urement. The geochemistry of the principal radioactive elements and their decay products is presented meticulously but all too briefly in the introduction by L. H. Ahrens. There follow 12 chapters by the principal author: one a historical introduction, eight on the various methods of age determination, and one each on sediments, meteorites, and the geologic time scale. The author's efforts to include everything that he found in the literature, from the latest word to the wholly obsolete, produced a vast list of references (about 700 titles), but his unwillingness to sift and evaluate severely detracts from the general utility of the compendium. In Craig's immortal phrase, this is another *clerical* review.

Even more detracting is the steeplechase style, the profusion of factual mistakes, and the far too many grammatical and typographical errors. Some curious notions are presented as fact, and some very distinguished people get their names misspelled, not once, but throughout the book. Most of the dozen or so "original" line drawings have errors. There is a strange sketch of a mass spectrometer tube, which is shaped like a broken reed; a drawing of an ion scource that would never work; and a schema of an electron multiplier with all dynodes connected to the case and a supposed "ion beam" bouncing through. The complicated geologic diagrams tend to obfuscate rather than illustrate the principles in point.

Because of its comprehensive approach and in spite of its drawbacks, *Applied Geochronology* will be useful as a reference. Its stated aim, to "fill the gap" between the analyst and the field geologist, however, has not been realized.

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Momentum Books Series

The three latest additions to the Momentum Books Series fully measure up to the reputation established by the earlier monographs. Each is a slender little volume in paper back, concise, lucid, highly readable, and sufficiently exhaustive. It is the kind of book that the working scientist, the teacher, the inquisitive layman with an energetic mind, and even the professional physicist might slip into his pocket and read with profit and enjoyment on a train journey or during leisure hours. The series is published for the Commission on College Physics. The first general editor for the series was Edward U. Condon, who was ably succeeded by Walter C. Michels. Momentum Books are not exactly light reading, but they afford an easy way of becoming familiar with important and rapidly developing areas in physics.

Radioactivity and Its Measurement (Van Nostrand, Princeton, N.J., 1966. 168 pp., $1.75), by Wilfrid B. Mann and S. B. Garfinkel, is the tenth in the series, and the other two books discussed in this review are respectively 11th and 12th in the series. After a very interesting account of the discovery of radioactivity, Mann and Garfinkle discuss at some length the radioactive transformation series, the interactions of α-, β-, and γ-rays with matter, the energetics of nuclear change, and instrumentation for and standardization of radioactivity measurements. The survey is fairly complete, although the reader might have expected discussion of the biological effects of radioactivity and of the many fascinating applications in areas outside physics.

Plasmas—Laboratory and Cosmic (Van Nostrand, Princeton, N.J., 1966. 154 pp., $1.75), by Forrest I. Boley, deals with a very modern and rather glamorous field of physics. Gaseous plasma in itself is not modern, but the word and the methods of handling it theoretically and experimentally are modern. Laboratory plasma started with the first experiments on electric discharge through gases, and cosmic plasma is as old as the cosmos itself, if not older—is it not another word for the primeval chaos? The four chapters of the book deal with the general properties of a plasma, the plasma as a conducting fluid and wave-propagating medium, laboratory plasmas, and naturally occurring plasmas. The mathematics is a little more advanced than that used in other volumes of this series, but the reader is well rewarded for his effort. The sections on the search for thermonuclear power production and on the recent findings of satellites and space probes make fascinating reading.

A concise and extremely clear presentation of another glamor topic is Ivan Simon's **Infrared Radiation** (Van Nostrand, Princeton, N.J., 1966. 119 pp., $1.50). The topics cover the laws of radiation, sources for infrared radiation (IR), detectors, materials and optics, spectroscopy, and the major applications of IR techniques. One glaring omission is the Michelson interferometer as an IR instrument. The brief paragraph on interferometers deals solely with the Fabry-Perot etalon.

With the frontiers of science advancing rapidly and in many different directions, there is great danger of mutually uncomprehending cultures developing within the scientific community itself. Small and clear monographs like those of the Momentum Series render a great service to the professional scientist by making him familiar with important areas outside his own narrow specialty.

