

merit, which is no small one, of making Rush appear the natural denizen of his intellectual milieu, a somewhat perfervid specimen, perhaps, but a genuine child of his time—which is what the title of the book should be taken to mean. It ought to be said, too, that the author of these 300 pages is good company to the last. If we feel that he sometimes labors a trifle over his brief, this is the best of defects in a biographer. To twist a saying of Dr. Johnson's, an apologetic tone is what a great many of Benjamin Rush's biographers cannot help. Rush himself wrote: "My opinions upon many subjects and my innovations in the practice of medicine have so much divided my fellow citizens upon the subject of my talents and character, that it will be impossible for many years to decide the controversy respecting either of them." It has not been decided yet.

LLOYD G. STEVENSON

Yale University,
New Haven, Connecticut

Luminescence Conference

Bioluminescence in Progress. Proceedings of the Luminescence Conference, Kanagawa-ken, Japan, September 1965. FRANK H. JOHNSON and YATA HANEDA, Eds. Princeton University Press, Princeton, N.J., 1966. 664 pp., illus. \$15.

This thoughtfully compiled volume is dedicated to the memory of the late E. Newton Harvey. Such a dedication is appropriate, not only because that benevolent and brilliant biologist laid many conceptual foundations upon which much of the current rapid progress in bioluminescence is based, but also because so many of the outstanding contributors to this memorial volume are his scientific heirs—his students and their students. The editors as well as the sponsors of the symposium (the Japan Society for the Promotion of Science, and the National Science Foundation) are to be congratulated on the generally high quality of the science presented in these collected papers.

The liaison between Japanese and American scientists is particularly close and productive in the field of bioluminescence. The editors of this volume are to a considerable extent responsible for this scientifically rewarding collaboration, a collaboration that might have been implicit in the work of Harvey, carried out in the 1920's on the

lumino-biochemistry of the ostracod crustacean *Cypridina hilgendorffii*, a species abundant in the waters about Japan. One of the outstanding related contributions of this volume is, appropriately, a definitive report of the structure of *Cypridina* luciferin by Kishi, Goto, Hirata, Shimomura, and Johnson. I view with mixed delight the successful application of mass spectrographic cracking patterns to the problem of the structure of *Cypridina* luciferin, a resolution which was in my own hands unsuccessful in providing a unique clue to the structure of firefly luciferin. (This structure was subsequently determined by White, McElroy, and collaborators.)

A complete listing of the topics covered is not feasible in a review of this length. Of particular interest to biologists and biochemists are the considerable progress on *Cypridina* luciferin, luminous fungi, *Noctiluca miliaris*, dinoflagellates, protochordates, luminous earthworms, a freshwater limpet, fireflies, a New Zealand glowworm, and certain luminous shrimps, and the morphological and biochemical studies on the light organs of teleosts. All in all, this is a most worthwhile book and a fitting tribute to Harvey, who would also have been delighted by the surrealistic photograph on the cover—a cleverly disguised New Zealand cave, illuminated by glowworms and diffuse daylight.

B. L. STREHLER

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Bethesda, Maryland

Electronics

Nonlinear Electron-Wave Interaction Phenomena. JOSEPH E. ROWE. Academic Press, New York, 1965. 605 pp., illus. \$18.

Nonlinear interaction is a subject which has reached maturity only in the past decade. The need to understand the behavior of microwave devices for large radio-frequency signal levels has motivated theoretical work in the nonlinear regime. The present book is written by a leading investigator, and it should serve as a basic research monograph. It also may find some use as a graduate textbook, although it presupposes a sound knowledge of linear devices.

The treatment is almost entirely theoretical, although some experimental data are quoted in support of cer-

tain calculations. The material is related mainly to those devices which utilize an injected particle stream of some type. The nonlinear interaction is between a directed stream and an electromagnetic wave. Particle and wave velocities both small and comparable with the velocity of light are considered. The specific interaction mechanisms considered are pertinent to klystrons, traveling-wave amplifiers, backward wave oscillators, crossed field oscillators, multibeam devices, and electron-beam-plasma devices. As is not the case in a linear treatment, second- and higher-order terms are retained in the appropriate interaction equations. The solutions are usually obtained by resorting to high-speed computers. As indicated by the author, real insight into the interaction phenomena is obtained only through a detailed study of the reams of the digital computer output. Only in a few cases are closed-form solutions available.

JAMES R. WAIT

Division of Engineering and Applied
Physics, Harvard University,
Cambridge, Massachusetts

New Books

Abstract Theory of Groups. O. U. Schmidt. Translated from the second Russian edition (Moscow, 1933) by Fred Holling and J. B. Roberts. J. B. Roberts, Ed. Freeman, San Francisco, 1966. 184 pp. \$5.

