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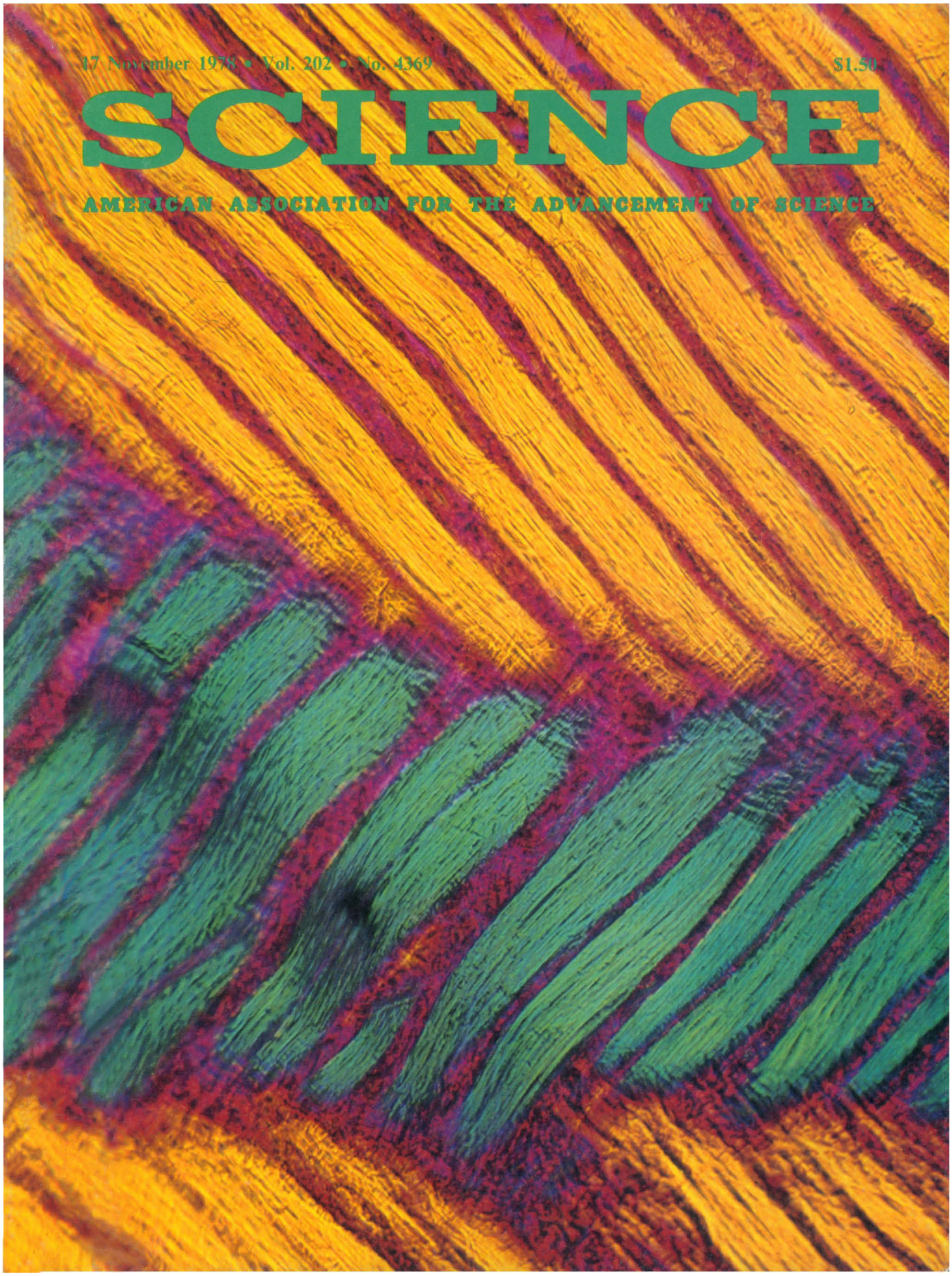

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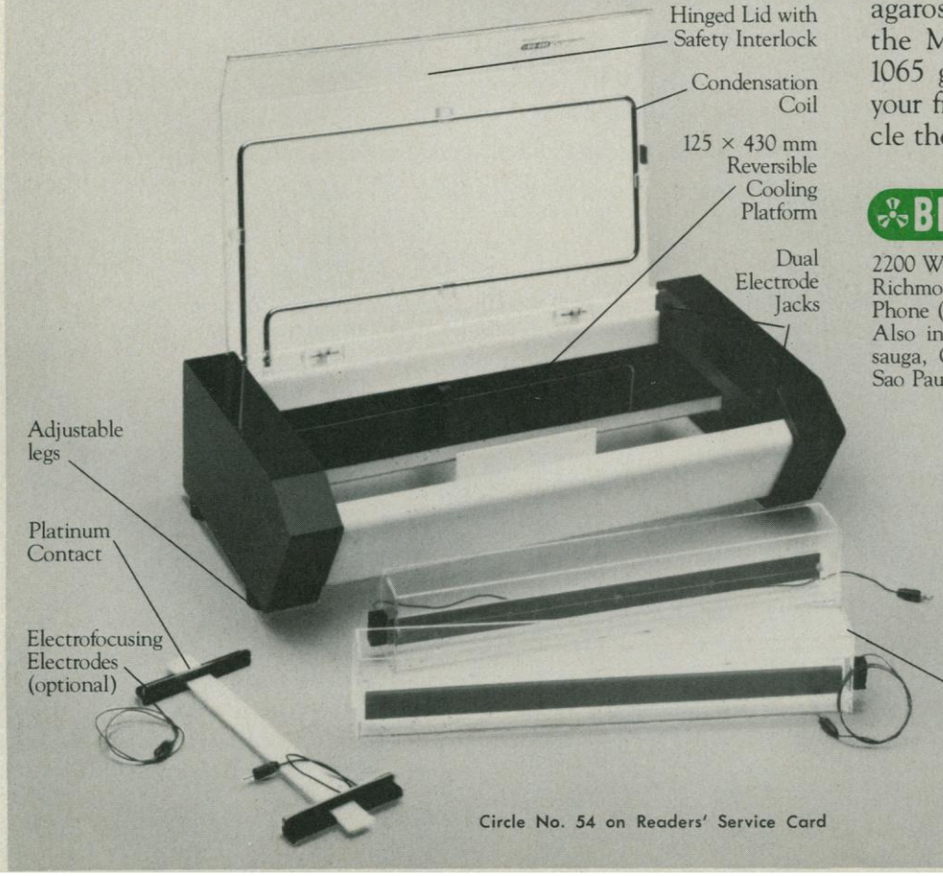

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COVER

Photomicrograph, taken with polarized light, of an oblique section through three layers of collagen fibers in the skin of a blacknose shark (*Carcharhinus acronotus*). Fibers are about 50 micrometers in diameter. See page 747. [Stephen A. Wainwright, Duke University, Durham, North Carolina 27706]

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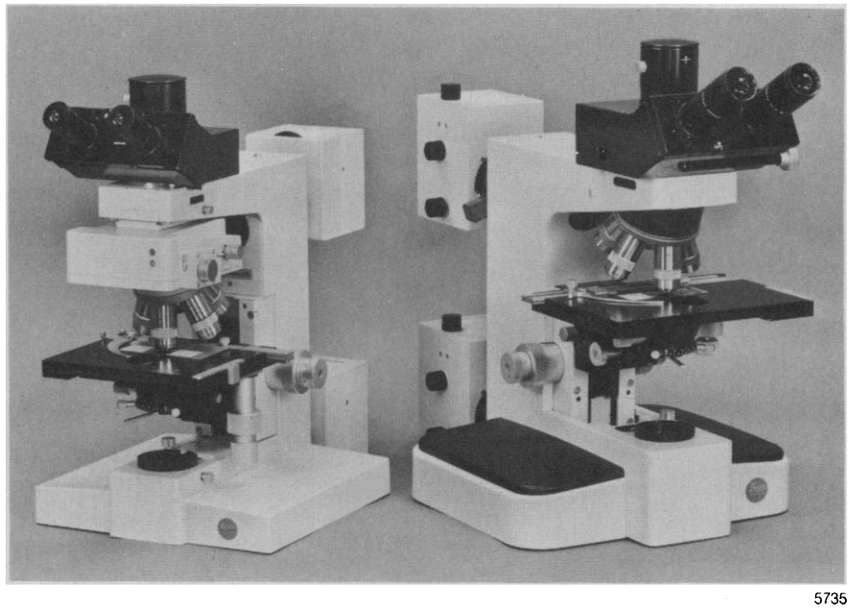

