THE ALGEBRAIC FUNCTIONS AND THEIR INTEGRALS.

Théorie des fonctions algébriques et de leurs intégrales.   Étude des fonctions analytiques sur une surface de Riemann. By PAUL APPELL and ÉDOUARD GOURSAT. With a preface by CH. HERMITE.   Paris, Gauthier-Villars   et   Fils, 1895.   8vo. 22+530 pp.

THE general theories of functions that originated respectively with Cauchy, with Weierstrass and with Riemann have each found in the algebraic functions and their integrals an instructive example, the study of which has turned out to be so fruitful that the results of this research occupy a place of much importance in modern mathematics.   Until recently the works of Neumann* and Clebsch and Gordan† have been the principal introductory treatises in this field.   The object of the first of these was to set forth Riemann's theory, that of the second, as Gordan expresses it, " to build the bridge between the theory of the Abelian integrals and the theory of the higher plane curves."   In the three decades that have elapsed since the appearance of these works, the activity of mathematicians in this field has been principally in research and not until recently has anyone been found to undertake the task of selecting and arranging the methods and the theorems that lie at the bottom of this subject, and working out *a systematic presentation of those things that the beginner ought to learn first.*   With this purpose in view Messrs. Appell and Goursat applied themselves to the elaboration of their treatise and the result is a work that occupies a place of first importance among the many recent text-books that treat this subject to a greater or less extent.

In the preface Hermite enumerates the principal points of view that have been of importance in the development of the theory of the Abelian integrals, and defines the object of the present work.

The plan of the book is as follows.   It is assumed that the reader is acquainted with the rudiments of the theory of functions and a syllabus of the theorems premised forms a nine page introduction.   The hyperelliptic equation

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* *Vorlesungen über Riemann's Theorie der Abelschen Integrale,* Teubner, first ed., 1865.   The physical ideas underlying Riemann's theory were treated by Klein: *Ueber Riemann's Theorie der algebraischen Functionen und ihrer Integrale,* Teubner, 1882.

† *Theorie der Abelschen Integrale,* Teubner, 1866.