abstract. The following papers were read by title: 'The Structural Peculiarities of the Eskimo of Smith Sound,' by Dr. G. S. Huntington; 'On the Names Glooscap and Illa Tichi Uira Cocha,' by Mr. Stansbury Hagar; and 'Belief in Will-Power Among the Pawnees,' by Miss Alice C. Fletcher. Dr. Boas represented the anthropologists in the discussion before the Society of Naturalists, and the Section took part in the other exercises and entertainments provided for the affiliated societies.

A. L. KROEBER.

SCIENTIFIC BOOKS.

Revised Text-Book of Geology. By JAMES D. DANA. Edited by WM. NORTH RICE. American Book Company.

It is now more than sixty years since the late Professor Dana produced, in 1837, his first important work, a System of Mineralogy. During subsequent years, down almost to the day of his death, in 1895, he was engaged at frequent intervals in writing or revising the several important text-books of geology and mineralogy that have done so much during the last half century to arouse among English-speaking students an intelligent interest in those subjects.

The first edition of 'A Manual of Geology' was published in 1862, the more elementary work, 'The Text-Book of Geology,' following in 1864. So great has been the popularity of the briefer work that extensive revisions were made by the author in 1874 and 1883, while the final revision, begun by him just before his death, has been admirably carried to completion, in the spirit of his old master, by Professor Wm. North Rice, of Wesleyan University.

Professor Rice started out with the plan of retaining the distinctive characteristics of the book, bringing it down to the present time as regards its facts, but still expressing Professor Dana's well-known opinions. Although the general plan of arrangement has been kept unaltered in the main, some radical changes have been made in the interpretation of geological phenomena. Especially is this shown in the treatment of the subject of metamorphism, where the editor takes a very different view from that held by Professor Dana, and one in harmony with modern thought, when he states that the crystalline schists are 'undoubtedly derived in some cases from granites and other plutonic rocks, a schistose structure being developed by pressure and shearing.'

Another change less radical in its character, but affecting the whole work, is the fuller recognition given to evolution as a factor in geological history. The editor states that from this standpoint he has entirely rewritten the closing chapter, in which the general bearing of paleontology upon evolution is discussed.

The zoological and botanical classifications are much modernized, although the anglicized terminology used by Professor Dana in earlier editions is for the most part followed. Professor Dana's plan of terminating names of rocks in *yte* in distinction from the names of minerals which terminate in *ite* is abandoned on the ground that the innovation in nomenclature has not been adopted by other writers.

In general, however, Professor Rice has faithfully reproduced the well-known opinions of Professor Dana in his revision, but has introduced enough in the way of modern views to make the book a most acceptable addition to our list of elementary text-books of geology. It is not an easy task to revise the work of another, and it often involves much more labor than writing the entire book anew. Professor Rice is to be congratulated on the success of his labor of love in revising 'The Text-Book of Geology,' which, from the earlier relations of teacher and student, he states was entered upon with something like a feeling of filial obligation.

W. B. CLARK.

JOHNS HOPKINS UNIVERSITY.

The Groundwork of Science. A Study of Epistemology. By ST. GEORGE MIVART, M.D., PH.D., F. R. S. New York, G. P. Putnam's Sons; London, Bliss, Sands & Co. 1898. Pp. xviii + 328.

This book forms the second volume of 'The Science Series,' which is now appearing under the editorial supervision of Professor Cattell and Mr. F. E. Beddard. "Each volume of this series," the prospectus sets forth, "will

treat some department of science with reference to the most recent advances, and will be contributed by an author of acknowledged authority." The book before us represents epistemology, or the science of knowledge, in this series. It does not, as one might perhaps expect from the title, treat primarily of the methods of science, or of the fundamental conceptions which science employs, but deals with the essential nature of knowledge, or 'science' in the broader sense, as developed by the human mind, in its relation to a world of real objects.

The table of contents shows the following list of chapters: (I.) Introductory; (II.) An Enumeration of the Sciences; (III.) The Objects of Science; (IV.) The Methods of Science; (V.) The Physical Antecedents of Science; (VI.) The Psychical Antecedents of Science; (VII.) Language and Science; (VIII.) Intellectual Antecedents of Science; (IX.) Causes of Scientific Knowledge; (X.) The Nature of the Groundwork of Science. The author regards as futile all attempts to furnish either a systematic or a historical classification of the sciences. He, therefore, contents himself with an enumeration of them, indicating briefly at the same time some of their more general logical relations.

