linear betatron oscillations, magnet problems (here, the Russians report on their 680-Mev synchrocyclotron and also on their new 10-Bev synchrotron, which is about complete), radio-frequency acceleration, electron-synchrotron problems, problems in the use of accelerators (this section covers only experience with existing machines), and, finally, general topics, including the Princeton-Pennsylvania proton-synchrotron and the Stanford linear accelerator.

This book is well printed. There are numerous errors, which arise from the difficulty of getting authors who are scattered all over the world to check their contributions carefully and quickly. In general, these do not cause trouble in reading. A more serious criticism is that, since the meeting was attended mainly by experts, many of the papers will be found to be very difficult to follow by anyone not familiar with the subject. However, the book does contain a great deal of information on the new types of accelerators, most of which is not published elsewhere except in the internal reports of the groups working on these problems. It is, therefore, a very valuable book for anyone who wishes to become a specialist, and many parts of it will be found useful by anyone desiring information about these new ideas.

ROBERT O. HAXBY
Midwestern Universities Research Association

Early Electrical Machines. The experiments and apparatus of two enquiring centuries (1600 to 1800) that led to the triumphs of the electrical age. Bern Dibner. Burndy Library, Norwalk, Conn., 1957. 57 pp. Illus. $1.50.

The picture of Otto von Guericke pursuing a drifting feather with his rubbed sulfur globe not only recalls a landmark in the history of electricity but constitutes a fit symbol of the instrument through the use of which, in the course of a century and a half, a miscellany of occult manifestations of nature were assembled into a science. Bern Dibner has undertaken to write a commemoration of that instrument, which is at the same time an excellent capsule history of electricity during the heyday of the electric machine.

Histories of electricity tend to become bloodless when the illustrations and descriptions of the quaint experiments—as they seem to us—are eliminated. A book such as this, which dwells on this era, rather than hurrying through it and touching only the "high spots," is an interesting and useful antidote to the malady of oversimplification which often afflicts works on the history of science. The illustrations in the present work are well selected and beautifully reproduced, and Dibner has given a fuller than usual account of the multitudinous experiments of the empirically minded electricians of the 17th and 18th centuries.

Modern technologists, it is to be feared, give too little thought to the debt owed their predecessors. It is pleasant to know of an outstanding exception in Dibner, whose beautiful and well-written publications on the history of science have gained him a well-deserved reputation, both as a student and as a patron of the history of science and technology.

ROBERT P. MULTHAUF
Smithsonian Institution

Ernest Rutherford, Atom Pioneer. John Rowland. Philosophical Library, New York, 1957. 160 pp. $4.75.

Ernest Rutherford was born on 30 August 1871, near the town of Nelson, New Zealand, and died on 19 October 1937 in Cambridge, England. Into this all too short life of 66 years (his father and mother lived to the age of 89 and 92 years, respectively) there were crowded an incredible number of scientific accomplishments and honors. At the age of 23 he earned his B.Sc. degree in New Zealand and left for the Cavendish Laboratory, Cambridge, with the aid of the single available scholarship. Three years later he earned a B.A. research degree and 1 year thereafter, at the age of only 27, he became Macdonald professor of physics at McGill University, Montreal, Canada. Nine years later he took charge of the physics department at Manchester University, England, and after another 12 years, at the age of 48, he succeeded his old teacher, J. J. Thomson, in England's most distinguished position in physics, that of Cavendish professor at Cambridge, a position he held until his death.

At McGill, Rutherford laid the experimental foundations of the entire field of radioactivity and wrote the first and second editions of his authoritative book of that title. At Manchester his theory of the nuclear atom was born and experimentally established. At Cambridge, in 1919, he accomplished, for the first time, the artificial transmutation of elements, using alpha-ray bombardment to transform ordinary nitrogen into an isotope of oxygen.

In 1903, at the age of 32, Rutherford became a fellow of the Royal Society (and in 1925, its president); at the age of 37 he received the Nobel prize, *in chemistry;* at the age of 43 he was knighted, and at the age of 60, he became a baron.

Rutherford was an experimental genius, with comparatively little facility in mathematics and with slight sympathy for involved mathematical theories. In this he was much like Faraday, in whose papers, as Rutherford once pointed out, there does not appear a single line of mathematics. When Rutherford was asked, in 1929, to address the British Association, meeting in South Africa, on "The trend in modern physics," he replied that such a topic would not take more than 2 minutes to deal with. "All I could say would be that the theoretical physicists have got their tails up, and it is time that we experimentalists pulled them down again!"