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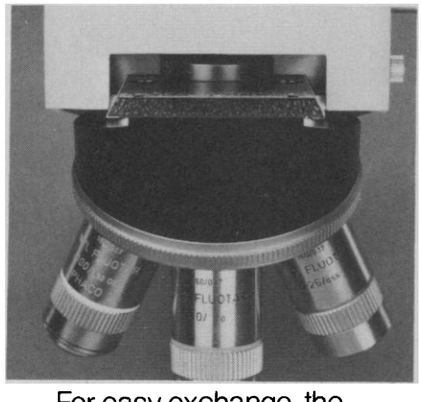

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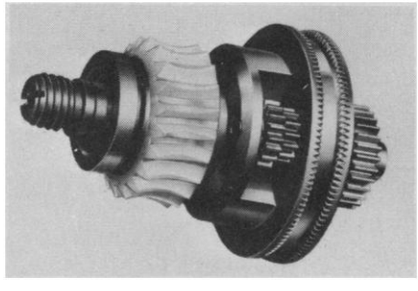

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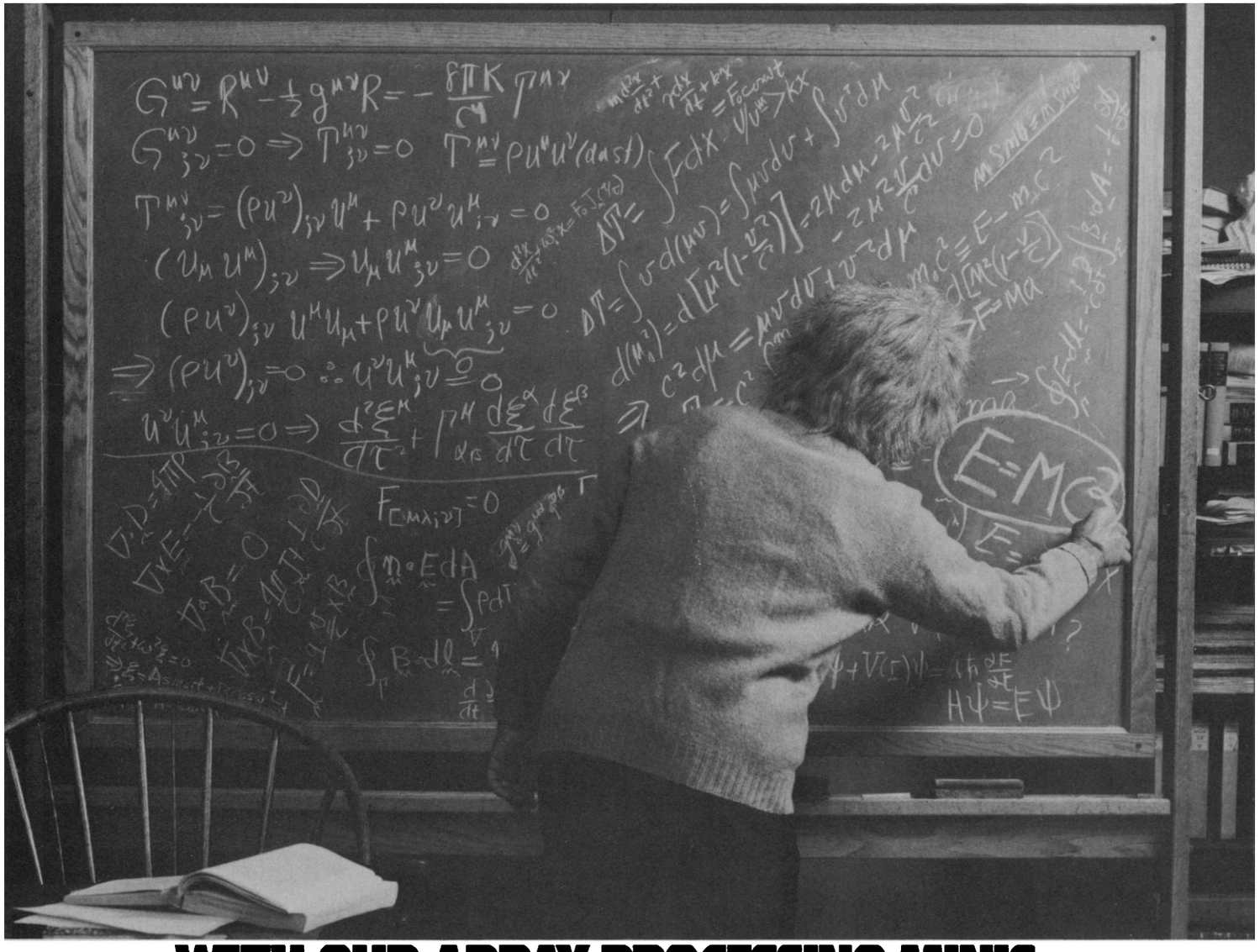

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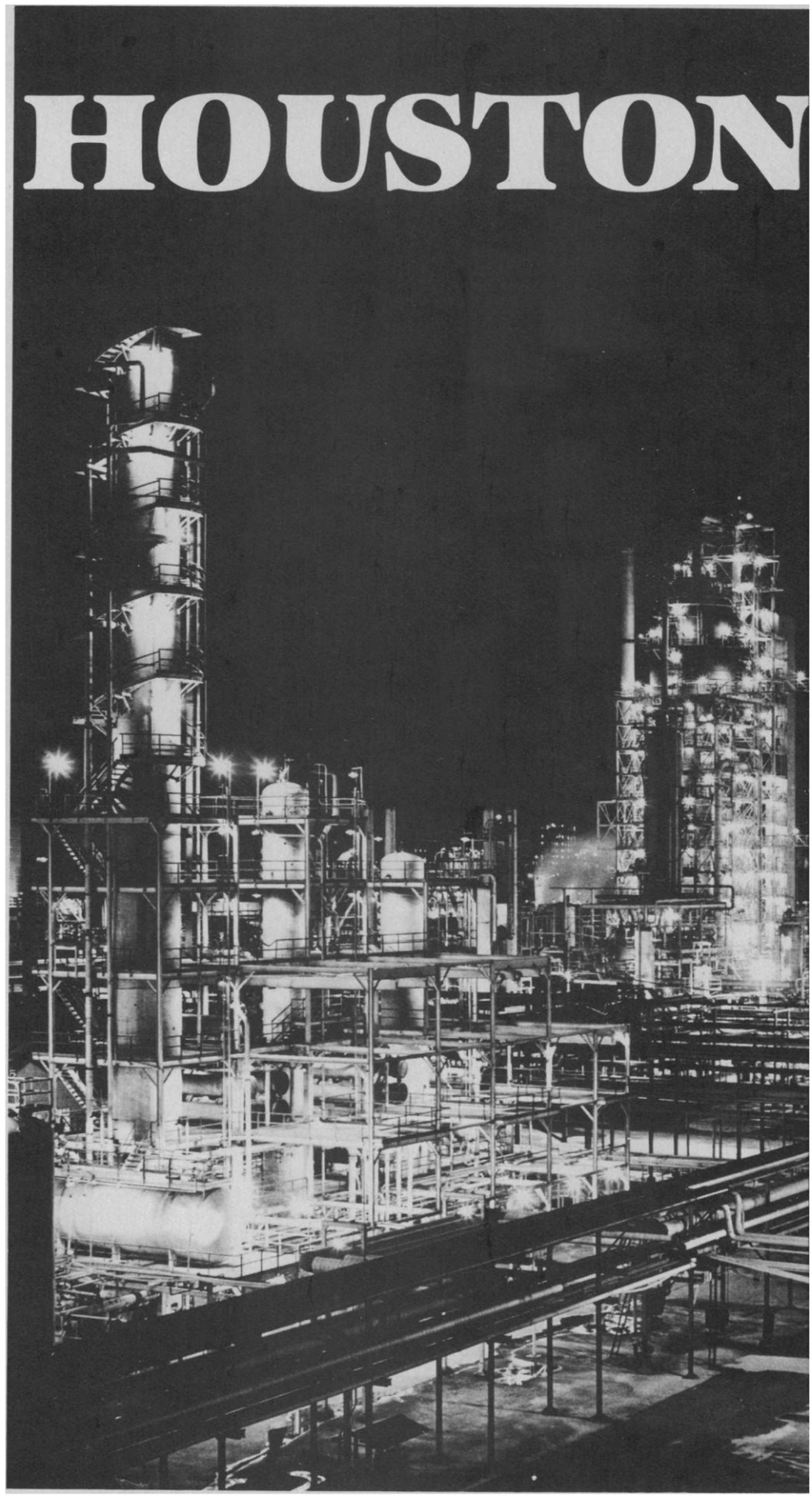

