botany, cell biology, ecology, endocrinology, enzymology, genetics, hematology, immunology, medical sciences, microbiology, nutrition, oncology, pathological physiology, pharmacology, physiology, radio-biology, reproduction, tissue culture, zoology and virology.

When Life Sciences was first published, it was with the hope that scientific reports would be published within two to six weeks of their acceptance. Due to unforeseen difficulties this goal was not accomplished. Procedural changes will be made that should drastically shorten the time between receipt of the manuscript by the journal and the receipt of the published papers by the readers. Firstly, subscribers will receive the journal by airmail at no extra charge. Secondly, a full-time executive secretary, in the new Editorial Office, at the University of Arizona College of Medicine in Tucson, will be responsible for coordinating the flow of papers between authors, referees and the printers. Thirdly, plans are afoot to print the journal directly in Tucson, which will further facilitate exchanges between authors, the executive secretary and the printers.

The Journal of Life Sciences will be published twice monthly as before. The new format will, however, combine the previously divided Parts I and II.

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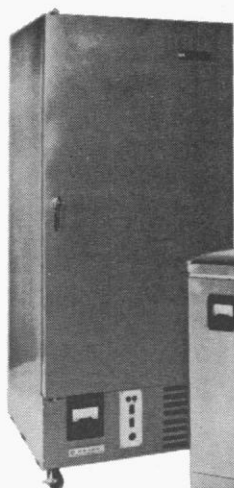
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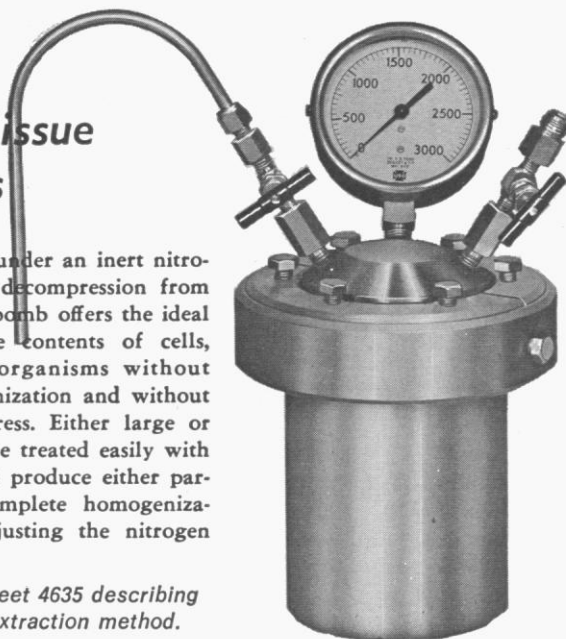
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NEWS AND COMMENT

(Continued from page 734)

Wisconsin, Madison. . . . **Paige Mulholland**, associate dean, College of Arts and Sciences, Kansas State University, to dean, College of Arts and Sciences, University of Oklahoma. . . . **Paul R. Paslay**, professor of engineering, Brown University, to dean, School of Engineering, Oakland University. . . . **Vaughnie J. Lindsay**, professor of business education, Southern Illinois University, Edwardsville, to dean, Graduate School at the university. . . . **Jonathan O. Cole**, former superintendent, Boston State Hospital, to chairman, psychiatry department, Temple University. . . . **Peter J. Jannetta**, former director, neurological surgery division, Surgery Department, School of Medicine, University of Pittsburgh, to chairman, neurological surgery department at the school. . . . **Charles E. Blevins**, associate professor of anatomy, Northwestern University Medical School, to chairman, anatomy department, School of Medicine, Indiana University. . . . **James M. Watson**, assistant professor of sociology, University of Rochester, to chairman, sociology department, State University of New York Teachers College, Geneseo. . . . **Quentin Peterson**, chairman, chemistry department, Monmouth College, to chairman, chemistry department, Central Michigan University. . . . **Wadi A. Bardawil**, professor of pathology, School of Medicine, Tufts University, to chairman, pathology department, Creighton University. . . . **Ralph L. Llewellyn**, executive secretary, board on energy studies, National Academy of Sciences/National Research Council, to chairman, physics department, Indiana State University. . . . **Richard D. Berlin**, associate professor of physiology, School of Medicine, Harvard University, to chairman, physiology departments, Medical and Dental Schools, University of Connecticut. . . . **Richard J. Popp**, assistant professor of psychology, State University of New York, Buffalo, to chairman, psychology department, University of Dayton. . . . **Joseph A. Brink**, director of development, Monsanto Enviro-Chem Systems Inc., to chairman, chemical engineering department, Washington State University. . . . **Tomlinson Fort, Jr.**, professor of chemical engineering, Case Western Reserve University, to chairman, chemical engineering department, Carnegie-Mellon University. . . . **J. Joseph Doerr**, acting Dean, School of Education, University of Missouri, Kansas City, to dean of the school.