It will be of advantage to state at once the principal results of the book, and thus to show the main theses which the author defends against what he regards as certain more or less widely prevalent tendencies of the present age. These are as follows: (1) The continuous existence of the Self or Ego; (2) the existence of a real world of extended things in themselves; (3) the necessity of assuming as intuitively known certain propositions which cannot be proved; (4) the possibility of absolute scientific certainty about some things; (5) the existence of breaches of continuity at certain points in the world-process, as, for example, between the organic and the inorganic, between insentient and sentient organisms, and especially between merely sensuous and emotional states of consciousness and the intellectual or rational life; (6) the inadequacy of a purely mechanical or naturalistic theory of evolution, and especially the impossibility of explaining in this way the various forms of life, and the intellectual and moral nature of man.

We may now look a little more closely at one or two of these propositions. The long chapter, 'The Objects of Science' (pp. 34–88), is occupied almost wholly with a refutation of idealism. The author feels "that if idealism were true, the authority and certainty of other self-evident truths would be gravely compromised, especially if a truth so self-evident as the existence of our own body (as we and most men understand that body to exist) were but an illusion and self-deception of the mind" (p. viii). Unfortunately, Mr. Mivart is here fighting a product of his own imagination. He regards idealism as the doctrine which denies the existence of an external world, and which can be summed up in Berkeley's somewhat unfortunate phrase, 'the *esse* of things is their *percipi*.' His own arguments consist mainly in an oft-repeated declaration that "we have an intuitive knowledge of the external world as extended. "This, of course, is as obvious an example of *ignoratio elenchi* as were the appeals of the Scottish philosophers to 'Common Sense' in behalf of what neither Berkeley nor anyone else has ever dreamed of denying. Moreover, the assertion in this chapter that there is a world of things in themselves, existing apart, and not dependent upon any mind, is sufficiently refuted by the passage with which the book closes. There we are told that "the action of an all-pervading but unimaginable intelligence alone affords us any satisfactory conception of the universe as a whole, or of any single portion of the cosmos which may be selected for exclusive study" (p. 321). In spite of the author's protestations, then, we shall have to regard him as an idealist, in exactly the same sense as we regard Aristotle and Hegel as idealists.

Numerous discussions are devoted to the question of intuitively certain or self-evident truths. The author's position seems to be that all inference rests upon the existence of certain indemonstrable propositions, which have to be accepted as intuitively self-evident (pp. vi, 103 ff, 240 f., 309). These truths are of an entirely different order from the facts known to us by perception or by inference. Each is known as certain and necessary in itself, and this cer-

tainty and necessity are not derived from its relation to anything else. Moreover, these truths are directly apprehended by our power of intellectual intuition (p. 104). It is those fundamental certainties which constitute 'the groundwork of science,' and the author enumerates the list several times with what appears to be slight variations (pp. 106, 241 ff., 310 ff). In this list are found: (1) the possibility of absolute certainty; (2) the existence of an external world of real objects; (3) our own substantial and continuous personal existence; (4) the possibility of drawing conclusions from premises; (5) the existence of self-evident truths; (6) the law of contradiction; (7) self-evident axioms; (8) the principle of causality; (9) the principle of uniformity; (10) the fact that some things are contingent and some necessary.

It is well-known that Aristotle maintained that all knowledge presupposes the existence of certain self-evident propositions which neither require nor are capable of proof. The earlier Scottish philosophers, also, adopting the same position, made several attempts to furnish lists of self-evident truths. But this doctrine no more belongs to the philosophical thought of to-day than does 'phlogiston' to modern chemistry, or 'vital force' to biology. In the first place, experience has shown that each thinker who defends intuitive truths is likely to have certain propositions of his own which seem to him specially sacred, and which he is anxious to place beyond the pale of examination and criticism. Secondly, what we believe to be a truer conception of the nature of mind, has led us to see that all knowledge is organic —that all of the facts of our experience are interrelated and mutually dependent. There are no truths, then, which are isolated and self-sufficient; every fact is known to be true and necessary only through its connection with other facts. The so-called self-evident propositions must be proved and justified in exactly the same way in which scientific hypothesis are shown to be true. Thus, for example, when I say that it is self-evident that an external world exists, or that nature is uniform, I mean that these propositions are obviously true because in no other way can I account for the facts of my experience. The proof in these cases may be easier and more convincing than the demonstration of the natural-selection hypothesis, but the former are no more *self*-evident than the latter.

