object of the Association as 'the promotion of the interests of philosophy in all its branches, and more particularly the encouragement of original work among its members.' The relation of the Association to the previously established Western Philosophical Association was referred to the executive committee to report at the next meeting. The next meeting will be held in Convocation Week in Washington in affiliation with the other societies, part of the time, probably, in joint session with the Psychological Association. The officers for the ensuing year are president, Professor A. T. Ormond (Princeton), vice-president, Professor, A. Meiklejohn (Brown), secretary-treasurer, Professor H. N. Gardiner (Smith), and the other members of the executive committee, Professors A. C. Armstrong (Wesleyan), J. G. Hibben (Princeton), W. Caldwell (Northwestern) and D. Irons (Bryn Mawr). The following is the list of papers read at the recent meeting:

Monday, March 31.

10 A.M.

'Poetry and Philosophy': Dr. Ralph Barton Perry.

'Recent Criticism of the Philosophy of T. H. Green': Professor William Caldwell.

'The Æsthetic Element in Human Nature': Professor E. Hershey Sneath.

2 P.M.

'Address of Welcome': President Nicholas Murray Butler.

'The Functional Theory of the Distinction between the Psychical and Physical': Professor H. Heath Bawden.

'The Atomic Self': Professor George Stuart Fullerton.

8 P.M.

Address of the President. Subject, 'The Purposes of a Philosophical Association': Professor James Edwin Creighton.

Discussion on the Address: President Francis L. Patton.

Tuesday, April 1.

10 A.M.

'The Concept of the Negative': Dr. W. H. Sheldon.

'Being, Not-Being and Becoming: a Study in the Logic of Early Greek Philosophy': Professor Alfred H. Lloyd.

'Aristotle's Theory of Reason': Professor William A. Hammond.

'On Final Causes': Dr. Edgar A. Singer, Jr.

'On the Study of Individuality': Professor J. A. Leighton.

2 P.M.

'The Consciousness of Obligation': Professor E. B. McGilvary.

'Kant and Teleological Ethics': Professor Frank Thilly.

'Epistemology and Ethical Method': Dr. Albert Lefevre.

'The Epistemological Argument for Theism': Professor Edward H. Griffin.

'The Philosophy of Religion: Its Aim and Scope': Dr. F. C. French. (Read by title.)

A pleasant feature of the meeting was the reception given to the members, about forty of whom were in attendance, by President and Mrs. Butler in the Avery Library on Monday evening. The thanks of the Association are also due to President Butler and the officers of the University for the admirable accommodations in Earl Hall.

H. N. Gardiner,
Secretary.

SCIENTIFIC BOOKS.

Inorganic Evolution as Studied by Spectrum Analysis. By Sir Norman Lockyer, K.C.B., etc. London, Macmillan and Co. 1900. Pp. vi+198; 44 figs.

The author states in his preface that this 'volume contains an account of my most recent inquiries into the chemistry of the stars, and of some of the questions which have grown out of these inquiries.' Dissociation is the main topic of the book, and the author makes the 'endeavor to show how, in the studies concerning dissociation, we have really been collecting facts concerning the evolution of the chemical elements,' and he points out 'especially that the first steps in this evolution may possibly be best studied by, and most clearly

represented in, the long chain of facts now at our disposal touching the spectral changes observed in the hottest stars.'

The separate 'books' into which the small volume is divided are entitled as follows: I., 'The Basis of the Inquiry'; II., 'Application of the Inquiry to the Sun and Stars'; III., 'The Dissociation Hypothesis'; IV., 'Objections to the Dissociation Hypothesis'; V., 'Inorganic Evolution.' The work therefore deals with a chemical problem by the methods and with the results of astronomy. It does not primarily treat of the theory of stellar evolution, which is now being gradually built up on the foundation of the new facts of astronomy and astrophysics. The author presents his evidence in his usual brilliant manner, and it is easy to see how one may be carried along to his conclusions, if the evidence is not carefully examined. The dissociation hypothesis is undoubtedly a particularly alluring one to the astronomer, as presenting a comparatively easy escape from some of the difficulties of solar and stellar physics. But the validity of the evidence upon which any such theory is based should be beyond question, and this cannot be said of some of the evidence here presented. It is also very doubtful if other workers in these lines can share Sir Norman's optimistic view expressed on page 29: "I propose to pass over the history of nearly twenty years' work, with all its attendant doubts and difficulties, and deal with what that work has brought us, a perfect harmony between laboratory, solar and stellar phenomena." To many it may appear that the discoveries of facts in spectroscopy in recent years have tended to temporarily diminish rather than increase the harmony between the phenomena observed in the laboratory and the heavens.