RECENT DEATHS

Emory S. Bogardus, 91; dean emeritus, Graduate School, University of Southern California; 21 August.

Leonard Carmichael, 74; vice president, National Geographic Society, and former head, Smithsonian Institution; 16 September.

Nelson S. Fisk, 59; associate professor of civil engineering, School of Engineering and Applied Science, Columbia University; 2 October.

George Gold, 61; attending professor of psychiatry, College of Physicians and Surgeons, Columbia University; 29 September.

George D. Humphrey, 76; former president, University of Wyoming and Mississippi State College; 10 September.

Elmer E. Jukkola, 68; retired advanced systems materials engineer, Wright-Patterson Air Force Base; 15 June.

Frank D. Kern, 90; first dean, Graduate School, Pennsylvania State University; 28 September.

Laura A. Kolk, 82; former associate professor of biology, Brooklyn College; 11 August.

Beatrice G. Konheim, 64; dean, Institute of Health Sciences, Hunter College; 1 October.

Thomas B. Ledbetter, 53; professor of mechanical and aerospace engineering, North Carolina State University; 25 August.

Frank T. McClure, 57; deputy director, Applied Physics Laboratory, Johns Hopkins University; 18 October.

Robert E. Ohm, 55; dean, College of Education, University of Oklahoma; 14 October.

Frank E. Rice, 86; former professor of agricultural chemistry, Cornell University; 19 August.

Gordon L. Roene, Jr., 43; associate professor of physiology and health science, Ball State University; 7 September.

Karl Sax, 81; professor emeritus of botany, Harvard University; 8 October.

Madan M. Singh, 49; professor of medicine, State University of New York, Buffalo; 24 August.

Erratum: In the issue of 25 January, p. 291, *Science* reported that Representative Charles A. Moshier (R-Ohio), vice chairman of the Technology Assessment Board, would become chairman of the board in January 1975. However, by law, any House member of the board may become the chairman. It is likely that a member of the majority party, in this case a Democrat, will be chosen. Edward Wenk, Jr., is chairman of the Committee on Public Engineering Policy of the National Academy of Engineering.

RESEARCH NEWS

(Continued from page 738)

between his program and the final form of the report. "I was just one of the infantry for the tanks to run over," he said. Geologists seem to have been particularly alienated during the preparation of the report, which took more than 2 years.

But the report of the U.S. Geodynamics Committee serves a useful function in drawing up a coordinated program for scientists from the many disciplines now involved in the earth sciences. There was no previous tradition of comprehensive earth science reports. The only obvious predecessor is the report of the Upper Mantle Project in 1962, which is just 36 pages long and much more limited in scope. In the view of some scientists, the report also comes at a time when better monitoring of the various funds spent for earth science research is badly needed. The committee made a hesitant attempt at monitoring by denoting the areas to which various federal agencies contributed research monies, although it did not publish the figures.

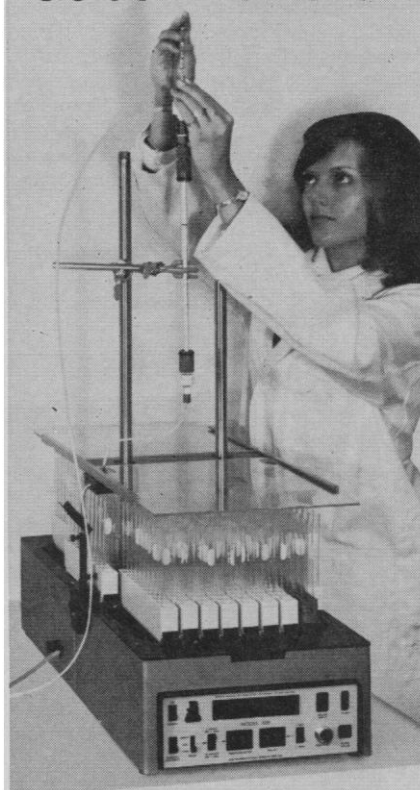
The report could also have the effect of making the importance of geodynamics much more visible to Congress and the public. The idea that North and South America split away from Africa and Europe has fascinated people for years. Unfortunately, the report is probably too technical for a nonscientific audience.