If space permitted, I should like to examine in some detail the doctrine of new beginnings, 'breaches of continuity,' at certain points in the world process. Here, again, it seems to me that the conclusions reached by Mr. Mivart are not in accord with the results of modern scientific and philosophical thought. The modern defender of teleology does not, it seems to me, rest his case upon breaches of continuity in natural law, or upon new beginnings at this point or that. He rather insists that no part of the world—not even the inorganic—can be completely understood without regarding it as the manifestation of an energy in some way analogous, at least, to his own intelligence. If Mr. Mivart had made use of the idealistic principle which he so clearly expresses at the end of his book, and to which I have already referred, he would have found a surer defence against materialism, and would have avoided what must seem to many scientists an attempt to introduce final causes into the field of natural science.

In conclusion, I can not refrain from saying that it seems to me unfortunate that this book should represent Epistemology in a series which undertakes to deal with the most recent advances in the various sciences. The volume doubtless contains a good deal that is interesting and suggestive; but, at the same time, it is at once evident that the writer's special work has been in a different field from that of Epistemology. It seems to me that it is sufficiently clear, from what has been already said, that the author has not followed at all the epistemological discussions of the last twenty years. I add two or three illustrations of very serious confusions with regard to the facts and problems of modern philosophical systems which are not uncommon in the book. "The whole philosophy of Germany and Holland," we are informed, "from Spinoza to Hartmann, has been the result of the mental seed first sown in men's minds by Berkeley, who explicitly produced what was implicitly contained in Locke" (pp.

40–41). This is truly wonderful in view of the fact that Spinoza was dead eight years before Berkeley was born! But even with regard to the later philosophers, the statement is thoroughly misleading. Again, the author might have learned from any standard history of philosophy, without even looking inside Fichte's works, that the statement that 'Solipsism was first developed and upheld by Fichte, though he ultimately abandoned it' (p. 83), is wholly unwarranted. Finally, Mr. Mivart in denouncing the futility of the question: 'How is experience possible?' supposes that Kant and others who have formulated the epistemological problem in this form raised an absurd question as to whether knowledge does or does not exist, and apparently does not at all understand that they were inquiring what conditions its actual existence implies (pp. 56, 275).

Why should one write on a philosophical subject without special knowledge, any more than on biology or physics?

J. E. Creighton.

Cornell University.

The Freezing-point, Boiling-point and Conductivity Methods. By Harry C. Jones, Instructor in Physical Chemistry in Johns Hopkins University. Easton, Pa., Chemical Publishing Co. Pp. 64. Price, 75 cents.

In this book, which is intended as a laboratory guide, the author has not only included the mechanical processes, but has discussed briefly the principles upon which these methods are based. The subject is treated under three heads. In the first part the historical development and applications of the freezing-point method are discussed, as is the boiling-point method in a similar manner in the second part. In the third part the method used to determine the conductivity of solutions and the applications of this method are described. An apparatus for use in the boiling-point method is described by the author which is much simpler than the Beckmann apparatus and very rapid and accurate in its results. The methods described in this book can be carried out in a short time and should be tried by every student of chemistry who is interested in the methods which have done so much to advance our ideas of the nature of solutions. J. E. G.

Outlines of Industrial Chemistry. A Text-book for Students. By Frank Thorp, Ph.D., Instructor in Industrial Chemistry in the Massachusetts Institute of Technology. New York, The Macmillan Co. 1898. Pp. xx+543.

This book aims to furnish an elementary course in Industrial Chemistry suitable for students in the schools of technology. The subjects treated are broadly classified under the heads, 'Inorganic Industries' and 'Organic Industries,' about one-half of the book being devoted to each. Metallurgy has been entirely omitted. Otherwise the topics selected for discussion are essentially the same as in other similar works. The descriptions of processes, while necessarily concise, are clear and interesting. The author has evidently made a careful study of recent methods of manufacture as well as of older, standard processes. The frequent reference to American practice is an important feature which distinguishes the book from other works on chemical technology. A select bibliography follows each subject, and will be found very useful to those wishing to study any topic in greater detail.

W. A. Noyes.

Aperçus de taxinomie générale. Par J. P. Durand (de Gros). Paris, Felix Alcan, Editeur. 1899.

The title of this book leaves one somewhat in the dark as to the nature of its contents, but a brief perusal shows that its mission is not so much to tell us how to classify as how not to classify. Not that the author does not believe in classification; on the contrary, he considers that everything should be classified and may be classified, provided we adopt the proper methods. What these methods are we are not told; for, after exhorting us to set about fashioning the general science of classification without delay, M. Durand hastens to add that he himself proposes to take no hand in so important an undertaking, preferring rather to stand by and criticise the efforts of others. Towards all existing schemes the attitude of the author is very much like that of the ship-wrecked Irishman who, as he crawled up the beach of the desert island, waved a piece of driftwood about his head, exclaiming: "Whatever form of gov-