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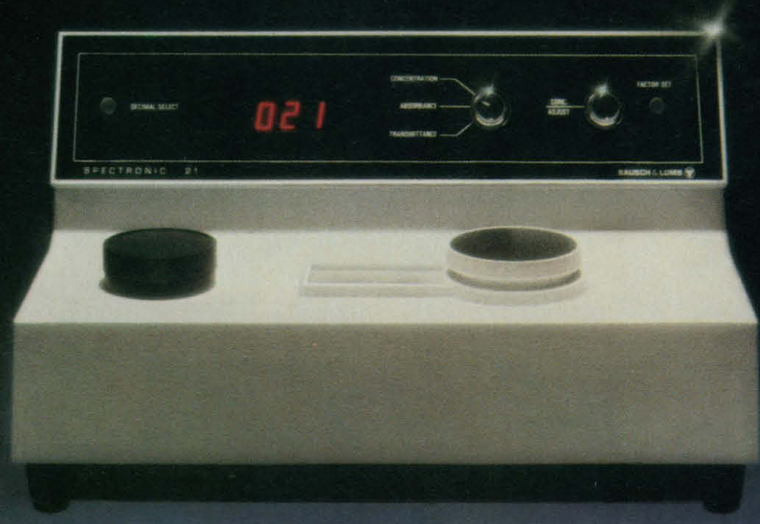

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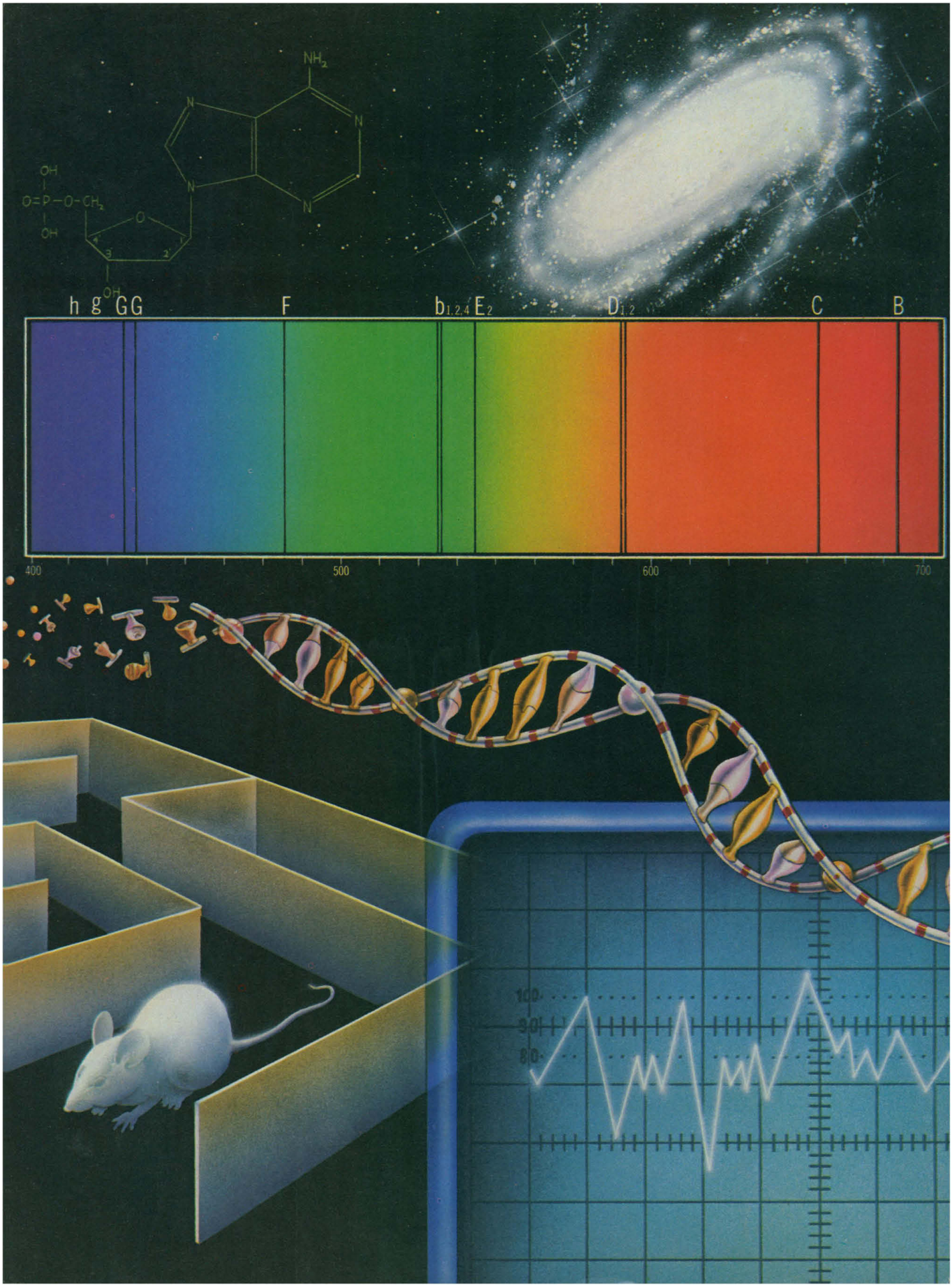
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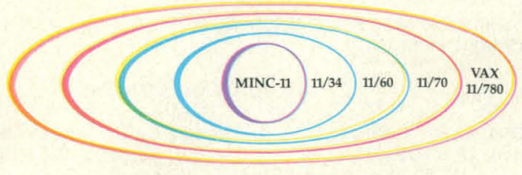

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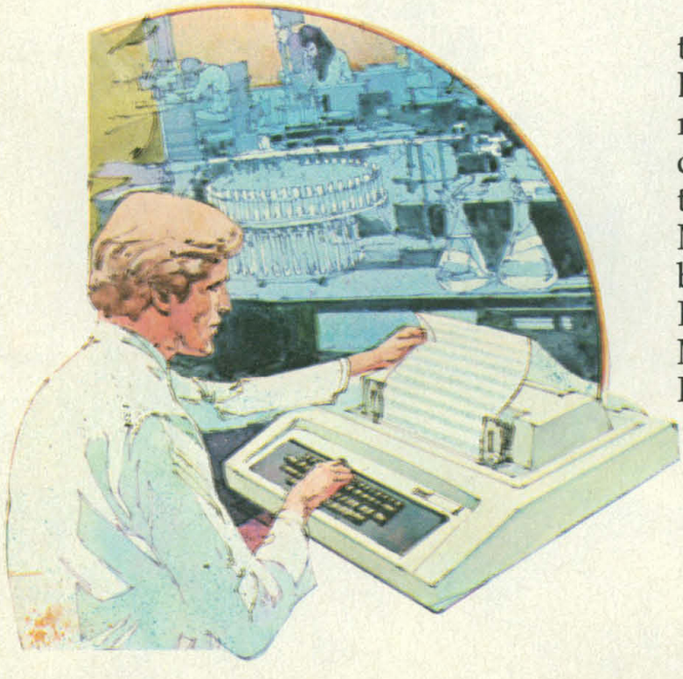