Until close to the time of his death, Rutherford enjoyed the most robust health. He was often taken, by strangers, for a farmer rather than a professor. He married a childhood sweetheart (after an engagement of 5 years!) and had an exceptionally peaceful and happy married life. In spite of the honors heaped upon him, Rutherford preserved to the end his innate modesty. He was always generous in his recognition of the work of others, including that of his coworkers. He was a tremendously hard worker and expected the same of his assistants. But he was both respected and loved by everyone who had associations with him. An intimate friend said of him, "Rutherford never made an enemy and never lost a friend." There are truly few persons in all scientific history who can so well be chosen as a model and an inspiration to others in the field. For just this reason it is appropriate that the details of Rutherford's scientific and personal life be widely publicized.

Such details are, in fact, contained in his official biography, written only 2 years after his death by A. S. Eve, a distinguished physicist and a close friend and colleague of Rutherford at McGill University. Eve's book is very interesting as well as authoritative. Now John Rowland has written a much more condensed biography. The major portion of Eve's material consists of letters to and from Rutherford, both personal and scientific. Nearly 300 such letters are quoted in full or in part, and they constitute collectively the most intriguing feature of the volume for the professional scientist.

Rowland's new book, on the contrary, merely quotes a sentence here and there from such letters. It represents, however, a well-selected and well-written brief account of Rutherford's life and can be read with profit and pleasure by a large section of the public. Unfortunately it closes with an eleven-page "Epilogue" on advances in physics since the death of Rutherford. Here Rowland falls down badly. For instance, Fermi, in place of McMillan, is credited with the discovery of the first transuranium element, neptunium. Rowland's description of the re-

actions that occur in the hydrogen bomb is quite incorrect. He makes no distinction between the process of fission (A-bomb) and that of fusion (H-bomb) and there is, in fact, no indication that he even realizes that there is a difference.

The other feature of Rowland's book that disturbs me is the price. Eve's book is handsomely bound, printed on 451 large pages of high-grade paper, with 17 plates of photographs, plus the frontispiece, and six line drawings. Rowland's book, which contains not more than one-fourth as many words, is printed on 160 small pages of ordinary paper, with three line drawings and no photographs, except for the frontispiece. Yet Eve's book sold in 1939, and still does sell, for $5, whereas Rowland's book sells at $4.75—surely a glaring example of the effects of inflation, if nothing more. But it is an interesting and reliably written book, provided that the reader overlooks those last 11 misleading pages.

RAYMOND T. BIRGE
University of California

Progress in the Chemistry of Organic Natural Products. vol. 13. L. Zechmeister, Ed. Springer, Vienna, 1956. 624 pp. Illus. $25.60.

The timely coverage of important developments in the field of natural products has been maintained in this 13th volume of the Zechmeister series. The various topics are discussed with competence and clarity by the foremost research workers in the field, and a multitude of formulas, conveying structures and reaction schemes, are presented.

The first chapter, by A. R. H Cole, deals with the application of infrared spectroscopy to the elucidation of the structure of natural products, with primary emphasis on steroids and terpenoids. A short discussion is also devoted to the polyenes. The description of the various instruments and sampling techniques could well have been omitted, since they have been considered in various other books.

O. T. Schmidt discusses the progress of the chemistry of tannins since 1929 in the second chapter. The third chapter, by C. Tamm, deals with the progress of research in the field of cardioactive glycosides. The isolation and properties of the various glycosides are described. In the discussion of structure determinations, degradation reactions and structures of aglycones are emphasized.

The recognition of the importance of naturally occurring tropolones and troponoids is well treated in the fourth chapter, by T. Nozoe. A description of structure determination of natural tropolones is given, and general methods for the synthesis of various types of troponoids are outlined.

Alkaloids that are related to anthranilic acids are reviewed by J. R. Price in the fifth chapter. Quinoline, acridine, furoquinoline, quinazoline, and quindoline alkaloids are included here.

The final two chapters, by A. Chatterjee, with S. C. Pakrashi and G. Werner, and by W. Grassman, with E. Wünch, deal, respectively, with recent developments in the chemistry and pharmacology of *Rauwolfia* alkaloids and with the syntheses of peptides.

HENRY FEUER
Purdue University

New Books

The Exploration of the Colorado River. John Wesley Powell. University of Chicago Press, Chicago, Ill., 1957 (abridged from ed. 1, 1875). 159 pp. $3.75.

The Chemistry of Plants. Erston V. Miller. Reinhold, New York; Chapman & Hall, London, 1957. 181 pp. $4.75.

Physiology of the Nervous System. E. Geoffrey Walsh. With chapters on somatic sensibility and the applied physiology of pain by John Marshall. Longmans, Green, New York, 1957. 579 pp. 50s.

Précis de Biologie Humaine. Les bases organiques du comportement et de la pensée. Propédeutique biologique des étudiants en psychologie et sciences humaines. Paul Chauchard. Presses Universitaires de France, Paris, 1957. 415 pp. Paper, F. 1400.

