had been checked daily by the Naval Observatory signal, and the air was calm and the sea smooth. At 4 P.M. with sun in the southwest the remarkable mirage appeared in the direction of southwestern Iceland. The Snaefells Jökull (4,715 feet) and other landmarks well known to the captain and the mate were seen as though at a distance of twenty-five or thirty nautical miles, though the position of the schooner showed that these features were actually at a distance of 335 to 350 statute miles. A checking observation of the sun made at 6 P.M. gave the latitude at that time as 63° 42′ N and longitude 33° 32′ W. It was warm and rainy; the air had throughout been calm and the sea smooth. Captain Bartlett writes: "If I hadn't been sure of my position and had been bound for Rejkjavik, I would have expected to arrive within a few hours. The contours of the land and the snow-covered summit of the Snaefells Jökull showed up almost unbelievably near."

It should be pointed out that superior or polar mirage is always a phenomenon concerned with great distances and, further, is visible for any given features only within a comparatively limited area. This is because the rays from the object must be directed upward into the warmer air layers of an *inversion*, and these inversions are generally at elevations in excess of a thousand meters where the differences in temperature are represented by a few degrees only. The refraction of the rays necessary to bring them down to the surface of the sea where they would be visible thus represents very flat curvatures and correspondingly great distances. The writer has drawn attention to examples where distances of 100 to 300 miles are involved. The example furnished by Captain Bartlett is somewhat in excess of the examples already described.[1]

WILLIAM H. HOBBS

INDEX TO SCHOOLCRAFT'S "INDIAN TRIBES"

THE monumental six-volume work by Henry R. Schoolcraft entitled "Historical and Statistical Information Respecting the History, Condition and Prospects of the Indian Tribes of the United States." which was published in 1851–1857, represents the first systematic attempt on the part of the Federal Government to study the ethnology and archeology of the North American Indians. Because of this fact and because of the early date at which the information was collected, it will always remain a most valuable source of information on American ethnology.

While this report has proved an important reference work on American Indians for nearly ninety years, its usefulness has been greatly hampered because of the fact that heretofore no index has been available. Mrs. F. S. Nichols, of the editor's office of the Bureau of American Ethnology, has now completed an index consisting of about 22,000 entries on cards, which is available in its present form to ethnologists, librarians and other workers who may wish to make use of it.

Those who can not consult it in person may write to the Editor's Office, Bureau of American Ethnology, Smithsonian Institution, and information requested will gladly be furnished by mail.

M. W. STIRLING

BUREAU OF AMERICAN ETHNOLOGY

AVAILABLE LECTURERS IN GEOLOGY AND GEOGRAPHY

SEVERAL months ago a note in SCIENCE announced a tentative plan to furnish university departments with information regarding distinguished foreign geologists and geographers who may be available for lectures. During the summer and early fall, the names of five scholars who wish to make lecture tours were registered with the Division of Geology and Geography. Some of these men have already arranged to give lectures at several universities, and will be glad to make other appointments. Departments that are interested may secure detailed information by writing to the office of the division.

In this connection, attention is called to the Institute of International Education, which acts as a clearing house of information on available lecturers in all fields of learning. This institute publishes a "News Bulletin," issued monthly from October to May, giving specific information about individual lecturers. The bulletin is published at 2 West 45th St., New York.

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SCIENTIFIC BOOKS

DEVELOPMENTS IN PHYSICS

Atomes, radioactivité, transmutations. By MAURICE DE BROGLIE. 269 pp. Bibliothèque de Philosophie scientifique, Flammarion, Paris, 1939. Paper covers, 22 francs.