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Wiener Memorial Volume

On 18 March 1964, when Norbert Wiener died, the world lost a great mathematician and thinker. He has left us some 250 papers on matters mathematical, philosophical, cybernetical, and social, as well as ten books. The volume under review, **Selected Papers of Norbert Wiener** (Society for Industrial Mathematics and M.I.T. Press, Cambridge, Mass., 1964. 463 pp., $12.50) contains 12 of Wiener's papers, two sizable introductory articles on his work in mathematics and engineering, and a foreword by his colleagues N. Levinson, Y. W. Lee, and W. T. Martin, respectively. The papers included are:

(1) "Nets and the Dirichlet problem."
(2) "Differential space."
(3) "The Dirichlet problem."
(4) "Generalized harmonic analysis."
(5) "Tauberian theorems."
(6) "Uber eine Klasse Singularer Integralgleichungen."
(7) "The homogeneous chaos."
(8) "The Ergodic theorem."
(9) "Entropy and information."
(10) "Problems of sensory prosthesis."
(11) "Homeostasis in the individual and society."
(12) A factorization of positive hermitian matrices."

Of these papers the first six were published before 1932 and have been hard to get. They are, however, of much interest even now, Nos. 2, 4, 5 being in fact minor classics. As Levinson remarks in his introduction (which, incidentally, is a valuable mathematical exposition of the thread running through Wiener's early thought), these pioneer-

ing works were ahead of their times and have come to be understood and appreciated only rather recently. Since most of Wiener's later work is patterned after these early papers, they provide a key to much of his work. As such, the volume under review is very useful indeed.

Unfortunately, not much thought seems to have gone into the selection of some of the other papers. The note No. 9 is barely a page long, contains no references, and yet touches on the profound issues of entropy, information, Maxwell's demon, and light as a conveyor of information as well as the bearing of this last aspect on photosynthesis, enzyme action, and related matters. Obviously, what should have been included is Wiener's longer and more illuminating article on the same subject, which was published in *Scientia* (September 1952), a journal that is much harder to procure than the American Mathematical Society publication from which the note is reprinted. One also wonders why paper No. 7 is included but not its natural and important sequel "The discrete chaos" [*Amer. J. Math.* **65** (1943)], which Wiener wrote with A. Wintner. In view of H. Furstenberg's recent work, the inclusion of Wiener and Wintner's paper "Harmonic analysis and ergodic theory" [*Amer. J. Math.* **63** (1941)] would also have been useful. There is much interest today in the spectrum of the flow of Brownian motion, and on the explication of its "derivative," white noise. Wiener and E. J. Akutowicz published an interesting paper bearing on this question [*Rend. Cir. Math. di Palermo* **6**, 1 (1957)], which is not as well known as it should be. This paper, which is hard to procure, is not in the volume, but the volume does contain the rather dated paper No. 12, readily available in the *Indiana Journal*, the main result of which emerges easily from the general theory of isometric semigroups, as subsequent research has made clear [compare *Acta Math.* **107**, 275 (1962)].

The M.I.T. Press has maintained an unfortunate practice by reproducing Wiener's writings without correcting misprints. It has added its own bit of noise: at page 116, four pages from the memoir No. 4 have been accidentally omitted. Another unfortunate feature of the printing is the obliteration of all the original page numbers. These days, unlike the Middle Ages, artists tend to thrust their egos into their work, and it is common to witness unauthentic portraiture and photography. The picture of Wiener appearing in the volume is one of the strangest I have seen. Although the Massachusetts Institute of Technology and the Society for Industrial and Applied Mathematics are to be commended for paying this tribute to the memory of Wiener, the volume does seem somewhat inadequate by itself. I hope that in due course the attempt will be made to publish Wiener's collected works, in keeping with the tradition set in the case of his great contemporaries G. D. Birkoff and J. von Neumann.

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New Books

General

The Algebra of Abū Kāmil: Kitāb fī al-jābr wa'l-muqābala in a Commentary by Mordecai Finzi. Translated and edited by Martin Levey. Univ. of Wisconsin Press, Madison, 1966. 240 pp. Illus. $10.

Commercial Timbers of the World. F. H. Titmuss. Technical Press, London; Chemical Rubber Co., Cleveland, Ohio, ed. 3, 1965. 285 pp. Illus. First published in 1948 as *A Concise Encyclopedia of World Timbers.*

A Draught of Fishes. F. D. Ommanney. Crowell, New York, 1966. 262 pp. Illus. $6.95.