Acoustics. Alexander Wood. Dover, New York, 1966. 608 pp. Illus. Paper, \$3.50. Reprint, ed. 2, 1960.

Advances in Control Systems: Theory and Applications. vols. 3 and 4. C. T. Leondes, Ed. Academic Press, New York, 1966. vol. 3, 356 pp.; vol. 4, 334 pp. Illus. \$14.50 for each volume. Twelve papers.

Astronautics Year. An international astronomical and military space/missile review of 1965. David Howard, Ed. Pergamon, New York, 1966. 336 pp. Illus. \$10.

Basic Microscopic Technics. Ruth McClung Jones. Univ. of Chicago Press, Chicago, 1966. 348 pp. Illus. \$6.50. Based on Michael F. Guyer's *Animal Micrology* (ed. 5, 1953).

Brandeis University Summer Institute in Theoretical Physics, 1965. vols. 1 and 2. vol. 1, *Axiomatic Field Theory*, 528 pp. \$32.50; vol. 2, *Particle Symmetries*, 703 pp. \$35. M. Chrétien and S. Deser, Eds. Gordon and Breach, New York, 1966. Illus. Eleven papers.

Carnegie Institution of Washington Year Book 1965-1966. vol. 65. Carnegie Institution, Washington, D.C., 1966. 642 pp. Illus. \$1.50.

Celestial Mechanics. vols. 1 to 4. Marquis de LaPlace. Translated, with a com-

(Continued on page 921)

NEW BOOKS

(Continued from page 819)

mentary, from the French edition by Nathaniel Bowditch. Chelsea, Bronx, N.Y., 1966. vol. 1, 938 pp.; vol. 2, 1008 pp.; vol. 3, 940 pp.; vol. 4, 1054 pp. Illus. \$79.50 per set. Reprint, 1829, 1832, 1834, 1839 editions.

Chemotaxonomie der Pflanzen. vol. 4, *Dicotyledoneae: Daphniphyllaceae-Lythraceae.* R. Hegnauer. Birkhäuser, Basel, Switzerland, 1966. 551 pp. Illus. F. 106.

Computer Design. Ivan Flores. Prentice-Hall, Englewood Cliffs, N.J., 1967. 477 pp. Illus. \$14.

Computer Programming and Related Mathematics. Richard V. Andree. Wiley, New York, 1967. 294 pp. Illus. \$6.50.

Concatenated Codes. G. David Forney, Jr. M.I.T. Press, Cambridge, Mass., 1966. 159 pp. Illus. \$8.50.

The Control of Environment. Lectures delivered at the second Nobel Conference (St. Peter, Minn.), January 1966. John D. Roslansky, Ed. North-Holland, Amsterdam, 1967. 124 pp. \$5. Six papers.

Critical Phenomena. Proceedings of a conference (Washington, D.C.), April 1965. M. S. Green and J. V. Sengers, Eds. Sponsored by National Bureau of Standards, National Science Foundation, and Office of Naval Research. U.S. Department of Commerce, Washington, D.C., 1966 (order from Superintendent of Documents, Washington, D.C.). 256 pp. Illus. \$2.50. Thirty-four papers. A report of the conference appears in *Science* 150, 229 (1965).

Cultural Frontiers of the Peace Corps. Robert B. Textor, Ed. M.I.T. Press, Cambridge, Mass., 1966. 391 pp. Illus. \$6.95. Sixteen papers.

Cytological Technique: The Principles Underlying Routine Methods. John R. Baker. Methuen, London; Wiley, New York, ed. 5, 1967. 161 pp. Illus. \$4.50.

Design of Thin Concerte Shells. vol. 2, *Negative Curvature Index.* A. M. Haas. Wiley, New York, 1967. 252 pp. Illus. \$14.95.

The Development of Medicine as a Profession. Vern L. Bullough. Hafner, New York, 1966. 133 pp. \$7.50.

Development and Systematics of Some Pacific Marine Symbiotic Copepods. A study of the biology of the Notodelphyidae, associates of ascidians. Patricia L. Dudley. Univ. of Washington Press, Seattle, 1967. 288 pp. Illus. \$6.50.

Diary of the "Discovery" Expedition to the Antarctic Regions 1901-1904. Edward Wilson, Ann Savours, Ed. Humanities Press, New York, 1967. 416 pp. Illus. \$22.50.

Dictionary of Inventions and Discoveries. E. F. Carter. Philosophical Library, New York, 1966. 201 pp. \$6.

Economic Policies Toward Less Developed Countries. Harry G. Johnson. Brookings Institution, Washington, D.C., 1967. 295 pp. Illus. \$6.75.

Electrical Conduction Mechanisms in Thin Insulating Films. D. R. Lamb. Methuen, London; Barnes and Noble, New York, 1967. 130 pp. Illus. \$4.50. Methuen's Monographs on Physical Subjects.