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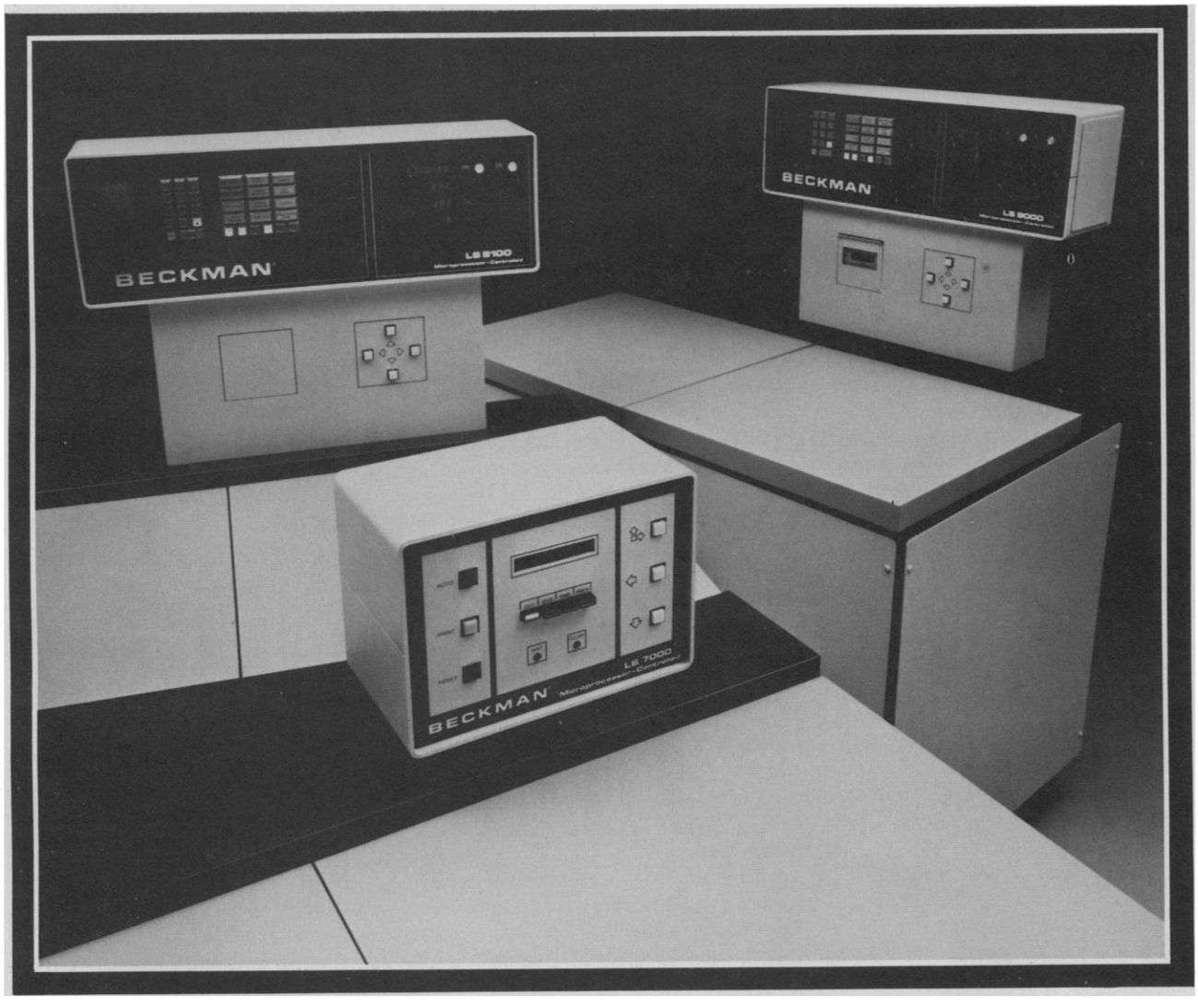

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decades without a similarly significant finding ever having been made. Nor has the Coast Guard, with its substantial appropriations and its general jurisdiction over many aspects of the Merchant Marine, ever brought the asbestos problem to our attention.

As a result of Weill's work, MEBA has been alerting engineers to the necessity of coping with the dangers from asbestos in the engine rooms. We have, in addition, instituted a vigorous program of covering up asbestos overlays around the engine rooms, and of removing all excess asbestos material to properly controlled storage space at shore locations.

What concerns me about the article is that some of our members might mistakenly assume that Weill is some kind of a corporate medical apologist. That was certainly not the case in his work on the research performed by MEBA, which conformed to the best traditions of the medical profession.

It may be that some union people, some members of the medical profession, and some officials of agencies and institutes feel that Weill is company-oriented and not neutral. MEBA found him both professionally skillful and biased only against the spread of asbestos and related lung infections, for which we are grateful.

J. M. CALHOON
National Marine Engineers' Beneficial Association, 440 North Capitol Street, Washington, D.C. 20001

Marsupials in the Lab

It is good news that there is increasing interest in the laboratory potential of marsupials—including the opossums which Jurgelski has been rearing at Research Triangle Park for several years (News and Comment, 29 Sept., p. 1194).

I have long hoped that the breeding difficulties with the mouse opossum (*Marmosa mitis*) of northern Colombia might be overcome so that this little animal could replace the rat in testing of orally administered plant materials suspected of carcinogenicity in humans.

In 1971 I provided a female *Marmosa mitis* for examination by the Chilean pathologist Robert Zaldívar. After a histologic study, he wrote me that "The stomach is totally lined by a glandular epithelium, similarly to man. Therefore, this species may be used for studying the sensitivity of such epithelium to known strong and weak chemical carcinogens. In addition, this animal has a convenient size."

This observation, probably never published, may encourage further (and, I hope, successful) attempts to raise these appropriate animals beyond the second generation (*1*).

JULIA F. MORTON

Morton Collectanea,
University of Miami,
Coral Gables, Florida 33124

References

1. R. D. Barnes and H. G. Wolf, *Int. Zoo Yearb.* **11**, 50 (1971).

Prevention of Long-Term and Disabling Diseases

Gio B. Gori and Brian J. Richter, in "Macroeconomics of disease prevention in the United States" (9 June, p. 1124), ignore some crucial economic effects of disease prevention. Their calculations focus entirely on the effects of preventing "five major causes of death." This leads to their conclusion that "a successful policy of disease prevention has a regressive economic potential."

If that is true, then the sicker the population the healthier the economy! That is hard to believe. We do not have the training needed to unravel their macroeconomic model, but we are sufficiently expert in epidemiology and biostatistics to point to a bias in their work which partly accounts for their unbelievable conclusion, a conclusion which can impede disease prevention initiatives.

Identifying the main causes of mortality is not, and never will be, unimportant, but morbidity is now the central problem, largely as a result of victories over yesterday's great killers. Preventing lifelong illnesses and disabilities has positive effects which do not enter into Gori and Richter's accounting (*1*). So they give disease prevention a dismal appearance.

We have tried to persuade public health professionals to assign an appropriate high priority to the prevention of long-term illness and disability. The mental disorders are a case in point. They produce many cases of severe disabling illness at every age with a total annual cost close to $40 billion (*2*). Mortality statistics would never reveal the extent of this burden. Only a small proportion of all deaths are ever reported with mental disorder as the underlying cause (*3*). Surely, success in preventing mental disorders would not have a regressive effect on the economy.

If no prevention occurs, this burden will increase by two mechanisms.