Much research in the earth sciences is also relevant to another important public concern—the availability of fossil fuels and minerals. Although the report underplays economic aspects, plate tectonics is clearly related to the formation of oil and mineral deposits. Long-term vertical movements have resulted in sediment-filled basins which are important sources of hydrocarbons, and the locations of minerals may be influenced by tectonic spreading centers. Geodynamic research may thus have a substantial economic impact. Geophysical exploration cruises are already followed quite closely by those hoping to find oil.

A comment by John Sclater, of the Massachusetts Institute of Technology, seems to sum up the view of many others. "We've got a nice model which works damn well for 70 percent of the world, but that's all ocean. How's it going to work for the continents?"

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BOOKS RECEIVED

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Communication and Affect. Language and Thought. Proceedings of a symposium, Mississauga, Canada, Mar. 1972. Patricia Pliner, Lester Krames, and Thomas Alloway, Eds. Academic Press, New York, 1973. xii, 200 pp., illus. \$9.95.

Computer-Aided Design. Proceedings of a conference, Eindhoven, The Netherlands, Oct. 1972. J. Vlietstra and R. F. Wielinga, Eds. North-Holland, Amsterdam, 1973 (U.S. distributor, Elsevier, New York). viii, 462 pp., illus. \$23.50.

Congenital Malformations. Case Studies

in Developmental Anatomy. Martha E. Sucheston and M. Samuel Cannon. Photography by Gabriel A. Palkuti. Davis, Philadelphia, 1973. x, 272 pp., illus. Paper, \$8.25.

Current Research Topics in Bioinorganic Chemistry. Stephen J. Lippard, Ed. Interscience (Wiley), New York, 1973. x, 454 pp., illus. \$24.95.

Development and Aging in the Nervous System. Proceedings of a symposium, Miami, Feb. 1973. Morris Rockstein and Marvin L. Sussman, Eds. Academic Press, New York, 1973. xii, 218 pp., illus. \$9.25.

Digital Magnetic Tape Recording for Computer Applications. L. G. Sebestyen. Chapman and Hall, London, 1973 (U.S.

distributor, Halsted [Wiley], New York). x, 158 pp., illus. \$12.50. Modern Electrical Studies.

Drug Design. Vol. 4. E. J. Ariens, Ed. Academic Press, New York, 1973. xvi, 490 pp., illus. \$35. Medicinal Chemistry, vol. 11.

Embryology and Phylogeny in Annelids and Arthropods. D. T. Anderson, Pergamon, New York, 1973. xiv, 496 pp., illus. \$24. International Series of Monographs in Pure and Applied Biology, Zoology, vol. 50.

Energy Metabolism. Eric G. Ball. Addison-Wesley, Reading, Mass., 1973. xii, 84 pp., illus. Cloth, \$12; paper, \$6.50. Advanced Book Program.

Energy Through Nuclear Reactors. Harry A. Kuljian and Andrew W. Kramer. Saint Joseph's College Press, Philadelphia, 1973. xii, 122 pp., illus. Paper, \$3.

Energy Transfer Parameters of Aromatic Compounds. Isadore B. Berlman, Academic Press, New York, 1973. x, 380 pp. \$20.

Essays in Fundamental Immunology 1. Ivan Roitt, Ed. Blackwell Scientific, Oxford, England, 1973 (U.S. distributor, Davis, Philadelphia). vi, 66 pp., illus. Paper, \$5.25.

European Technology. The Politics of Collaboration. Roger Williams. Halsted (Wiley), New York, 1973. x, 214 pp. \$13.

Evolution of the Genus Homo. William Howells. Addison-Wesley, Reading, Mass., 1973. iv, 188 pp., illus. Paper, \$2.95. Addison-Wesley Modular Program in Anthropology.

The Freshwater Molluscs of the Canadian Interior Basin. Arthur H. Clarke. Institute of Malacology, University of Michigan, Ann Arbor, 1973. 510 pp., illus. Paper, \$25. *Malacologia*, vol. 13, No. 1-2, 1973.

Function of Naturally Occurring Polyamines. Uriel Bachrach. Academic Press, New York, 1973. xii, 212 pp., illus. \$12.50.

Fundamentals of Air Pollution. Arthur C. Stern, Henry C. Wohlers, Richard W. Boubel, and William P. Lowry. Academic Press, New York, 1973. xvi, 492 pp., illus. \$14.50.

Fundamentals of Cell Pharmacology. S. Dikstein, Ed. Thomas, Springfield, Ill., 1973. xxii, 548 pp., illus. \$38.50.