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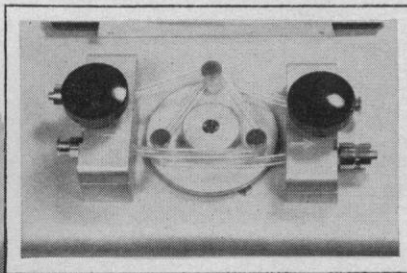
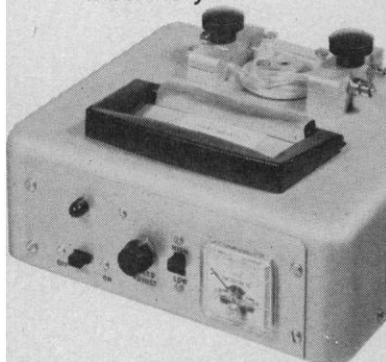
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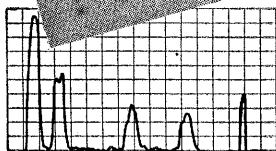
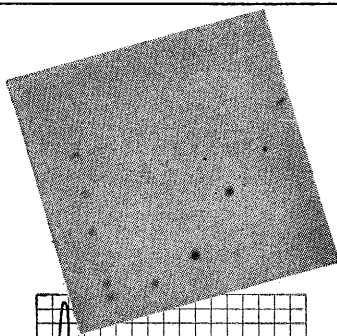
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Elementary Reactor Physics. P. J. Grant. Pergamon, New York, 1966. 204 pp. Illus. Paper, \$5. Commonwealth and International Library.

Engineering Kinematics. Alvin Sloane. Dover, New York, 1966. 320 pp. Illus. Paper, \$2.25. Reprint, 1941 edition.

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Essays in Mathematical Economics. In honor of Oskar Morgenstern. Martin Shubik, Ed. Princeton Univ. Press, Princeton, N.J., 1967. 495 pp. Illus. \$12.50. Twenty-seven papers.

Essentials of Biology. C. Leland Rodgers. Barron's Educational Series, Woodbury, N.Y., 1967. 557 pp. Illus. Paper, \$2.50; cloth, \$5.95.

Fluid Mechanics, Thermodynamics of Turbomachinery. S. L. Dixon. Pergamon, New York, 1966. 227 pp. Illus. Paper, \$6. Commonwealth and International Library.

Sigmund Freud. Francine Klagsbrun. Watts, New York, 1967. 160 pp. \$2.95. Immortals of Science Series.

Fundamentals of Quality Control for the Food Industry. Amihud Kramer and Bernard A. Twigg. Avi, Westport, Conn., ed. 2, 1966. 556 pp. Illus. \$14.75.

Genetics and the Future of Man. A discussion at the first Nobel Conference (St. Peter, Minn.), January 1965. John D. Rostlansky, Ed. Appleton-Century-Crofts, New York, 1966. 216 pp. Illus. \$5. Six papers.

Géologie du Pétrole. Alain Perrodon. Presses Universitaires de France, Paris, 1966. 448 pp. Illus. Bibliothèque de l'Ingénieur-Géologue.

Geology of Northern California. Edgar Bailey, Ed. California Division of Mines and Geology, San Francisco, 1966. 520 pp. Illus. \$6. Thirty-five papers.

Gnosiology: The Scientific Approach to the Theory of Knowledge. Tadeusz Kotarbinski. Translated from the Polish by Olgierd Wojtasiewicz. G. Bidwell and C. Pinder, Translation Eds. Pergamon, New York, 1966. 562 pp. Illus. \$18.50.

The Golden Age of Science. Thirty portraits of the giants of 19th-century science by their scientific contemporaries. Bessie Zaban Jones, Ed. Simon and Schuster, New York, 1967. 697 pp. \$12.

Grundriss der allgemeinen Zoologie. Alfred Kühn. Thieme, Stuttgart, 1967 (order from Intercontinental Medical Book Corp., New York). 399 pp. Illus. Paper, DM 9.80.

A Guide to the Minerals of Switzerland. M. Weibel. Interscience (Wiley), New York, 1966. 135 pp. Illus. \$6.50.

Handbook of Middle American Indians. vol. 4, *Archaeological Frontiers and External Connections.* Gordon F. Ekholm and Gordon R. Willey, Eds. Univ. of Texas Press, Austin, 1967. 375 pp. Illus. \$15. Fifteen papers.



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High-Temperature Oxidation of Metals. Per Kofstad. Wiley, New York, 1966. 354 pp. Illus. \$13.50. The Corrosion Monograph Series.

An Historical Atlas of China. Albert Herrmann. Aldine, Chicago, 1966. 120 pp. Illus. \$12.50. Based on *Historical and Commercial Atlas of China* (1935).