Précis de Biologie Animale. M. Aron and P. Grassé. Masson, Paris, 1957. 1421 pp. Cloth, 1 vol., F. 5900; paper, 2 vol., F. 5300.

Physics. Erich Hausmann and Edgar P. Slack. Van Nostrand, Princeton, N.J., ed. 4, 1957. 732 pp. $8.

A Monograph of the Immature Stages of African Timber Beetles. E. A. J. Duffy. British Museum (Natural History), London, 1957. 345 pp. £5.5s.

Heat Transfer and Fluid Mechanics Institute, 1957. Preprints of papers. Held at California Institute of Technology, Pasadena, 19–21 June. Stanford University Press, Stanford, Calif., 1957. 446 pp. $8.50.

Evolution of the Veterinary Art. A narrative account to 1850. J. F. Smithcors. Veterinary Medicine Publishing Co., Kansas City, Mo., 1957. 417 pp.

Seminar on the Decline of Materialism. Sponsored by the Laymen's Movement for a Christian world, 10–11 Nov. 1956, Wainwright House, Milton Point, Rye, N.Y. Laymen's Movement for a Christian World, 347 Madison Ave., New York 17, 1957. 108 pp.

Medical Department, United States Army, Surgery in World War II. Orthopedic Surgery in the Mediterranean Theater of Operations. John B. Coates, Jr., Ed.-in-Chief. Office of the Surgeon General, Department of the Army, Washington, D.C., 1957 (order from Supt. of Documents, GPO, Washington 25). 388 pp. $4.

Miscellaneous Publications

(Inquiries concerning these publications should be addressed, not to Science, *but to the publisher or agency sponsoring the publication.)*

West African Maize Research Unit, Second Annual Report. 1954. West African Research Unit, Moor Plantation, Ibadan, Nigeria, 1957. 51 pp. 5s.

Study Group on the Ecology of Intermediate Snail Hosts of Bilharziasis, Report. WHO Tech. Rept. Series No. 120. 38 pp. $0.30. *Study Group on Atherosclerosis and Ischaemic Heart Disease, Report.* WHO Tech. Rept. Series No. 117. 40 pp. $0.30. *The Work of WHO, 1956.* Official records of the World Health Organization, No. 75. Annual report of the Director-General to the World Health Assembly and to the United Nations. 233 pp. $2. World Health Organization, Geneva, 1957.

Home Study Blue Book. Homer Kempfer, Ed. National Home Study Council, Washington, ed. 19, 1957. 32 pp.

Energy Transfer in Polyacene Solid Solutions. A guide to the literature to the end of 1956. NRC No. 4320. F. R. Lipsett. Radio and Electrical Engineering Div., National Research Council of Canada, Ottawa, 1957. 64 pp. $0.50.

A Spectacular Waterfowl Migration through Central North America. Biological Notes No. 36. Frank C. Bellrose. State Natural History Survey Div., Urbana, Ill., 1957. 23 pp.

Individual Differences in Night-Vision Efficiency. Medical Research Council Special Report Series No. 294. M. H. Pirenne, F. H. C. Marriott and E. F. O'Doherty (with a section on *The Frequency of Seeing at Low Illumination* by H. K. Hartline and P. R. McDonald). Her Majesty's Stationery Office, London, 1957. 83 pp. 8s.

Stress; Experimental Psychology; Child Psychiatry. Psychiatric Research Reports, 7. Jacques S. Gottlieb, Chairman, Editorial Committee. American Psychiatric Assoc., Washington 6, 1957. 88 pp. $2.

The Nature and Transmission of the Genetic and Cultural Characteristics of Human Populations. Papers presented at the 1956 annual conference of the Milbank Memorial Fund. Milbank Memorial Fund, New York, 1957. 143 pp. $1.

Abstracts of Research Financed by the Petroleum Research Fund, 1954–1956. Administered by the American Chemical Society. Petroleum Research Fund, Washington, 1957 (order from Secretary, Petroleum Research Fund Advisory Board, 1155 16 St., NW, Washington 6). 34 pp.

Proceedings of the Symposium on Rauwolfia. Held under the auspices of the Pharmaceuticals and Drugs Committee of the Council of Scientific and Industrial Research on 17–19 October 1955 at the All-India Institute of Hygiene and Public Health, Calcutta. Reprinted from *The Indian Journal of Pharmacy,* vol. XVIII, Nos. 4–7, 1956. Popular Press, Bombay, 1957. 148 pp.

Symposium on Techniques in Polymer Science. With an introduction by C. H. Bamford. Lectures, Monograph and Reports, 1956, No. 5. Royal Institute of Chemistry, London, 1957. 79 pp. $1.15.