of some one variable. Instead of true total differentials, he gets *total derivatives*. The *du* in § 137 are not *total* differentials, but differtials of functions of one variable. In the differentiation of implicit functions the author assumes merely the existence of the partial derivatives. He should assume also their continuity. The form of demonstration is bad, as it requires him to assume (tacitly) the existence of the very thing he is seeking, viz., dy/dx.

In the treatment of envelopes, § 141, the author does not as usual give sufficient conditions for the validity of his reasoning, but contents himself with the vague statement in a footnote that the process is all right 'in all applications made in this book.' This blemish, which a few lines will remedy, should be removed in another edition. The definition of an infinite series given in § 147 is not felicitous. In avoiding the lax definition usually given the author has gone to the opposite extreme. The simplest way seems to be to consider

$$a_1 + a_2 + a_3 + , \ldots \text{ in inf.}$$

as a symbol to which a meaning is attached as to other symbols, as $> < =$, etc. The solution of Ex. 3, § 152, is not quite rigorous, as it postulates the covergence of G. In § 160 *undefined* arithmetical operations are performed on series.

We can not agree with the author that the remainder in Taylor's series for several variables is too complicated to be given. The treatment of maxima and minima can be made much more complete without complications or difficulty. The reasoning given at the bottom of page 248 can be made not only 'plausible,' but entirely conclusive, using no more space that that required by the author.

In the reduction of indefinite integrals the author proves the trivial formulæ

$$\int (du + dv - dw) = \int du + \int dv - \int dw,$$

$$\int adv = a \int dv,$$

but omits entirely the demonstration relative to the transformation of the variable. This is all the more surprising as this transformation is constantly employed, even in establishing important theorems. Two chapters, XXIX. and XXX., are devoted to definite integrals. In the first we arrive at the notion of a definite integral by means of the notion of area; in the second, by means of the limit of a sum. In our opinion the first treatment is not only superfluous, but should be entirely omitted on several counts.

The relatively few blemishes in this work, the reviewer is glad to state, will be removed in the next edition. JAMES PIERPONT.

YALE UNIVERSITY.

The Study of the Atom, or the Foundations of Chemistry. By F. P. VENABLE. Easton, Pa., The Chemical Publishing Co. Pp. 290.

The history of an important scientific theory is an interesting study, where it is possible, as it often is, to trace the orderly development of that theory from stage to stage. The evolution of the atomic theory is a subject which has claimed the attention of many writers, and the story has been told so often and so well in works on the history of chemistry, that one wonders whether it is not familiar to most chemists. A careful perusal of this book does not disclose any new point of view, or anything new in the method of treatment, though the matter is generally presented in a satisfactory manner, especially Chapter V., which deals with the periodic system. In the last chapter of the book the author considers the most recent hypotheses regarding the constitution of matter by J. J. Thomson, Rutherford and others. The book is generally clear, conservative in tone and, on the whole, well-proportioned, though 75 pages, or one fourth of the contents, seems rather too much to devote to the conception of the atom before the time of Dalton, especially as this material must be taken entirely from secondary sources. The book may be commended as a good summary for students. E. T. ALLEN.

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES. SECTION OF GEOLOGY AND MINERALOGY.

THE section was called to order at 8:15 P.M., November 21, 1904, with Vice-president Kemp in the chair and forty persons present.

The first paper of the evening was by Professor J. J. Stevenson, upon 'The Island of Spitzbergen and its Coal,' and was illustrated by lantern slides. In introducing his subject, the speaker described briefly the coast of northern Norway and its geology, and referred in some detail to Bergen, Hammerfest and other cities. Spitzbergen was then taken up, and its coals and their geological relations were passed in review. The coal beds are of Jurassic age, and the coal is peculiar in that it partakes of the characters of the lignites as well as of the true coals.

The second paper on the program was by Professor James F. Kemp, on 'The Titaniferous Magnetite in Wyoming.' On account of the lateness of the hour, the speaker presented his topic only in abstract. The magnetite occurs in two places, fifteen and twenty miles north of Laramie, Wyoming, the former and smaller occurrence being near the Shanton ranch, the latter and larger being on Chugwater Creek. Both are in wall-rock of anorthosite which is practically indistinguishable from anorthosite occurring in the Adirondacks. The ores range from 20 per cent. to 40 per cent. TiO_2. Thin sections show that they contain green spinels, and one slide presents much olivine. They can be most reasonably explained as intrusive dikes. In this view the speaker agreed with Waldemar Lindgren, who has published a brief note regarding them.

JAMES F. KEMP,
Secretary pro tem.

THE section held a special meeting December 2, 1904, with Vice-president Kemp in the chair and two hundred members and visitors in attendance. The meeting was called to order at 8:25 P.M. and the program of the evening was at once taken up. This consisted of a lecture by Professor Albrecht Penck, of the Imperial University at Vienna, who is an honorary member of the academy.

The speaker discussed 'The Glacial Surface Features of the Alps,' and gave a brief summary of some of the results of the twenty years of masterly work which has been done by him and under his direction in the Tyrol. Professor Penck described in popular language the nature of the valleys of the Alps and showed by means of lantern slides and a diagram how the glaciers have widened and deepened portions of their rocky basins and produced lakes.