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Insect Chemosterilants. Alexej B. Borokov. Interscience (Wiley), New York, 1966. 153 pp. Illus. \$6.95. Advances in Pest Control Research Series, vol. 7.

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Ionization and Breakdown in Gases. F. Llewellyn-Jones. Methuen, London; Barnes and Nobel, New York, 1967. 176 pp. Illus. Paper, \$2.35; cloth, \$3.75. Reprint, 1957 edition.

An Introduction to Biomechanics. H. M. Frost. Thomas, Springfield, Ill., 1966. 159 pp. Illus. \$7.50.

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Introduction to Statistical Mechanics. Ronald W. Gurney. Dover, New York, 1966. 276 pp. Illus. Paper, \$2. Reprint, 1949 edition.

An Introduction to the Calculus of Finite Differences and Difference Equations. Kenneth S. Miller. Dover, New York, 1966. 175 pp. Illus. Paper, \$1.75. Reprint, 1960 edition.

Introductory Complex Analysis. Richard A. Silverman. Prentice-Hall, Englewood Cliffs, N.J., 1967. 384 pp. Illus. \$8.75.

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Knowledge and Power: Essays on Science and Government. Sanford A. Lakoff, Ed. Free Press, New York, 1966. 512 pp. \$9.95. Fifteen papers.

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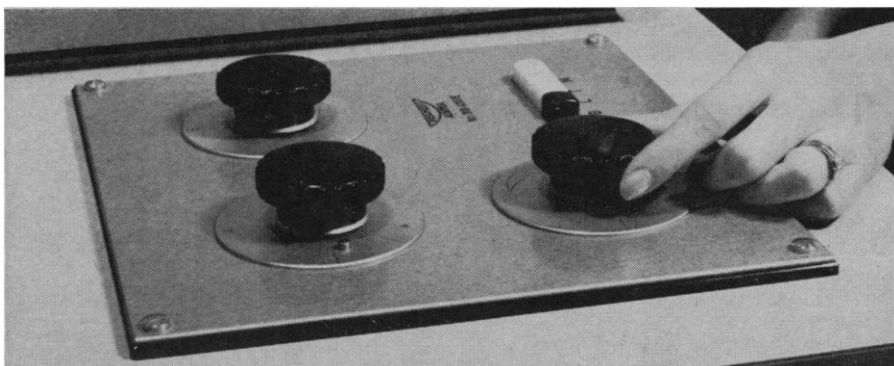
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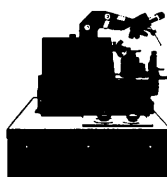


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Liquid Hydrogen (Properties, Production and Applications). Lectures given at Grenoble, France, June 1965. Louis Weil and Paul Perroud, Eds. Pergamon, New York, 1966. 393 pp. Illus. \$10. Pure and Applied Cryogenics, vol. 5. Twenty papers.

Magnetic Susceptibility. L. N. Mulay. Interscience (Wiley), New York, 1966. 137 pp. Illus. Paper, \$2.95. Reprinted, with additions, from *Treatise on Analytical Chemistry*, pt. 1, vol. 4.

Manpower and the Growth of Producer Services. Harry I. Greenfield. Columbia Univ. Press, New York, 1966. 160 pp. \$6.

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Microwave Spectroscopy. Walter Gordy, William V. Smith, and Ralph F. Trambarulo. Dover, New York, 1966. 460 pp. Illus. Paper, \$3. Reprint, 1953 edition.

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Network-Based Management Systems (PERT/CPM). Russell D. Archibald and Richard L. Villoria. Wiley, New York, 1967. 522 pp. Illus. \$16.

The New Look of the Universe. Patrick Moore. Norton, New York, 1967. 126 pp. Illus. \$3.95.

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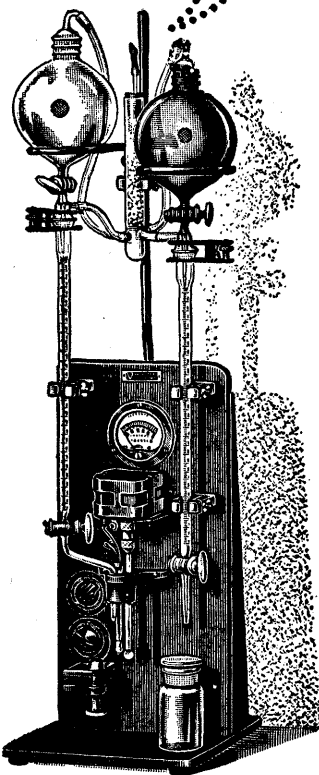
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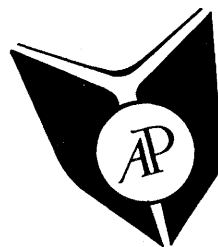
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