First, current trends in the age-sex-race distribution of the population be-

tween 1970 and 1985 will produce disproportionately large increases in groups whose members are at the highest risk of being patients in psychiatric facilities, of being cases of schizophrenia, of being inmates of correctional institutions or training schools for juvenile delinquents, or of being in homes for the aged and dependent. If the 1970 age- and race-specific rates for these major social problems continue unchanged, the percentage of increases that will occur in the numbers of persons with such problems between 1970 and 1985 will far exceed the 15.2 percent increase expected in the total population of the United States in the same period. The annual admissions to psychiatric facilities will increase by 24 percent, the annual number of cases of schizophrenia under care by 28 percent, residents of homes for the aged and dependent by 30 percent, and inmates of correctional institutions by 42 percent (*4*).

Second, the conquest of major killing diseases frequently eliminates killers that selectively precipitate death in people who are either already developmentally damaged or are already chronically ill (*5*). Survivorship rates of people with senile dementia increased so much faster between 1947 and 1957 than that of their age-mates that the age-specific prevalence rate of this debilitating disease doubled. The life expectancy of mongoloid newborns has risen so fast as compared to that of all newborns that prevalence rates of mongolism at age 10 have more than doubled. If future preventive efforts concentrate on the killing diseases and neglect the disabling diseases, the prevalence of disability will increase, and that will place a burden on the economy. But if the search for effective preventives concentrates on the causes of disabling diseases, the economic effect will be positive.

For example, two significant causes of lifelong brain damage are now totally preventable—measles and rubella. The two viruses responsible for these infections could be exterminated in a single campaign. If the search for other preventable causes of long-term disease and disability are given top priority, then an ounce of prevention will still be worth a pound of cure.

MORTON KRAMER
ERNEST M. GRUENBERG
School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Maryland 21205

References

1. E. M. Gruenberg, in *The Definition and Measurement of Mental Health*, S. B. Sells, Ed. (National Center for Health Statistics, Department of Health, Education, and Welfare, Rockville, Md., 1968), p. 220.
2. Task Panel on Cost and Financing, in *Task Panel Reports Submitted to the President's Commission on Mental Health, 1978* (Government Printing Office, Washington, D.C., 1978), appendix, vol. 2, p. 530.
3. M. Kramer, E. S. Pollack, R. Redich, B. Z. Locke, *Mental Disorders/Suicide* (Harvard Univ. Press, Cambridge, Mass., 1972), pp. 7-8.
4. M. Kramer, *Psychiatric Services and the Changing Institutional Scene, 1950–1985* (Department of Health, Education, and Welfare, Rockville, Md., 1977).
5. E. M. Gruenberg, *Milbank Mem. Fund Q.* **55**, 1 (1977).

It is unfortunate that Kramer and Gruenberg do not quote completely from our conclusion that "if current social, legislative, and economic rules remain unchanged, a successful policy of disease prevention has a recessive economic potential, as more people will reach and live well beyond retirement age."

The point of our article was not anti-prevention—far from it. We were attempting to point out that changes in social, legislative, and economic policies are necessary to successfully face the challenge of an older and longer living population.

We have no quarrel with Kramer and Gruenberg's emphasis on mental disorders. Cooper and Rice (*1*) have estimated mental disorders to be the third most costly group of diseases, both in direct and indirect morbidity costs, behind diseases of the respiratory system and diseases of the circulatory system, and the eleventh most expensive in terms of indirect mortality costs.

Our study was a mortality study, and we did include the caveat that "prevention would also alter a variety of factors of economic significance, in ways that are not easily analyzed," and which our model could not incorporate at that time. These stated factors included the "patterns of morbidity and disability." We are presently developing methods whereby morbidity considerations can be incorporated within our overall modeling system.

Because of our interest in prevention, we were excited about Kramer and Gruenberg's conclusion that "if the search for effective preventives concentrates on the causes of disabling diseases, the economic effect will be positive" and would be most interested in seeing the analysis supporting that statement.

GIO B. GORI
Division of Cancer Cause and Prevention, National Cancer Institute, Bethesda, Maryland 20014
BRIAN J. RICHTER
Enviro Control, Inc., Rockville, Maryland 20852

References

1. B. S. Cooper and D. P. Rice, *Soc. Secur. Bull.* **39** (No. 2), 21 (1976).

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*Method of Maxam, A.M., and Gilbert, W., *Proc. Nat'l Acad. Sci. USA, 74,* 560–564 (1977).
**Method of Rigby, P.W.J., Dieckmann, M., Rhodes, C., and Berg, P., *J. Mol. Biol., 113,* 237–251 (1977)

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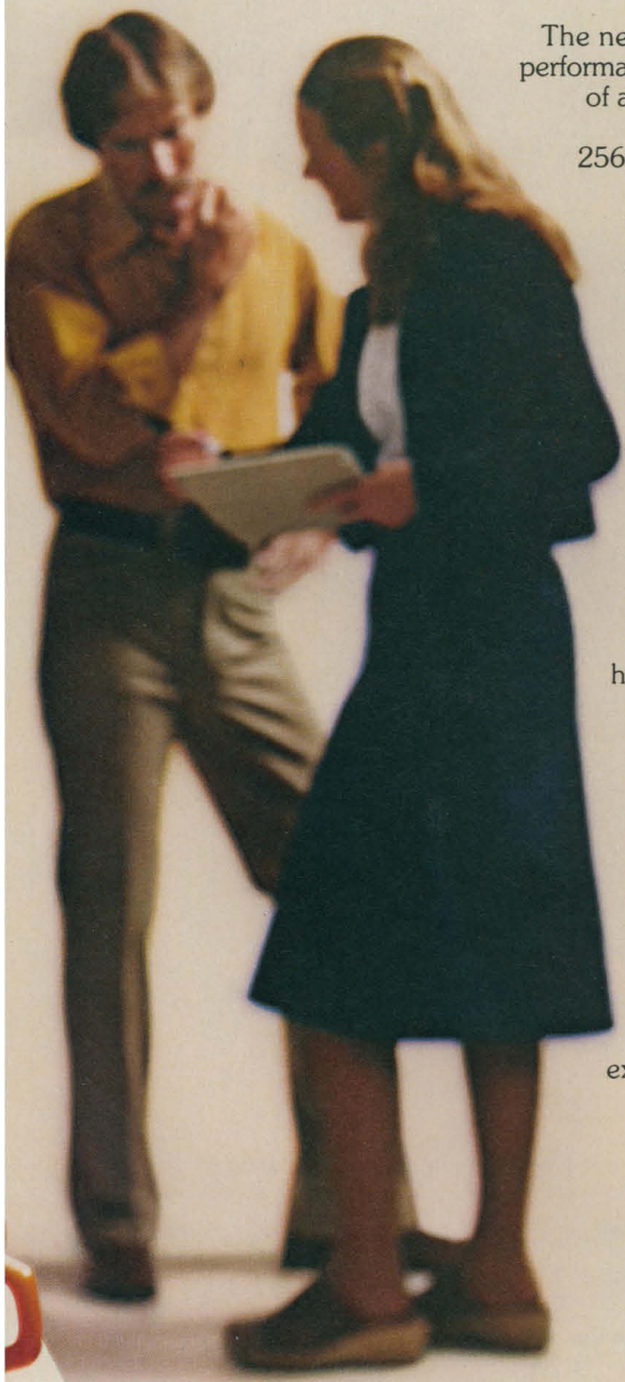

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17 November 1978, Volume 202, Number 4369 **SCIENCE**

Science in the Political Economy

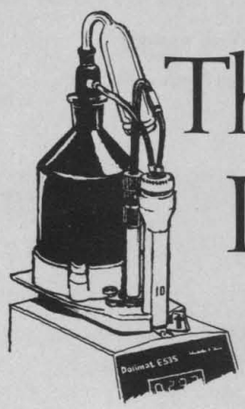
Although scientific research in the United States is not planned and managed after the fashion of controlled economies, it is still highly sensitive to ups and downs in the political economy. For one thing, government provides half of all the financial outlays that go into research and development. This makes for both stability and instability, for good times and lean times, and we will be reminded of the facts of life as the government plods toward its war on inflation in an environment of rising taxpayer resistance to public spending. Science, politics, and economics all shade into one another in a score of ways.