The reviewer's copy of the book contains many marginal queries as to the correctness of the evidence brought forward as representing the facts. Thus, for instance, we read on page 34 of "the simplification of the spectrum of a substance at the temperature of the chromosphere. To take an example, in the visible region of the spectrum, iron is represented by nearly a thousand Fraunhofer lines; in the chromosphere it has only two representatives." Now recent photographs of eclipse spectra—and first of these that obtained in 1896 by Sir Norman's assistant, Mr. Shackleton—actually show the presence of a great number of iron lines at the base of the chromosphere, matching almost every one of the strong dark lines ascribed to iron in the solar spectrum. In several places the assertion is made that the lower chromosphere is certainly not the origin of the Fraunhofer lines, although the author's own photographs of the 'flash spectrum' at the Indian eclipse of 1898 clearly contradict this.

We are surely much indebted to Sir Norman for his valuable researches on the lines having greater intensity in the spark than in the arc spectrum, to which he has applied the term 'enhanced lines.' But it is difficult to avoid the impression that he attaches an exaggerated importance to their significance in solar and stellar spectra. To the vapors producing the enhanced lines he prefixes 'proto,' as proto-magnesium, proto-iron, suggesting that at high spark temperatures a finer form of the element is developed. The spectrum of α Cygni is considered to contain chiefly the enhanced lines; numerically, 120 enhanced metallic lines were found in approximate coincidence with some of the 307 lines measured in the spectrum of α Cygni; or, dealing only with the strongest lines, 'the coincidences with enhanced metallic lines with the dispersion employed amount to 38' out of 40. The reviewer has not been able to fully confirm this resemblance on comparing the wave-lengths found in α Cygni by other observers with Sir Norman's lists of enhanced lines of metallic spectra, and had hoped to make the comparison on recent plates taken at the Yerkes Observatory; but this would have too long deferred this review. However, one of the points especially emphasized by Sir Norman is the superior temperature of the reversing layer of α Cygni to that of the sun. As his reasoning is based on the incorrect premise that the reversing layer lies outside the chromosphere, the conclusions are not convincing. On this and similar evidence is constructed the author's elaborate and ingenious classification of stars into genera depending upon their density and temperature, divided into ascending and descend-

ing branches. The reviewer must confess his inability to understand clearly Professor Lockyer's differentiation between descending and ascending stars, although not wishing to question the probability that both branches exist.

In subsequent chapters the author interestingly discusses the bearing upon the dissociation hypothesis of the recent discoveries of series in the spectra of the elements, of pressure shifts of lines, of magnetic perturbations (Zeeman effects), and of the 'fractionation' evidence. He finds in them a quite satisfactory confirmation of his hypothesis, and displays great skill and command of the subject in marshaling to its support the data from such various sources.

As has been said of other volumes in this series, the illustrations do not adequately reproduce the author's original photographs, and could be greatly improved upon in a future edition.

EDWIN B. FROST.

Outlines of Electrochemistry. By HARRY C. JONES, Associate Professor of Physical Chemistry in the Johns Hopkins University. New York, The Electrical Review Publishing Co. Price, $1.50.

The author has not tried to give an exhaustive account of electrochemistry, for he prepared the seven chapters, which cover about one hundred pages, for a technical journal, whose readers are for the most part men busy in every field of applied engineering science; consequently he wisely selected those theoretical topics which would appeal most strongly to this particular class of students. The book, however, will prove instructive and helpful to all who wish to get a clear and definite knowledge of the subjects it presents. The writer has read it with profit, and feels sure that he does not err in recommending it. One might, however, well ask whether 'the whole subject of the electrolytic separation of the metals was opened up' (p. 44) through the study of the decomposition values of the ions by LeBlanc, Freudenberg and others in Ostwald's laboratory, when it is recalled that all but three or four of the separations recorded by these chemists had been made long before by others? Or, if 'the decomposition values of the ions' is the vital point, should we omit mention of the work of Kiliani, who first carried out metal separations by attention to the differences in electromotive force? Perhaps these may be regarded as minor matters, but the historical development of the subject calls for their presence.

EDGAR F. SMITH.

Enzymes and Their Application. By Dr. JEAN EFFRONT. Vol. I., The Enzymes of the Carbohydrates. Translated by SAMUEL C. PRESCOTT. New York, John Wiley & Sons; London, Chapman & Hall, Limited. 1902. 8vo. Pp. 322.

This is a very excellent work and is a valuable addition to the literature on enzymes and their application. The book is designed to meet the wants of not only scientific investigators, but also of those interested in the industrial application of these substances, and will be appreciated by both classes. The author has carried out his purpose in a clear, concise manner. From the standpoint of theoretical consideration he is careful and conservative, and his treatment of the technical application of enzymes to commercial practices is unusually full and clear for a work of this kind. The book is more than a compilation, inasmuch as the author has, as stated in the preface and borne out by internal evidence, confirmed in his laboratory most of the facts presented. The second volume which is now in course of preparation, will take up the proteolytic enzymes and the toxins, and its appearance will be looked for with interest. Professor Prescott is to be congratulated in presenting a translation that in no way detracts from the original. The printing is well done and the paper and binding good.

ALBERT F. WOODS.

BUREAU OF PLANT INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.

Animals of the Past. By FREDERIC A. LUCAS. New York, McClure, Phillips & Co. 1901.

One who has had much to do with a public museum of extinct vertebrates is pretty sure of the queries that the ordinary sight-seer will