A Geomorphological Reconnaissance of Sumatra and Adjacent Islands (Indonesia). H. Th. Verstappen. Wolters-Noordhoff, Groningen, The Netherlands, 1973 (U.S. distributor, International Scholarly Book Services, Portland, Ore.). xii, 182 pp., illus. + maps. \$18.50. *Verhandelingen of the Royal Dutch Geographical Society 1.*

Geoscience and Man. Vol. 7. Proceedings of a meeting, Tucson, Arizona, Oct. 1971. Bob F. Perkins, Ed. School of Geoscience, Louisiana State University, Baton Rouge, 1973. viii, 134 pp., illus. + plates. Paper, \$9.50.

Hydromechanically Loaded Shells. Part 1. Proceedings of a symposium, Hawaii, 1971. Rudolph Szilard, Ed. University Press of Hawaii, Honolulu, 1973. xvi, 928 pp., illus. \$50.

The Hydrophobic Effect. Formation of Micelles and Biological Membranes. Charles Tanford. Wiley-Interscience, New York, 1973. viii, 200 pp., illus. \$12.50.

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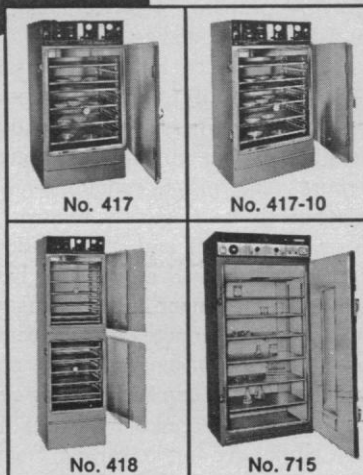
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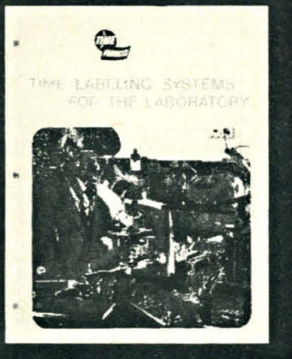
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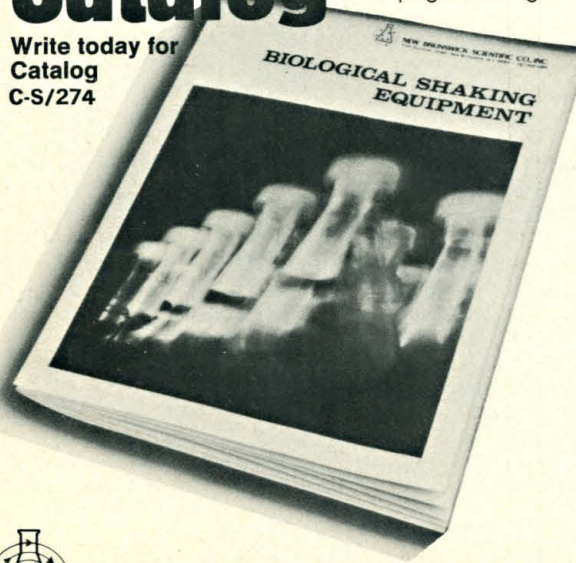
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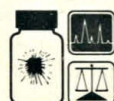
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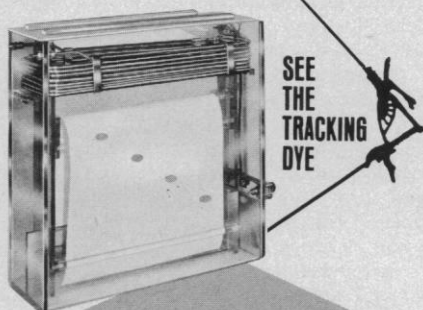
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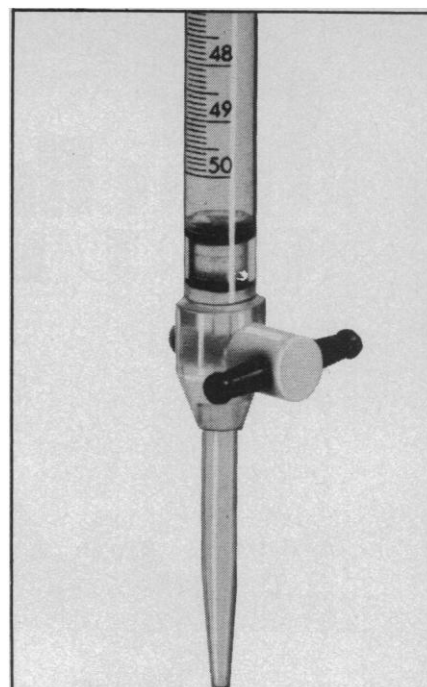
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