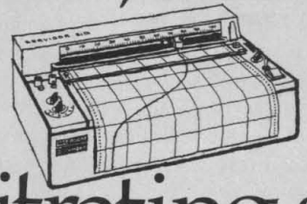
One problem is that science is still perceived in government as a discretionary activity buried in a vast and relatively uncontrollable budget. The concept of research as investment gained respectability only this year in President Carter's 1979 Budget Message, and an idea like this has a burdensome prehistory to overcome. Although there are good reasons to believe that the President's Science Adviser and the Office of Management and Budget will continue to view scientific research in this light, the going will get rough when research must compete with powerful client-oriented categories of the budget under the stresses of rationing.

Another problem is the battered state of the political economy itself. Considering the worsening of inflation coupled with low economic growth and lagging productivity, economic logic strongly argues for budgetary restraint and a reduced deficit. If double-digit inflation materializes by the time the 1980 budget is locked up, it will take very heavy doses of appropriations to make up for inflation and allow real budget increases for R&D. Science might be fortunate to escape with a cost of living increase. In short, hard days lie ahead and the scientific community may be in for a refresher on the linkage between resources for science and the capacity limits of the larger political economy.

Given all this, it needs to be said again that more money is not the only strategy by which government can advance science and innovation. There has been an unwise and unthinking tendency to look solely at the curve of federal R&D funding as a kind of Dow-Jones clue to the health of science. Other factors are just as important to the vitality and productivity of R&D. If budget dollars are to be scarce, government can help to the utilization of the R&D it has funded by overhauling its static patent policies. It can make existing research dollars stretch farther by simplifying rather than adding to the dog's breakfast of methods, procedures, and controls that are now imposed on university research at such formidable costs to productivity. Government can apply the brakes to the profusion of regulations that retard risk-taking and innovation in industrial R&D. In doing these things, government would reduce inflationary pressure and free budget dollars that are being drawn off from research into defensive administration. The view from this quarter is that genuine progress in these directions would go a long way toward making austere R&D budgets more acceptable.

For the longer run, the function of science and innovation in the performance of the political economy calls for closer examination. As far as the indicative evidence takes us, it appears that industrial growth and competitiveness owe a great deal to scientific and technological vitality. That lesson has not been lost on the developing countries, and the People's Republic of China is the latest and largest of the world's political economies to stake its future on the promises of science and technology. Closer to home, the celebrations of General Electric's centennial and AT&T's three-quarters of a century tell us a great deal about the convergence of scientific creativity, managerial skill, and entrepreneurship in generating growth with productivity. What matters in the end is not so much the quantity of R&D as the conditions and the environment that stimulate or constrain discovery and use. There is a message here for the architects of the political economy.—WILLIAM D. CAREY



The Metrohm pH Stat Titrator. It gives you self-refilling burets, a removable digital pH Meter,  quick-release  titration vessels, finger tip setting of stat point  or end point, and a multirange recorder,  all in the same pH stat titrating system.

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Creep of Engineering Materials and of the Earth. Papers from a meeting, London, Feb. 1977. The Royal Society, London, 1978. vi, 236 pp., illus. + plates. £18.30. First published in *Philosophical Transactions of the Royal Society of London*, series A, vol. 288. pp. 1-236.

A Debate on *A Time to Choose*. A Critique. William Tavoulareas. A Reply. Carl Kaysen. Ballinger (Lippincott), Cambridge, Mass., 1977. xiv, 110 pp., illus. $12.50.

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Ecological Perspectives on Carcinogens and Cancer Control. Papers from a conference, Cremona, Italy, Sept. 1976. C. C. Stock, L. Santamaria, P. L. Mariani, and S. Gorini, Eds. Karger, Basel, 1978. vi, 170 pp., illus. $52.25. Progress in Biochemical Pharmacology, vol. 14.

Ecology of Pesticides. A. W. A. Brown. Wiley-Interscience, New York, 1978. x, 526 pp., illus. $25.

Economic and Fiscal Impacts of Coal Development. Northern Great Plains. John V. Krutilla and Anthony C. Fisher with Richard E. Rice. Published for Resources for the Future by Johns Hopkins University Press, Baltimore, 1978. xxii, 208 pp. $16.

Education and the Brain. The Seventy-Seventh Yearbook of the National Society for the Study of Education, part 2. Jeanne S. Chall, Allan F. Mirsky, and Kenneth J. Rehage, Eds. National Society for the Study of Education, Chicago, 1978 (distributor, University of Chicago Press, Chicago). xxiv, 414 pp., illus. $13.

Electrical Interactions in Molecular Biophysics. An Introduction. Raymond Gabler. Academic Press, New York, 1978. xii, 352 pp., illus. $25.

Electromagnetic and Electromechanical Machines. Leander W. Matsch. Harper and Row, New York, ed. 2, 1977. x, 566 pp., illus. $21.

Elementary Surveying. Russell C. Brinker and Paul R. Wolf. Crowell, New York, ed. 6,

1977 (distributor, Harper and Row, New York). xx, 568 pp., illus. $16.75. IEP Series in Civil Engineering.

Energy Primer. Solar, Water, Wind, and Biofuels. Richard Merrill and Thomas Gage, Eds. Dell Publishing Company, New York, ed. 2, 1978. 256 pp., illus. Paper, $7.95. A Delta Special.

Energy Systems. An Analysis for Engineers and Policy Makers. Papers from a seminar, 1977. James E. Bailey, Ed. Dekker, New York, 1978. x, 124 pp., illus. Paper, $19.50. Energy, Power, and Environment, 2.

Energy Use in the United States by State and Region. A Statistical Compendium of 1972 Consumption, Prices and Expenditures. Irving Hoch. Published for Resources for the Future by Johns Hopkins University Press, Baltimore, 1978. xvi, 738 pp. Paper, $15. RFF Research Paper, R-9.

Environmental Biogeochemistry and Geomicrobiology. Proceedings of a symposium, Wolfenbüttel, Germany. Wolfgang E. Krumbein, Ed. Ann Arbor Science, Ann Arbor, Mich., 1978. Three volumes. Vol. 1, The Aquatic Environment. xviii, 394 pp., illus. Vol. 2, The Terrestrial Environment. xviii + pp. 395–712, illus. Vol. 3, Methods, Metals and Assessment. xviii + pp. 715–1056, illus. $37.50.

Essentials of Medical Microbiology. Wesley A. Volk. Lippincott, Philadelphia, 1978. xii, 654 pp., illus. Cloth, $24; paper, $14.95.

Evaluation of Behavior Therapy. Issues, Evidence, and Research Strategies. Alan E. Kazdin and G. Terrence Wilson. Ballinger (Lippincott), Cambridge, Mass., 1977. xx, 230 pp. $15.50.

Evolution and the Fossil Record. Readings from *Scientific American*. Introduction by Léo F. Laporte. Freeman, San Francisco, 1978. x, 222 pp., illus. Cloth, $14; paper, $7.

Evolution and the Genetics of Populations. Vol. 4, Variability within and among Natural Populations. Sewall Wright. University of Chicago Press, Chicago, 1978. x, 580 pp., illus. $37.50.

Extranuclear Genetics. Geoffrey Beale and Jonathan Knowles. Arnold, London, 1978. viii, 142 pp., illus. Paper, £5.95.

The First Child and Family Formation. Papers from a conference. Pacific Grove, Calif., Mar. 1976. Warren B. Miller and Lucille F. Newman, Eds. Carolina Population Center, Chapel Hill, N.C., 1978. xiv, 466 pp. Paper, $5.

Foetus into Man. Physical Growth from Conception to Maturity. J. M. Tanner. Harvard University Press, Cambridge, Mass., 1978. vi, 250 pp. $10.

Food. Past, Present and Future. Egon Larsen. Illustrations by David Armitage. Muller, London, 1978 (U.S. distributor, Crane, Russak, New York). 112 pp. $7.95.

