and actinium; fourth subgroup, titanium, zirconium, hafnium, and thorium; fifth subgroup, vanadium, niobium, tantalum, and (protoactinium); sixth subgroup, chromium, molybdenum, tungsten, and uranium; seventh subgroup, manganese, technetium, and rhenium; eighth subgroup, metals of the iron group and the platinum metals; first subgroup, copper, silver, and gold; second subgroup, zinc, cadmium, and mercury; the lanthanide series; radioactivity and isotopy; isotopy of the stable elements; artificial radioactivity and nuclear chemistry; the transuranic elements; distribution of the elements, geochemistry; colloids and surface chemistry; catalysis and reaction kinetics; reactions in nonaqueous solutions; reactions of solid substances.

Volume I (not reviewed here) consists of 18 chapters which cover the remaining chemical elements of the Periodic System as well as such subjects as valence and affinity, crystal structure and x-rays, constitution and properties, coordination theory, alloys, oxidation and reduction, salt formation and neutralization, the hydrogen spectrum, and the Periodic System.

Volume II in its translated form is a welcome addition to the literature in English on inorganic chemistry. The subject matter of the chapters is well chosen and presented. The descriptive sections are enhanced in value through numerous tables and figures. As a college textbook it should appeal to the student. As a ready reference work for the research chemist or engineer, it should serve a useful purpose. The translator has turned the German text into smooth, excellent English.

RALEIGH GILCHRIST
National Bureau of Standards

Exploration for Nuclear Raw Materials. Robert D. Nininger, Ed. Van Nostrand, Princeton, N.J., 1956. 293 pp. Illus. $7.50.

This is one of the Geneva Series on the Peaceful Uses of Atomic Energy under the editorship of James G. Beckerley.

Part I describes the geology of uranium and thorium from genesis to natural occurrence of these two elements, drawing upon five of the 96 papers from 17 countries presented at Geneva in August 1955. The five used are all by American authors with about half of the first part taken from P. F. Kerr's "Natural occurrence of uranium and thorium."

Part II discusses the techniques of prospecting for these two elements and draws on 25 of the 27 Geneva papers in this field presented from nine countries. After the expected techniques are described, botanical and hydrogeochemical prospecting are described. Then comes a discussion of exploratory drilling, finally a chapter on subsurface radiometric technique. The index seems to be complete.

Considering that this book is a composite, edited from 103 papers, one can understand that it is slow reading. Nininger has accomplished a wonderful job in putting it together with coherence and clarity. He has taken the papers, sorted them out into logical order, and made a readable book. It should have a place awaiting it.

E. WILLARD BERRY
Duke University

Travels and Traditions of Waterfowl. H. Albert Hochbaum. University of Minnesota Press, Minneapolis, 1955. xii + 301 pp. Illus. $5.

To a lifelong student of migration, like myself, this latest work from the pen of "Al" Hochbaum can be cited only with acclaim. It is replete with his personal experiences as director for 14 years of the Waterfowl Research Station at Delta, Manitoba. In addition, the author shows an almost voracious appetite for the literature bearing on this fascinating subject. The book is exceptionally well documented with quotations from many experts in the field, all well tied to the author's own observations and experiences. As is indicated by the title, it is heavily slanted toward the movements of waterfowl, although the migratory habits of the song and other nongame species are brought into the picture.

The work is divided into three parts. Part I deals with the "Travels of waterfowl" and, under chapter headings, discusses the patterns of local movement; learned response to the environment; the visual world; the function of memory; the aerial environment; and awareness of time and space. Part II is headed "Migrations of waterfowl" and has chapters on the cycle of migration; flight trails south; homeward migration; the classification of waterfowl travel; the dimensions of travel; the influence of bad weather; overseas migration; and awareness of direction. Part III, "Traditions of waterfowl" has chapters on biological traditions; building new traditions; tradition and racial isolation; and broken traditions. The book concludes with a well-organized bibliography; a short chapter on the nomenclature of birds in which the author presents a list (both vernacular and scientific names) of the birds mentioned in the text, preceded by comments of his own, chiefly on the spelling of certain names; acknowledgments to his many colleagues and collaborators; a list of specialists; and a subject index.

