# THE THEORY OF FUNCTIONS.

*A Treatise on the Theory of Functions.* By JAMES HARKNESS and FRANK MORLEY. New York, Macmillan & Co., 1893. 8vo. IX + 503 pp.

IN the vast realm of Mathematical Science, as it stands before us to-day, there exists, owing to the genius, activity, and assiduity of mathematicians, such a great variety of widely extended subdivisions that it seems to be an impossibility for one man to keep pace with the rapid development of all of them. The consequence has been that mathematicians try to confine themselves to some special line of their science, not only in research work, but also in reading up mathematical literature. This is a pity, because the cultivation of any special branch suffers considerably by disregarding the methods and results of other branches, while, on the other hand, the most beautiful results have often been obtained by the combination of apparently unconnected regions: it is to be regretted, but it is a fact, and will remain so as long as the capacity of the human intellect remains limited.

There exists, however, one branch of mathematical science whose bearing on nearly all the other parts is so evident that it appears to be, with perhaps a few exceptions, indispensable for special work of any kind—that is, the *Theory of Functions.* Even in applied mathematics it seems to gain a foothold: the theoretical astronomer as well as the mathematical physicist has frequently enough, when he wants to feel safe ground under his feet in his calculations, to fall back on the theory of functions.

While thus the high importance of function theory will be readily admitted, it has until lately been impossible to obtain a fair knowledge of this subject without consulting quite a number of different German or French treatises and original papers. There did not exist any English text-book on the subject at all.* But there is also no Continental work which deals with the theory of functions in any degree of completeness. Either Cauchy's, or Riemann's, or Weierstrass's method is given alone, whereas a combination of all three methods is needed in order to pursue the study of the subject to advantage.

An urgent demand was met therefore when there appeared, some months ago, two new, comprehensive treatises, both in English: Forsyth, "Theory of Functions of a Complex Vari-

* I should perhaps except here some chapters in Chrystal's Algebra, which bear on subjects belonging to the theory of functions.