Les Français, la Science et les Media. Une Evaluation de l'Impact de la Vulgarisation Scientifique et Technique. Jean-François Boss and Jean-Noël Kapferer. Bureau National de l'Information Scientifique et Technique, Paris, 1978. 276 pp. Paper, 60 F.

Frontiers in Neuroendocrinology. Vol. 5. William F. Ganong and Luciano Martini, Eds. Raven, New York, 1978. x, 400 pp., illus. $24.50.

Fusion and Fast Breeder Reactors. W. Häfele, J. P. Holdren, G. Kessler, and G. L. Kulcinski with contributions by A. M. Belostotsky and five others. D. Faude, M. Helm, and W. Weisz, Eds. International Institute for Applied Systems Analysis, Laxenburg, Austria, 1977. xiv, 506 pp., illus. Paper, $18.

Gaddum's Pharmacology. Revised by A. S.

V. Burgen and J. F. Mitchell. Oxford University Press, New York, ed. 8, 1978. viii, 270 pp., illus. Paper, $11.95. Oxford Medical Publications.

Genetic Interaction and Gene Transfer. Papers from a symposium, Upton, N.Y., May 1977. Carl W. Anderson, Ed. Brookhaven National Laboratory Biology Department, Upton, N.Y., 1978 (available from the National Technical Information Service, Springfield, Va.). xvi, 378 pp., illus. Paper, $13; microfiche, $3. Brookhaven Symposia in Biology, No. 29.

Genetics. Ursula Goodenough. Holt, Rinehart and Winston, New York, ed. 2, 1978. xx, 840 pp., illus. $15.95.

The Genetics of Recombination. D. G. Catcheside. University Park Press, Baltimore, 1977. x, 172 pp., illus. Paper, $13.75. Genetics—Principles and Perspectives, 2.

Goode's World Atlas. Edward B. Espenshade, Jr., and Joel L. Morrison, Eds. Rand McNally, Chicago, ed. 15, 1978. xii, 372 pp. Cloth, $12.95; paper, $8.95.

The Guidebook to ESP and Psychic Wonders. Katherine Fair Donnelly. McKay, New York, 1978. xvi, 176 pp. $9.95.

Handbook of Learning and Cognitive Processes. Vol. 5, Human Information Processing. W. K. Estes, Ed. Erlbaum, Hillsdale, N.J., 1978 (distributor, Halsted [Wiley], New York). xii, 338 pp., illus. $19.95.

High Temperature Thermal Energy Storage. Including a Discussion of TES Integrated into Power Plants. Robert H. Turner. Franklin Institute Press, Philadelphia, 1978. 102 pp., illus. Paper, $6.50. Solar Energy Series.

Hormonal Proteins and Peptides. Vol. 5, Lipotropin and Related Peptides. Choh Hao Li, Ed. Academic Press, New York, 1978. xvi, 202 pp., illus. $22.50.

Hormone Receptors. Proceedings of a conference, Columbia, Mo., Oct. 1975. David M. Klachko, Leonard R. Forte, and John M. Franz, Eds. Plenum, New York, 1978. x, 214 pp., illus. $27.50. Advances in Experimental Medicine and Biology, vol. 96.

The Ideas of Physics. Douglas C. Giancoli. Harcourt Brace Jovanovich, New York, ed. 2, 1978. xiv, 528 pp., illus. $13.95.

In Memory of Henry Norris Russell. Papers from a symposium, Washington, D.C., Nov. 1977. A. G. Davis Philip and David H. DeVorkin, Eds. Dudley Observatory, Albany, N.Y., 1977. xii, 182 pp., illus. cloth, $16; paper, $11. Dudley Observatory Reports, No. 13.

Indian Alchemy or Rasayana in the Light of Asceticism and Geriatrics. S. Mahdihassan. Institute of History of Medicine and Medical Research, New Delhi, 1977. x, 140 pp., illus. Paper, $4.

Inelastic Ion-Surface Collisions. Papers from a workshop, Murray Hill, N.J., July 1976. N. H. Tolk, J. C. Tully, W. Heiland, and C. W. White, Eds. Academic Press, New York, 1977. x, 352 pp., illus. $19.

Infrared and Raman Spectra of Inorganic and Coordination Compounds. Kazuo Nakamoto. Wiley-Interscience, New York, ed. 3, 1978. xvi, 448 pp., illus. $24.50.

Institutional Design for Improved Environmental Quality. Legal and Economic Aspects in Wisconsin. Daniel W. Bromley, Melville McMillan, Marc Robertson, and Alan Schroeder. University of Wisconsin Sea Grant College Program, Madison, 1977. vi, 252 pp., illus. Paper. Technical Report No. 232.

Intercity Transport. Engineering and Planning. Tom Rallis. Halsted (Wiley), New York, 1978. xii, 232 pp., illus. $27.50.

International Comparisons of Energy Consumption. Proceedings of a workshop. Joy Dunkerley, Ed. Published for Resources for the Future by Johns Hopkins University Press, Baltimore, 1978. xxxiv, 218 pp. Paper, $7.50. RFF Research Papers, R-10.

Introduction to Functions of a Complex Variable. J. H. Curtiss. Dekker, New York, 1978. xviii, 394 pp. $16.50. Pure and Applied Mathematics, 44.

Introduction to Ordinary Differential Equations. Rodney D. Driver. Harper and Row, New York, 1978. xii, 340 pp., illus. $12.95.

Introductory Statistics for Sociology. Judith D. Handel. Prentice-Hall, Englewoods Cliffs, N.J., 1978. xii. 388 pp., illus. $14.95.

Investigations of the Southwestern Anthropological Research Group. An Experiment in Archaelogical Cooperation. Proceedings of a conference, Mar. 1978. Robert C. Euler and George J. Gumerman, Eds. Museum of Northern Arizona, Flagstaff, 1978. viii, 186 pp., illus. Paper, $5.95. Museum of Northern Arizona Bulletin No. 50.

Jewelry of the Prehistoric Southwest. E. Wesley Jernigan. School of American Research, Santa Fe, N.M., and University of New Mexico Press, Albuquerque, 1978. xiv, 260 pp., illus. + plates. $24.95. School of American Research Southwest Indian Arts Series.

The Knowable Future. A Psychology of Forecasting and Prophecy. David Loye. Wiley-Interscience, New York, 1978. xvi, 202 pp. $12.95.

Laboratory Outlines in Zoology. Peter Abramoff and Robert G. Thomson. Freeman, San Francisco, 1978. xii, 398 pp., illus. Paper, $8.

The Lapps. Arthur Spencer. Crane, Rus-

sak, New York, and David and Charles, Newton Abbot, England, 1978. 160 pp., illus. $10.50. This Changing World.

Leukocyte Chemotaxis. Methods, Physiology, and Clinical Implications. Papers from a conference, Santa Ynez, Calif., Jan. 1977. John I. Gallin and Paul G. Quie, Eds. Raven, New York, 1978. xiv, 430 pp., illus. $34.

Light Water. How the Nuclear Dream Dissolved. Irvin C. Bupp and Jean-Claude Derian. Basic Books, New York, 1978. xii, 242 pp. $10.

Lithium in Medical Practice. Proceedings of a congress, Lancaster, England, July 1977. F. Neil Johnston and Susan Johnson, Eds. University Park Press, Baltimore, 1978. xviii, 460 pp., illus. $27.50.

Lories and Lorikeets. The Brush-Tongued Parrots. Rosemary Low. Van Nostrand Reinhold, New York, 1978. xii, 180 pp., illus. $18.95. *To order this book circle No. 404 on Readers' Service Card*

Magic, Science, and Civilization. J. Bronowski. Columbia University Press, New York, 1978. viii, 88 pp. $6.95. Bampton Lectures in America, No. 20.

Manias, Panics, and Crashes. A History of Financial Crises. Charles P. Kindleberger. Basic Books, New York, 1978. xii, 272 pp. $12.95.

Maritime Labor Organizations on the Great Lakes—St. Lawrence Seaway System. Eric Schenker, Harry C. Brockel, and Wayne R. Wendling. University of Wisconsin Sea Grant College Program, Madison, 1978. xii, 98 pp. Paper. Technical Report No. 233.

