find the text unencumbered with logical subtleties. Much of the contents, moreover, is of recent date, as is evidenced by the numerous references to journals.

J. W. YOUNG.

La Statique Chimique Basée sur les deux Principes Fondamentaux de la Thermodynamique. Par E. ARIÈS. Paris, A. Hermann, 1904. viii + 251 pp.

THAT the investigations of Willard Gibbs on the purely theoretical side of physical chemistry have taken a vital place in recent French researches whether on the theoretical or practical side of the subject is due partly to the seed sown long ago by the pioneer Massieu and later assiduously cultivated by Duhem, partly to the translations of Gibbs's memoirs by Le Chatelier and Brunhes, and partly no doubt to the Frenchman's natural admiration and love for a logically developed theory. Ariès in his work on chemical statics shows traces of Massieu, of Duhem, and particularly of Gibbs. In fact, although his notation is not at all that of Gibbs, his ideas are by his own admission largely taken from him.

The book under review is an excellent account of the more important results of the theory of chemical equilibrium. As such books are not numerous and as the original memoirs of Gibbs are not always easy reading, Ariès's volume cannot help but be a very useful addition to the literature of the subject. After presenting the fundamentals of the theory, the author takes up in separate chapters several different applications. We may mention: Change of state and analogous phenomena, some types of dissociation, solutions, monovariant systems, the separation of mixed liquids, mixed gases in equilibrium with mixed liquids, perfect gases, the law of Dalton and Gibbs's principle, dilute solutions, and osmosis.

From this partial list of the subjects treated it will appear that we have here a tolerably complete and systematic account of those parts of theoretical physical chemistry which are likely to be of greatest use to the reader. It is well to mention that in many instances the illustrations and discussions of the author may serve as elucidations of parts of Gibbs's work which on account of their very generality are difficult of comprehension. In particular we should like to call attention to the theory of gaseous equilibria and the principle of Gibbs, chapters XII and

XIII. The statement of the principle of Gibbs and its bearing on the behavior of gaseous mixtures is treated with exceptional clearness, and the fundamental fact that the theory of such mixtures depends on only three laws (those of Mariotte, Joule, and Gibbs) is so emphasized that no reader can miss it or fail to see its significance.

E. B. WILSON.

NOTES.

THE opening (January) number of volume 29 of the *American Journal of Mathematics* contains the following papers: "The groups which contain less than fifteen operators of order two," by G. A. MILLER; "Concerning the improper definite integral," by N. J. LENNES; "On the congruence of axes in a bundle of linear line complexes," by O. P. AKERS; "On septic scrolls having a rectilinear directrix," by C. H. SISAM. This number also contains a portrait of Professor DAVID HILBERT, of the University of Göttingen.

The April number contains: "Beiträge zur nicht-euklidischen Geometrie, I, II, III," by E. STUDY; "Certain triply orthogonal systems of surfaces," by L. P. EISENHART.

THE April number (volume 8, number 3) of the *Annals of Mathematics* contains: "Note on the use of group theory in elementary trigonometry," by G. A. MILLER; "The asymptotic lines on the anchor ring," by M. B. WHITE; "On certain theorems of mean value for analytic functions of a complex variable," by D. R. CURTISS; "Note on regular polygons," by C. A. SCOTT; "The revolution of a dark particle about a luminous center," by E. B. WILSON.

AT the meeting of the London mathematical society, held on March 14, the following papers were read: By G. W. EVANS-CROSS, "Exhibition of a new calculating machine"; by T. STUART, "On the reduction of the factorization of binary septans and octans to the solution of indeterminate equations of the second degree"; by L. E. DICKSON, "Invariants of the general quadratic form modulo 2"; by J. BRILL, "On partial differential equations of the first order."