Early Electrodynamics: The First Law of Circulation. R. A. R. Tricker. Pergamon, New York, 1965. 227 pp. Illus. Paper, $2.95. The Commonwealth and International Library.

Molecules. J. C. Speakman. McGraw-Hill, New York, 1966. 168 pp. Illus. Paper, $1.95; cloth, $4.95.

The Phenomenon of Life: Toward a Philosophical Biology. Hans Jonas. Harper and Row, New York, 1966. 315 pp. $6.

Philosophy of Social Science. Richard S. Rudner. Prentice-Hall, Englewood Cliffs, N.J., 1966. 128 pp. Paper, $1.75.

Psychoanalysts in Training: Selection and Evaluation. Henriette R. Klein. College of Physicians and Surgeons, Columbia Univ., New York, 1966. 131 pp. $2.

Speech and Man. Charles T. Brown and Charles Van Riper. Prentice-Hall, Englewood Cliffs, N.J., 1966. 157 pp. Illus. Paper, $2.25.

Reprints

Bacterial Metabolism. Marjory Stephenson. M.I.T. Press, Cambridge, Mass., 1966. 412 pp. Illus. Paper, $2.95. M.I.T. Paperback Series; reprint (ed. 3, 1949).

Developmental Biology. Reed A. Flickinger. Brown, Dubuque, Iowa, 1966. 267 pp. Illus. $4.25. Brown Biology Readings Series. Sixteen papers reprinted from various sources—proceedings and symposia volumes and journals, 1933–1964.

The Foundations of Mathematics: A Study in the Philosophy of Science. Evert W. Beth. Harper and Row, New York, 1966. 769 pp. Illus. Paper, $4.45. Reprint, 1959 edition.

God and Golem, Inc. A comment on certain points where cybernetics impinges on religion. Norbert Wiener. M.I.T. Press, Cambridge, Mass., 1966. 109 pp. Paper, $1.45. Reprint, 1964 edition.

Human Learning. Edward L. Thorndike. M.I.T. Press, Cambridge, Mass., 1966. 214 pp. Paper, $1.95. Reprint, 1931 edition.

The Material Culture and Social Institutions of the Simpler Peoples. An essay in correlation. L. T. Hobhouse, G. C. Wheeler, and M. Ginsberg. Routledge and Kegan Paul, London; Humanities Press, New York, 1965. 313 pp. Illus. $7.50. Reprint, 1915 edition.

The Nature of Life: The Main Problems and Trends of Thought in Modern Biology. C. H. Waddington. Harper and Row, New York, 1966. 133 pp. Illus. Paper, $1.25. Reprint, 1962 edition.

The Pirotechnia of Vannoccio Biringuccio. M.I.T. Press, Cambridge, Mass., 1966. 507 pp. Illus. Paper, $3.45. Reprint of the translation from Italian by Cyril Stanley Smith and Martha Teach Gnudi, published by the American Institute of Mining and Metallurgical Engineers (1943).

The Pocket Guide to Birds: Eastern and Central North American. Allan D. Cruickshank: Washington Square Press, New York, 1966. 216 pp. Illus. Paper, 75¢. Reprint, 1953 edition (Dodd, Mead).

The Quintessence of Irving Langmuir. Albert Rosenfeld. Pergamon, New York, 1966. 369 pp. Paper, $2.95. The Commonwealth and International Library. Reprint, 1961 edition.

Space Travel and Exploration. Sir Harrie Massey. Taylor and Francis, London, 1966. 121 pp. Illus. $2.60. Six papers reprinted from *Contemporary Physics*, February 1964–June 1965.

Symmetry Groups in Nuclear and Particle Physics. A lecture-note and reprint volume. Freeman J. Dyson. Benjamin, New York, 1966. 334 pp. Illus. Paper, $4.95; cloth, $9. Mathematical Physics Monograph Series, edited by A. S. Wightman. Reprints of thirty-two papers published in various journals between 1937 and 1965.

The Theory of Electric and Magnetic Susceptibilities. J. H. Van Vleck. Oxford Univ. Press, New York, 1965. 396 pp. Illus. $3.40. The International Series of Monographs on Physics. Reprint, 1932 edition.

A Theory of Natural Philosophy. Roger Joseph Boscovich. M.I.T. Press, Cambridge, Mass., 1966. 251 pp. Illus. Paper, $2.45. Reprint, 1921 edition.