After a vote of thanks to the distinguished guest of the evening, the section adjourned.

EDMUND OTIS HOVEY,
Secretary.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE 592d meeting was held December 10, 1904.

The first paper was read by invitation by Mr. H. H. Kimball, of the Weather Bureau, on 'Variations in Insolation and in the Polarization of Blue Sky-light, during 1903 and 1904.' Observations with an Angström pyrheliometer have been maintained by the Weather Bureau at Washington since April, 1903. Comparison with previous observations at Providence, R. I., and Asheville and Black Mountain, N. C., indicate that the quantity of solar radiation reaching the surface of the earth on clear days during 1903 was considerably less than during 1902 and 1904, the deficiency from April to September being 16 per cent. as compared with 1902, and 9 per cent as compared with 1904.

Observations with a Pickering polarimeter indicate that there have been corresponding fluctuations in the polarization of blue sky-light, the percentage of polarization at a point on a vertical great circle passing through the sun and 90° from it, having averaged 49.6 per cent. from May to October of 1904, as compared with 40.6 per cent. during the same months of 1903.

The work of the astrophysical observatory of the Smithsonian Institution and numerous European observations were quoted, showing similar deficiencies in insolation, in the transmissibility of the atmosphere, and in the polarization of blue sky-light, during 1903.

The subject was considered to be one well worthy of investigation by meteorologists.

Mr. J. F. Hayford, of the Coast and Geodetic Survey, presented some recent results on 'The Computation of Deflections of the Vertical from the Surrounding Topography.'

Deflections may be due to irregularity of density within the earth or to attraction of parts of the earth above the surface of the mean spheroid. By an ingenious method, partly graphical, the author had found it practicable to take account of the influence of all known topographical features on the plumb-line at more than 200 stations; it is usually necessary to consider all the land-masses within 2,500 miles of the station. When these computed deflections from known causes are combined with the deflections found from geodetic measurements, the quantities to be accounted for by irregularities within the earth's surface are usually much greater than had been supposed heretofore.

CHARLES K. WEAD,
Secretary.

MICHIGAN ORNITHOLOGICAL CLUB.

THE Michigan Ornithological Club held its last quarterly meeting for 1904 at the Detroit Museum of Art on December 2. The following program was presented:

P. A. TAVERNER: 'Re Kirtland's Warbler.'

A. W. BLAIN, JR.: 'Some Phases of the Life History of the House Wren.'

J. WILBUR KAY: 'Remarks on the Cowbird.'

DR. P. E. MOODY: 'Nesting of the Blue-gray Gnat-catcher in Wayne and Oakland Counties, Michigan.'

J. CLAIRE WOOD: 'Notes on a Great Horned Owl in Captivity.'

A. B. KLUGH: 'Summer Birds of Puschlinch, Lake Ontario.'

The following were presented by title:

PROFESSOR WALTER B. BARROWS: 'Birds of the Beaver Islands, Michigan.'

DR. MORRIS GIBBS: 'Bird's Nesting.'

WM. H. DUNHAM: 'A Preliminary List of the Birds of Kalkaska County, Michigan.'

PROFESSOR FRANK SMITH: 'An Unusual Flight of Sparrow Hawks in Michigan in 1904.'

CHAS. C. ADAMS: 'A Natural History Expedition to Northern Michigan.'

The next meeting of the society will be held on March 3, 1905. A. W. BLAIN, JR.

DISCUSSION AND CORRESPONDENCE.

INTERESTING AND IMPORTANT FACTS.

IN Powell's 'Truth and Error' a philosophic distinction is made by giving special definitions to the terms *property* and *quality*. A property is an essential characteristic considered in itself; a quality is a characteristic considered in relation to man. Thus the ductility of iron is a property; its utility a quality. The form and coloration of a tree are properties; its beauty or ugliness is a quality. Iron's property of ductility, when thought of in connection with human needs, is a factor of its quality of utility; and the properties of the tree, when viewed from the standpoint of man's esthetic sense, are qualities. This simple distinction is of far-reaching application, because properties are the domain of science and qualities the domain of art. Pure science (with a reservation in respect to anthropology) is not at all concerned with qualities, and when the investigator deals with them he passes into the field of applied science, or the arts. Failure to recognize this distinction leads to much confusion of thought and expression.

One of the milder or less harmful, but at the same time most conspicuous, manifestations of this confusion is connected with the word *interesting*. Not unfrequently an essay ostensibly and mainly scientific will contain the statement that an object, or relation, or other phenomenon is 'interesting,' the context indicating that interest is supposed to inhere in the phenomenon. As a matter of fact, interest is a mental attitude of the observer, and the adjective 'interesting,' though applied to the phenomenon, describes only the observer's relation to it. There are, of course, many legitimate uses of the adjective, and some of these occur in scientific writings. When an author, for example, declares that the insect habits he is about to describe are interesting to students of the psychology of the Bombocoreidæ, it is clear that he does not deceive himself by supposing that he has named a property of the phenomena.

Something similar may be said of *important, valuable,* etc., when employed in scientific description. In common with *novel, pertinent, significant,* and the like, they indicate the relations of phenomena to the condition of human knowledge. Just as each observed fact has at some time, temporarily, the quality of novelty,