These must have been planted in clearings and probably had not been abandoned for more than a century, or they would have been smothered by the forest. An earlier European settlement on Cocos Island seems improbable, but many islands off Panama were inhabited. Oviedo's account of the Isthmus, written in the time of Balboa and published in 1526, leaves no doubt that coconuts were abundant on the Pacific coast.

O. F. COOK

U. S. DEPARTMENT OF AGRICULTURE

MOMENTUM AND ENERGY

IN a note in SCIENCE (January 12, 1940, p. 43) Dr. Heyl discusses the seventeenth century dispute over momentum and energy, and compares it with the present dual points of view regarding what might be called wave-electricity and particle-electricity.

The difference between the momentum and energy effects of force is no more than a difference in point of view. The energy aspect is represented by the equation

$$2\int_1^2 F\,v\,dt = m(v_2^2 - v_1^2)$$

where F, in the direction of v, is the force on the mass m. For simplicity assume rectilinear motion.

If this statement represents a law it should be independent of the velocity of the observer. Let him move at constant velocity c relative to the laboratory in which the law is being checked experimentally. The moving observer will therefore use the equation

$$2\int_1^2 F(v+c)\,dt = m\{(v_2+c)^2 - (v_1+c)^2\}$$

which reduces to the momentum law

$$\int_1^2 F\,dt = m(v_2 - v_1)$$

Perhaps the electromagnetic paradox can be resolved similarly. In our present state of knowledge, however, radiation seems to result from the propagation of a partial differential equation through space.

R. F. DEIMEL

STEVENS INSTITUTE OF TECHNOLOGY

THE USEFULNESS OF BIOLOGICAL ABSTRACTS

THE receipt of the index to Vol. 11 (1937) of *Biological Abstracts* impels me to relate an experience which demonstrated, to my own satisfaction at least, the usefulness of this abstracting journal. Having to revise for Editor Allen the chapter on "Ovulation, Fertilization and the Transport and Viability of Eggs and Spermatozoa" for the 1939 edition of "Sex and Internal Secretions," and having exhausted the Quarterly Cumulative Index as well as various German Berichte, I turned to the indexes, so far as published, of *Biological Abstracts,* using the appropriate key words such as egg, sperm, ovulation, fertilization, oviduct, etc. The result was gratifying and a little surprising, for over 100 references new to me, including several of considerable importance, were unearthed in this simple way.

The usefulness of *Biological Abstracts* lies in the superb indexing job, the technique of which was worked out by the founder, Dr. Schramm. The indexes are unique in that the aim has been to include not merely main titles but also subordinate, though no less important, subject-matter that would otherwise be hopelessly buried. Now that Editor Flynn is determined to bring the indexes up to date, *Biological Abstracts* should come into its own as a most useful instrument for those who are interested in the broader biological aspects and the "Grenzgebiete" of their subjects.

CARL G. HARTMAN

BALTIMORE, MD.

SCIENTIFIC BOOKS

TERRESTRIAL MAGNETISM AND ELECTRICITY

Terrestrial Magnetism and Electricity. Edited by J. A. FLEMING. Being Volume VIII of the Series "Physics of the Earth" Prepared under the Auspices of Various Committees of the National Research Council. New York and London: McGraw-Hill Book Company, Inc., xii + 794 pp. $8.00.

THIS very valuable volume contains a series of chapters written by various authorities on the fields concerned; and perhaps the best that can be done in the way of a brief summary is to commence by listing the articles under these various chapters, as follows:

The various chapters are written as far as possible in language which is not too technical, but there is of necessity a wide range in the degree of difficulty involved for the reader. This range extends, however, from an upper limit, which is representative of no more complexity than should be capable of being handled by the average laboratory physicist, to a lower limit of simplicity, in which there is much which should be understandable to the educated layman.

It is naturally not practical to give anything like a detailed review of the individual sections. There is of necessity a fair amount of overlapping, but such a situation presents advantages as well as disadvantages, and the former probably well outweigh the latter.

The last chapter, entitled "Bibliological Notes and References," contains a valuable summary of the different organizations and journals concerned with publications in the fields covered by the book. It also embodies in conveniently classified form an extensive series of references to the literature, based upon the citations in the main text.

The authors are to be congratulated upon bringing together into so convenient and readable a form so many diverse topics bearing directly and indirectly upon the science of terrestrial magnetism and electricity.

W. F. G. SWANN
BARTOL RESEARCH FOUNDATION

MODERN SCIENCE

Modern Science. By HYMAN LEVY. x + 736 pages. New York: Alfred A. Knopf. 1939. $5.00.

THE author, who is professor of mathematics at the Imperial College of Science and Technology, South Kensington, endeavors to present in this volume a "landscape picture of modern science for the ordinary intelligent person." Rather than present a picture which startles and mystifies the reader, as do many books on science for the layman, he emphasizes the simplification of the problems of nature which has been achieved and which constitutes in reality the true aim of science. He includes, however, enough of the curiosities to arouse and hold the interest of the reader.

The volume is a good illustration of the tendency which appears to be greatly increasing to-day, particularly in England, to view science as a whole not as a body of doctrine or a catalogue of empirical results, but as essentially a social phenomenon. The scientific workers themselves and their reasons for undertaking problems are regarded as an important part of the phenomenon, as well as the social implications of the discoveries made. Thus the author attempts to show that during a period of general social unrest there is a corresponding unrest, not only among the scientific workers, but also in the hypotheses which they are contemplating at that time. The scientific results achieved are more dependent on the period than on the men who achieved them. For example, Professor Levy believes that if Newton, by some accident, had not been born, others would have made all Newton's discoveries at practically the same time as they were made. There is intended no disparagement of Newton's genius here, the author's thesis is concerned only with the problems with which Newton was occupied.

Professor Levy treats in some detail the modern practice and the theory behind our present methods of illumination, and attempts in this manner to demonstrate the important consequences, from the point of view of society as a whole, of such abstract and, at first sight, purely theoretical subjects as relativity and the quantum theory.

The style of the book makes for smooth and easy reading, although its length may discourage some. The diagrams are numerous and extremely well done. They sometimes accomplish more than pages of text could do. The volume is well worth the study of many, and in particular of scientific workers who are generally too prone to disregard entirely the implications to society as a whole of the things they are doing and the things they are leaving undone.

C. G. MONTGOMERY
THE BARTOL RESEARCH FOUNDATION OF THE FRANKLIN INSTITUTE, SWARTHMORE, PA.

PREHISTORIC LIFE

Prehistoric Life. By PERCY E. RAYMOND. ix + 324 pp. Illustrated. Cambridge, Mass.: Harvard University Press. 1939. $5.00.

IN this charmingly written, thought-provoking book, Dr. Raymond traces the history of life from the time of its first appearance on the earth to the present.

After clarifying our small stock of knowledge of pre-Cambrian life, he discusses the evolution and the manner of life of graptolites, trilobites, aquatic arachnids, corals and echinoderms of the early Paleozoic. Next he considers the origin of the vertebrate stem, outlining clearly the Amphioxus, annelid, arthropod and anaspid theories; he considers the last the most probable. Starting with the lobe-finned ganoids, he discusses the geologic conditions giving rise to the first tetrapods, the amphibians, and through these to the earliest reptiles. To the reptiles he gives five very interestingly suggestive chapters, discussing their rise, expansion and decline, noting the geographic and other environmental influences at work to produce