posal was first made in the correspondence columns of a Syracuse paper, the *Post-Standard,* and has since been taken up by local people until there is considerable possibility of its ultimate success. A committee of representative business men has been appointed to further the project.

The matter is here brought to the attention of readers of Science in order to ask that any who can help may be moved to use their influence with state officials or any others who might render help. East Green Lake and the surrounding region represent a larger and wilder tract of land. The lake itself is of equal geological interest and from the standpoint of the hart's tongue fern, is of greater interest than the west lake region because the best specimens in the country grow near the east lake. The west lake preserve includes only seventy acres, as this was all that was of special value as park. In the east lake region it is proposed to acquire two square miles to include not only the lake plunge-basin itself but also a marl-bottomed lake nearby and additional acres of beautiful woodland.

The preservation of the best stations for the hart's tongue fern, probably the rarest and most interesting fern in North America, is sufficient reason for urging the acquirement of this proposed new park. Besides this species there are other ferns to the number of about forty, making it probably the best fern preserve in the country. The need of prompt action is indicated by the fact that a lime development company now holds an option on the tract desired.

R. C. Benedict

SCIENTIFIC BOOKS

Theory of Measurements. By James S. Stevens, Professor of Physics in the University of Maine. New York, D. Van Nostrand Company. 1915. Pp. vii + 81. Price $1.25 net.

This little book is intended to fill the gap between the fragmentary treatment of the errors and adjustment of measurements, found in most laboratory manuals, and the detailed discussions given in formal treatises on the theory and precision of measurements. In eight short chapters, the author deals with the following topics: Measurements and Errors; Probability, including a discussion of the probability curve and integral; Adjustment of Observations; Precision of Measurements; Propagation of Errors, applied to direct and inverse problems; Plotting; Negligibility, including rules for the use of significant figures; Empirical Formulæ and Constants.

The methods and notation adopted are similar to those employed in Merriman's "Method of Least Squares" and Holman's "Precision of Measurements." The treatment is necessarily abridged to comply with the limits set by the scope of the book but the usual formulæ and methods are developed in sufficient fullness for their practical application by the intelligent student. Possibly owing to his desire to save space, the author gives very little discussion or explanation of the fundamental principles and assumptions underlying his mathematical derivations. Consequently the true significance of his results is not always apparent and the conditions essential for their correct application are apt to be overlooked. For example, the deductions from the law of accidental errors do not apply to a series of observations affected by systematic errors but the author has nowhere pointed out the necessity of considering such errors in connection with the discussion of precision.

Definitions and problems are frequently so briefly and inadequately stated that the unaided student is apt to misinterpret their meaning. The following quotation is a fair example: "Measurements are usually classified as follows: 1. *Direct*—when, for example, a distance is measured with a tape line. 2. *Indirect*—when the density of a cylinder is determined by measurements of its length, diameter and mass. 3. *Conditioned*—when the third angle of a triangle is restricted by the values of the other two angles. Measurements not so conditioned are called *independent.*"

However, with the aid of a competent teacher, the student should be able to make profitable use of the book in connection with

his work in the physical laboratory and acquire some facility in determining the accuracy and significance of his measurements.

A. DE FOREST PALMER

Electric Arcs. By CLEMENT D. CHILD, Ph.D., professor of physics, Colgate University. New York, D. Van Nostrand Company. 1913. Pp. 194.

A text of this kind must interest at least two classes of readers; those who wish to know more of the physics of the electric arc and those who are intensively engaged in arc lamp development. The author has digested the results of those investigations made since the publication of Mrs. Ayrton's "The Electric Arc," which contains a similar digest of the investigations made previous to 1898.

In the first six chapters the author discusses the relations between terminal voltage, current, resistance and E.M.F. of pure carbon, impregnated carbon, pure metal and metallic oxide arcs operated with direct and alternating current in air and in various gases at different pressures. This discussion also includes the performance of the mercury arc rectifier and the mercury arc lamp under various conditions.

The seventh chapter, headed "Photometry of the Electric Arc," contains information regarding the light-producing properties of various electric arcs and scarcely touches upon the measurement of light suggested by the caption. The following chapter contains a brief review of the use of the electric arc in wireless telephony. All hypothesis regarding the electric arc is reserved for the last chapter, where the author offers an explanation of certain arc phenomena in the ionic theory.

The book would take on added interest from the scientific viewpoint if it contained references to the action of electric arcs between metal terminals in liquids such as alcohol, mineral oil, carbon-tetrachloride, etc., or high tension arcs in air. Although the book title suggests a more general discussion the author pays more attention to the "light-producing electric arc."

The text includes an extensive bibliography to which detailed references are made at the appropriate place. The continuity of the discussion is increased by the results of the author's own investigations whenever the reports of others failed to reveal the required data. Thoroughness and presentation of many viewpoints characterize the text throughout. To the student interested in electric arc phenomena a careful reading of Mrs. Ayrton's text followed by that of Dr. Child should prove an invaluable foundation upon which to base further investigations.

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SCIENTIFIC JOURNALS AND ARTICLES

THE April number (Vol. 16, No. 2) of the *Transactions of the American Mathematical Society* contains the following papers:

L. E. Dickson: "Quartic curves modulo 2."

W. A. Hurwitz: "Mixed linear integral equations of the first order."

W. B. Fite: "Prime power groups in which every commutator of prime order is invariant."

W. A. Manning: "On the order of primitive groups, II."

J. W. Alexander, II.: "A proof of the invariance of certain constants of analysis situs."

A. B. Coble: "Point sets and allied Cremona groups (part I.)."

C. T. Sullivan: "Scroll directrix curves."

THE April number (Vol. 21, No. 7) of the *Bulletin of the American Mathematical Society* contains: "The rôle of the point-set theory in geometry and dynamics," by E. B. Van Vleck; "An enumeration of integral algebraic polynomials," by A. B. Frizell; "Mr. Paaswell's appeal to producing mathematicians," by C. N. Haskins; Review of Volterra's Leçons sur les Fonctions des Lignes, by G. A. Bliss; "Shorter Notices": Lehmer's List of Prime Numbers from 1 to 10,006,721, by L. E. Dickson; Whitford's The Pell Equation, by T. M. Putnam; Liebmann and Engel's Die Berührungstransformationen: Geschichte und Invariantentheorie, by T. H. Gronwall; Pasch's Veränderliche