The entire work is in lay language with a delightful blend of the experiences of the naturalist and hunter with those of the scientist. To this end, the serious student of migration, the amateur naturalist, and the sportsman will find in it much food for reflective thought. Not all specialists will agree with some of Hochbaum's conclusions, but all will agree that, almost without exception, he presents lucid discussions of the known facts. To condense into 300 pages of readable prose so much of our present-day knowledge of bird migration is a major accomplishment and marks the *Travels and Traditions of Waterfowl* as a distinctive book.

It would do the author an injustice to refrain from reference to the many excellent illustrations—also from his pen. They show that he is as competent as an artist as he is as a naturalist. It also should be recorded that in October 1945 Hochbaum was awarded the coveted Brewster medal by the American Ornithologists' Union in recognition of the high caliber of his earlier work *The Canvasback on a Prairie Marsh,* which was also based upon his waterfowl studies at the Delta Research Station.

FREDERICK C. LINCOLN
U.S. Fish and Wildlife Service

Electricité. Y. Rocard. Masson, Paris, ed. 2, 1956. 613 pp. Illus. Cloth, F. 3500; paper, F. 3000.

In this work the author attempts to describe all electric and electromagnetic phenomena from those found in a first course in physics to those in a graduate-level course in electricity. On the average, the plane of discussion is near that of an intermediate course in electricity. It is assumed that the reader has some facility in mathematics and thus is familiar with the common vector operations, simple manipulations with complex variables, linear differential equations, and series expansions.

The book is characterized by considerable breadth in the range of topics treated. This range is indicated by a list of the section headings: electrostatics, magnetism, electrokinetics, electrodynamics, alternating currents, propagation of radiation, free electrons (including electron optics, photoelectricity, thermionic emission, and electron tubes), ionic conductors and semiconductors, and units.

A strong point of the work is that the author gives a clear and logical physical description of each phenomenon he introduces and thus keeps in focus the field of electricity as interrelated physical phenomena. The related mathematical treatment is given secondary emphasis. A great many illustrative examples are solved in order to show the applications

of general principles to specific situations. The book is not limited to classical electricity and magnetism but devotes some attention to relatively recent developments, such as semiconductors, wave guides, and transistors.

A serious drawback from the textbook viewpoint is that no problems for student solution are included. The most serious omission of subject matter is that of the thermoelectric phenomena. The reader is left with the impression that the treatment of electricity is broad rather than deep and that, in fact, the discussion of many topics is superficial. This is an expected consequence of the attempt at covering such a wide range of topics.

V. A. JOHNSON

Purdue University

The World of Learning, 1956. Europa Publications, London, ed. 7, 1956. 1064 pp. $18.50.

This widely useful reference volume gives information on educational, technological, and cultural institutions in more than 80 countries. For each country, information is given about learned societies and research institutions (names, addresses, publications, principal officers, number of members, and sometimes names of members); libraries, museums, and art galleries (names, addresses, size and nature of collections, publications, names of officers, and sometimes brief historical descriptions); colleges and universities (names, locations, chief officers, enrollment, and sometimes names of professors.

As is inevitable in a book of such scope and for which the information had to be collected from so many sources, the information varies from entry to entry and is not always complete. The new, seventh, edition is, however, more complete than its predecessors. It also includes an introductory section on international agencies—UNESCO, the International Council of Scientific Unions, and others. The book is an excellent reference source on the world of learning, particularly for countries other than one's own.—D. W.

Rayonnements de Particules Atomiques, Electrons et Photons. Andre Berthelot. Masson, Paris, 1956. 192 pp. Illus. F. 1800, paper.

A book reviewer usually gets some help when he starts to write his review from the author himself. It is customary to start a book with some kind of foreword written by the author himself or, at least, a preface written by somebody else. None of these is given here and, therefore, the reviewer has to start from scratch. However, on opening the volume, the first page indicates that it is obviously a textbook, a textbook designed primarily for a graduate course. Its title covers a rather wide range, and a possible English equivalent could be *Introduction to Scattering Phenomena.* In trying to find some similar book in the American literature, I looked in vain. It would correspond to something like an introduction to atomic collisions, or an introduction to nuclear physics, or a cross between the two.

