insight into the character of the work, and to see that an empty place in our scientific literature has been discovered and satisfactorily filled. As was stated before, this book furnishes an excellent précis for anybody lecturing on general thermodynamics. If in addition there were in existence an elaborate treatise of three or four times the length following the same order of arrangement and amply supplied with physical applications and developments, the student of thermodynamics would scarcely have need of any lectures. As it is, both student and teacher are so much better off than they were a twelvemonth ago that it would be a bit ungracious already to ask for more — or would it be the highest expression of gratitude?

EDWIN BIDWELL WILSON.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON, *September*, 1907.

SHORTER NOTICES.

Funzioni poliedriche e modulari. By G. VIVANTI. Milan, Hoepli, 1906. viii + 437 pp.

THE object of this work cannot better be characterized than by the following quotation from the preface:

"The present volume has the modest scope of preparing the reader for the study of the classic lectures of Klein on the icosahedron and of the treatise on the elliptic modular functions by Klein and Fricke. The first of these, a model of elegance and a veritable mine of new and interesting ideas, is quite difficult to read both on account of the many concepts which are barely outlined and still more because, even after the various details have been understood, the connection which binds them, the guiding idea, is far from evident and comes to light only after a profound study and a thorough review of the entire material. The second work, on account of the mass and the multiformity of its contents, does not lend itself readily to an introductory study. On account of the lack of a suitable treatise for facilitating acquaintance with the theory of the polyhedral and modular functions, I believed it my duty to make available for others the work of elaboration which I have performed for my own use, thus saving them the repetition of this useful but laborious work.

"It may be too bold an attempt to include in the brief space of a small manual the principles of two vast and important theories. Nevertheless it seemed useful, in spite of the greater conciseness required, to unite both theories in order to avoid the repetition necessary in treating them separately, and also to show that the icosahedron theory, which is capable of appearing in the field of analysis as an elegant and independent creation of a special type, is only the first of a series of related constructions very closely bound together. From this point of view it would have been better still to take another step and include also the theory of the automorphic functions; but this would clearly be impossible.

"To save space, and for greater symmetry of treatment, I have assumed that the reader, besides having a certain familiarity with the more elementary parts of mathematics, has also some notions of several more advanced theories: analysis situs, functions of a complex variable and Riemann surfaces, elliptic functions, abelian integrals, linear differential equations, theory of numbers."

The program which the author thus places before himself has been carried out, we think, with much care and good judgment. He has treated his subject with admirable simplicity, directness, and unity. Not only will this work greatly facilitate the efforts of the reader to master these comprehensive theories, but it will be of particular service to those whose main interests lie outside this special field, by enabling them to become familiar with its general topography without an undue expenditure of time.

The book is printed in large, well leaded type. By using a paper as thin as is consistent with opaqueness and by cutting down to a narrow margin, the publisher has produced a small and handy volume without any sacrifice of legibility.

J. I. HUTCHINSON.

Vorlesungen über Zahlentheorie. Einführung in die Theorie der algebraischen Zahlkörper. By J. SOMMER. Leipzig, B. G. Teubner, 1907. iv + 361 pp.

THE generalizations of the ordinary theory of numbers which, following Gauss's introduction of complex integers, have been made by Kummer, Dirichlet, Dedekind, and Kronecker constitute an extensive and exceedingly interesting part of mathe-