WITH the distinctive clarity so characteristic of French authors, M. de Broglie gives an account of the developments in physics during the last thirty years culminating in a discussion of the modern concepts of the atomic nuclei and the transmutation of one element into another. Apart from the more profound philosophical aspects of the recent work in this field, and

[1] W. H. Hobbs, *Ann. Assoc. Amer. Geog.*, 27: 229–240, December, 1937.

its fundamental importance to physics, the new science of nuclear chemistry has already demonstrated its usefulness in its applications to medicine and physiology. The promises it holds for the future are nearly unlimited. It is particularly valuable to have at hand a volume which is so up to date and readable as the present one. The book does not require a specialist to understand it, but it will not appeal to the large class of readers of "popular" scientific works who desire more to be mystified than to be informed. Physics is essentially a simple discipline. It becomes abstruse only when it strives for the necessary preciseness by employing the language of mathematics. The text of M. de Broglie approaches closely to this ideal by the written word alone. It is a pity that this quality is so difficult to translate into English, or that we do not have more authors of such lucid style. All of us might well profit, if there were more books of this kind.

Measurement of Radiant Energy. Edited by W. E. FORSYTHE. xiv + 452 pp. Prepared under the direction of a Committee on Methods of Measurement of Radiation of the Division of Physical Sciences of the National Research Council. McGraw-Hill Book Company, Inc., New York and London, 1937. $5.00.

THIS volume consists of a series of contributions by twenty-one authors, each an authority in his field. It describes in detail the methods of measuring radiation in the ultra-violet, visible and infra-red regions. There are four phases of the problem presented: the fundamental concepts of radiation, the sources of radiation, the determination of frequency and the determination of intensity. Each phase is competently presented, and all the necessary precautions are discussed. There are numerous references to the original papers listed at the end of each chapter. The completeness and quality of the material presented are noteworthy, and the detail is carried so far as to include, for example, a chapter on galvanometers and their characteristics in relation to the measurements. The book is an extremely useful addition to the literature of physics, and will become, no doubt, indispensable to a large number of workers.

Atomic Structure. By LEONARD B. LOEB. xiv + 446 pp. John Wiley and Sons, Inc., New York, 1938. $4.50.

To provide a text for a course of lectures to third-year students at the University of California, Professor Loeb has written this volume. He has gathered together from many sources much useful and important material which is generally available only in the more advanced and more specialized treatises in the field of atomic structure. The subject is developed in more or less the chronological order. The first part of the book consists of four chapters dealing with the discovery and elementary properties of x-rays and electrons leading up to a discussion of the scattering experiments of Rutherford which are the basis of the nuclear atomic model. The fifth chapter deviates from the historical order and gives an account of the discovery of the positive electron and the neutron and presents some of the present-day ideas of the structure of the nucleus. The chapter is somewhat of a digression, but it in no way interferes with the logical arrangement. The second part of the book consists of a presentation of the classical quantum theory of Bohr which is outlined in sufficient detail to enable the breakdown of the theory, as shown by the necessity for half integral quantum numbers, to be indicated. The third portion consists of descriptions of the various kinds of impacts among atoms, electrons and photons, and is summarized by a chapter in which all the processes are written in the form of chemical reaction equations.

Professor Loeb states in the preface that "it is his firm conviction that it is impossible to introduce the student properly to the subject directly from the rather abstract and modern wave mechanical view-point. In order that a student really understand and be able to use the modern developments, he must grow into these, much in the same way as the physicists who developed the field have done." Younger physicists who do not regard wave mechanics as so "abstract and modern" will perhaps read this statement with suspicion, and wonder whether Professor Loeb is prejudiced in his text against the newer ideas. Although a criticism of this nature may be partially justified, the reviewer feels that Professor Loeb does not regard wave mechanics as any more abstract than the concept of electrons moving in Bohr orbits, but simply as being mathematically more complex. As a result the text is well balanced and fitted to the abilities of the students for whom the book is intended. It may be remarked that, in common with most other authors, Professor Loeb omits all reference to the fact that J. W. Nicholson derived the stationary orbits of hydrogen a year before Bohr's publications on the subject.

The volume closes with a short chapter on the kinetic theory of gases and two excellent chapters on the electron theory of metals, including a discussion of Fermi-Dirac statistics. This extremely important field is generally not presented to students until they are more advanced. Its inclusion in this work seems an excellent idea.

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