In 12 compact chapters there is an amazing amount of material, some of it perhaps even too condensed, but nevertheless it offers us a very interesting introduction into the subject. The chapter headings are as follows and in this order: "Review of some generalities"; "Theory of elastic corpuscular collisions"; "Generalities on atoms in movement"; "Variations of the state of charge of light atoms in movement"; "Slowing down of light atomic particles"; "Ionization produced by atomic particles in movement"; "Range of light atomic particles"; "Coulomb interaction of light atomic particles with nuclei"; "Slowing down of fission fragments"; "The electrons: general considerations and theoretical results"; "The electrons: experimental aspects"; "The photons."

The treatment is essentially experimental. There are a certain number of theoretical expressions given but without any derivations. The experimental material is illustrated very amply with many curves and other illustrated material. This illustrated material is more often than not limited to the presentation of the results with relatively little indication about the method used for achieving the results.

More often than not the student who wishes to find out how the results have been achieved will have to find it from the literature which is reasonably well quoted in the references at the end of the chapters. The words "reasonably well" indicate that not all chapters have references; some chapters which are relatively long do not have references at all. The best documented chapters are those on the slowing down of light atomic particles and the two chapters on the electrons. These three chapters take up two-thirds of all the references. Five chapters have distributed among them another third of the references, whereas four chapters do not have any references at all. The choice of the references is somewhat uneven. In areas with which the author is quite familiar, they are quite up to date and well chosen. In other areas with which the author is probably less familiar, they are sometimes surprisingly old references, and no attempt is made to make an up-to-date review.

Nevertheless, the book is a very interesting attempt at an introduction into collision physics, and I am sure it will be useful not only to the French graduate student but also to the American student who is willing to work on his French and get, in spite of the language barrier, a quick introduction into this field. In fact, it may be worth while to recommend this book as a useful source material for qualifying French language examinations for Ph.D. students. The format of the book is excellent; typesetting and the presentation of the figures are very well done.

L. MARTON

National Bureau of Standards

Books Reviewed in The Scientific Monthly, January

The Exploration of Mars, W. Ley and W. von Braun (Viking). Reviewed by T. S. Gardner.

Earth, Sky and Sea, A. Piccard (Oxford Univ. Press). Reviewed by I. E. Wallen.

Diseases of the Endocrine Glands, L. J. Soffer (Lea and Febiger). Reviewed by J. T. Velardo.

Stratigraphical Palaeontology, E. Neaverson (Clarendon Press). Reviewed by E. W. Berry.

The Human Heredity Handbook, A. Scheingeld (Lippincott). Reviewed by H. H. Smith.

Surgical Treatment of Penetrating Wounds of the Heart, Pericardium and Mediastinum, N. I. Grigor'ev (State Publishing House of Medical Literature, Moscow). Reviewed by S. A. Corson.

The Psychology of Occupations, A. Roe (Wiley; Chapman and Hall). Reviewed by L. E. Tyler.

A Scientific Sampler, R. Stevens, H. F. Hamacher, A. A. Smith, Eds. (Van Nostrand).

Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability, vol. V, J. Neyman, Ed. (University of California Press). Reviewed by K. A. Brownlee.

Varieties of Human Value, C. Morris (University of Chicago Press). Reviewed by W. F. Dukes.

How to Make and Use a Telescope, H. P. Wilkins and P. Moore (Norton). Reviewed by F. K. Edmondson.

New Books

Indian Students on an American Campus. Richard D. Lambert and Marvin Bressler. University of Minnesota Press, Minneapolis, 1956. 122 pp. $3.

Beiträge zur Geschichte der Erkenntnis des Erdmagnetismus. Heinz Balmer. Sauerlander, Aarau, Switzerland, 1956. 892 pp. F. 31.10.

Separation and Purification. vol. III, pt. 1 of *Technique of Organic Chemistry.* Arnold Weissberger, Ed. Interscience, New York, ed. 2, 1956. 873 pp. $17.50.

The Land Called Me. An autobiography. E. John Russell. Allen & Unwin, London, 1956. 286 pp. $5.75.