Marmosets in Experimental Medicine. Proceedings of a conference, Oak Ridge, Tenn., Mar. 1977. Nazareth Gengozian and Friedrich Dienhardt, Eds. Karger, Basel, 1978. x, 308 pp., illus. $83.25. Primates in Medicine, vol. 10.

Mastering Medicine. Professional Socialization in Medical School. Robert H. Coombs. Free Press (Macmillan), New York, and Collier Macmillan, London. 1978. xiv, 288 pp. $15.95.

Mathematical Tools for Applied Multivariate Analysis. Student Edition. Paul E. Green with contributions by J. Douglas Carroll. Academic Press, New York, 1978. xiv, 376 pp., illus. Paper, $13.50.

Measles Virus and Its Biology. K. B. Fraser and S. J. Martin. Academic Press, New York, 1978. x, 250 pp., illus. $19.25. Experimental Virology.

Mechanics and Motion. L. Mackinnon. Clarendon (Oxford University Press), New York, 1978. x, 164 pp., illus. Cloth, $14.95; paper, $7.95. Oxford Physics Series, 17.

Methods in Cancer Research. Vol. 14. Harris Busch, Ed. Academic Press, New York, 1978. xxii, 374 pp., illus. $37.

Microscope Technique. A Comprehensive Handbook for General and Applied Microscopy. W. Burrells. Halsted (Wiley), New York, ed. 2, 1978. xii, 574 pp., illus. $25.

The Modern Myth. Ancient Astronauts and UFOs. Morris Goran. Barnes, Cranbury, N.J., and Yoseloff, London, 1978. 192 pp., illus. $8.95.

Multivariate Analysis in Vegetation Research. László Orlóci. Junk, The Hague, ed. 2, 1978 (U.S. distributor, Kluwer Boston, Hingham, Mass.). x, 452 pp. $49.

Natural Plant Growth Inhibitors and Phytohormones. V. I. Kefeli. Junk, The Hague, 1978 (U.S. distributor, Kluwer Boston, Hingham, Mass.). xii, 278 pp., illus. $44.

Nature, Culture, and Human History. A Bio-cultural Introduction to Anthropology. Davydd J. Greenwood and William A. Stini. Harper and Row, New York, 1977. x, 532 pp., illus. $15.95.

Need for Power Study. An Assessment of the Adequacy of Future Electric Generating Capacity. MITRE Corporation, McLean, Va., 1977 (available from the National Technical Information Service, Springfield, Va.). Variously paged. Paper, $13; microfiche, $3.

The Neurosciences and Behavior. An Introduction. Dale M. Atrens and Ian S. Curthoys. Science Press (Boden Books), Marrickville, N.S.W., Australia, 1978. vi, 170 pp., illus. Paper, A$8.50.

New Aspects of Renal Function. Proceedings of a conference, Schloss Reisensburg, July 1977. H. G. Vogel and K. J. Ullrich, Eds. Excerpta Medica, Amsterdam, 1978 (U.S. distributor, Elsevier, New York). x, 222 pp., illus. $32.75. Workshop Conferences Hoechst, vol. 6.

New Methods in Tumor Localization. Papers from a meeting, Louisville, Ky., Oct. 1976. Yosh Maruyama, Ed. University of Kentucky Department of Radiation Medicine, Lexington, 1977. x, 334 pp., illus. Paper, $9.25.

New Perspectives on Galileo. Papers from a workshop, Blacksburg, Va., Oct. 1975. Robert E. Butts and Joseph C. Pitt, Eds. Reidel, Boston, 1978. xvi, 264 pp. Cloth, $29.50; paper, $12.50. University of Western Ontario Series in Philosophy of Science, vol. 14.

Nuclear Power. Erik S. Pedersen. Ann Arbor Science, Ann Arbor, Mich., 1978. Two volumes. illus. Vol. 1, Nuclear Power Plant Design. xvi, 558 pp. Vol. 2, Nuclear Power Project Management. xiv, 398 pp. $47.50.

The Ocular and Cerebrospinal Fluids. Papers from a symposium, Bethesda, Md., May 1976. L. Z. Bito, H. Davson, and J. D. Fenstermacher, Eds. Academic Press, New York, 1978. xvi, 562 pp., illus. $39. Reprinted from the Supplement to *Experimental Eye Research*, vol. 25.

The Organic Chemistry of Iron. Vol. 1. Ernst A. Koerner von Gustorf, Friedrich-Wilhelm Grevels, and Ingrid Fischler, Eds. Academic Press, New York, 1978. xii, 674 pp., illus. $29.50. Organometallic Chemistry.

Physical and Economic Feasibility of Nonstructural Flood Plain Management Measures. William K. Johnson. U.S. Army Corps of Engineers Hydrologic Engineering Center. Davis, Calif., 1978. vi, 96 pp., illus. + appendices. Paper.

Physics of the Atom. M. Russell Wehr, James A. Richards, Jr., and Thomas W. Adair III. Addison-Wesley, Reading, Mass., ed. 3, 1978. xvi, 526 pp., illus. $15.95. *To order this book circle No. 405 on Readers' Service Card*

Pollutants and High-Risk Groups. The Biological Basis of Increased Human Susceptibility to Environmental and Occupational Pollutants. Edward J. Calabrese. Wiley-Interscience, New York, 1978. xx, 266 pp., illus. $19.50. Environmental Science and Technology.

Polymeric Drugs. Proceedings of a symposium, New Orleans, Mar. 1977. L. Guy Donaruma and Otto Vogl, Eds. Academic Press, New York, 1978. xii, 398 pp., illus. $19.50.

Power Plant Entrainment. A Biological Assessment. J. R. Schubel and Barton C. Marcy, Jr. Academic Press, New York, 1978. x, 272 pp., illus. $16.

Prehistoric Mesoamerica. Richard E. W. Adams. Little, Brown, Boston, 1977. xiv, 370 pp., illus. $12.95.

The Primary Care Physician. Issues in Distribution. James E. C. Walker and Norman L. Armondino. Connecticut Health Services Research Series, New Haven, Conn., 1977. xvi, 122 pp., illus. Paper, $7.50. Connecticut Health Services Research Series, No. 7.

Principles of Chemical Kinetics. Gordon G. Hammes. Academic Press, New York, 1978. xii, 268 pp. $19.50.

The Private Worlds of Dying Children. Myra Bluebond-Langner. Princeton University Press, Princeton, N.J., 1978. xvi, 284 pp. $12.50.

Probability and Statistics. William L. Quirin. Harper and Row, New York, 1978. xiv, 488 pp., illus. $12.95.

Psychosomatic Families. Anorexia Nervosa in Context. Salvador Minuchin, Bernice L. Rosman, and Lester Baker with a contribution by Ronald Liebman. Harvard University Press, Cambridge, Mass., 1978. xiv, 352 pp. $15.

Quantum Liquids. Papers from a school. Erice, Italy, June 1977. J. Ruvalds and T. Regge, Eds. North-Holland, Amsterdam, 1978 (U.S. distributor, Elsevier, New York). x, 328 pp., illus. Cloth, $36.95; paper, $21.75.

Reactions of Organosulfur Compounds. Eric Block. Academic Press, New York, 1978. xvi, 320 pp., illus. $28. Organic Chemistry, vol. 37.

Reconciling Man with the Environment. Eric Ashby. Stanford University Press, Stanford, Calif., 1978. x, 104 pp. $7.95. The Leon Sloss Junior Memorial Lectures in Humanities.

Selected Papers from the 27th International Astronautical Congress. Anaheim, Calif., Oct. 1976. Luigi G. Napolitano, Ed. Pergamon, New York, 1978. vi + pp. 467–768, illus., + appendix. $33. Special issue of *Acta Astronautica*, vol. 4, Nos. 5 and 6. *To order this book circle No. 406 on Readers' Service Card*

Wind Effects on Structures. An Introduction to Wind Engineering. Emil Simiu and Robert H. Scanlan. Wiley-Interscience, New York, 1978. x, 458 pp., illus. $27.