

Theoretische Arithmetik. Von Otto Stolz und J. A. Gmeiner. Zweite Auflage, bearbeitet von J. Anton Gmeiner. I. Abteilung, 1911, vi + 146 pp.; II. Abteilung, 1915, viii + 369 pp. Leipzig, Teubner.

Maintaining the same division into "Abschnitte" as in the first edition and largely the same separation of each into sections, Gmeiner has given us in the second edition of the *Theoretische Arithmetik* of Stolz and Gmeiner a work larger by about twenty-five percent than the first edition of one volume. In every Abschnitt one finds numerous modifications and extensions, often of a minor character but occasionally of considerable extent. Many of the modifications are in the direction indicated by Stolz in notes he had made looking forward to a revision of the text. Gmeiner has carefully utilized these suggestions so as to carry out as far as possible the wishes of his teacher in this new edition of their common work.

The larger changes may be indicated briefly as follows: There is a fuller treatment in the second Abschnitt of subtraction of integers, division, powers, and the systematic representation of numbers; and there is a new section here on zero as a number. In the third Abschnitt the theory of the laws of operation has been expounded anew and in fuller form, especially that having to do with the distributive law. The sections on the fundamental operations with real numbers in the seventh Abschnitt and the theory of complex units in the tenth Abschnitt appear in a new form. Other changes, less important, are to be found throughout the volumes. In its new form the book will have an increased usefulness.

As the work is now divided the first volume treats the theory of rational numbers and the second the theory of real and complex numbers together with an introduction to the theory of infinite series both with real terms and with complex terms.

R. D. CARMICHAEL.

Advanced Lecture Notes on Light. By J. R. Eccles. Cambridge, University Press, 1919. 141 pp.

A sequel to the author's *Lecture Notes on Light*, 1917, the *Advanced Lecture Notes* treat in sequence Rainbows, Magnifying Power, Chromatic Aberration, Spherical Aberration, Wave Theory of Light, Interference, Diffraction, Polarisation of Light. There are really only half the indicated number of pages, because the left-hand page is left blank apparently

with the intention that the student shall draw thereon the figures which are entirely lacking in the text and perhaps make certain calculations supplementary to or illustrative of the text. A perusal of the work fails to indicate surely whether the lectures as given are largely theoretical or are amply illustrated by experiment showing the phenomena on a scale impressive even to undergraduates. No part of physics lends itself so well to treatment by experimental lectures as optics, particularly physical as contrasted with geometrical optics.

It is unnecessary to commend either the excellent care given to the treatment or the selection and order of the topics. The discussion of geometrical optics can hardly be made so moving as that of physical optics, but every pedagogic instinct, except that of fascinating or even mystifying the student, is better satisfied by commencing with the former, as the author does, and so far as the real training of the student in analysis or in the things of most use to him is concerned, geometrical optics will long remain preferable to physical. It would have been desirable, provided the students' previous training sufficed, to lay some small emphasis on the dynamics of wave motion.

The question of what shall be taught in optics and how it shall be taught is like the corresponding questions relative to mechanics, electricity, and heat, not only unsolved but as yet unstated in a form capable of solution. Eccles' book merits careful consideration by collegiate teachers of physics.

E. B. WILSON.

Materialien für eine wissenschaftliche Biographie von Gauss.
Gesammelt von F. Klein, M. Brendel, und L. Schlesinger
Heft VIII. *Zahlbegriff und Algebra bei Gauss.* Von A.
Fraenkel. Mit einem Anhang von A. Ostrowski: *Zum
ersten und vierten Gaußschen Beweise des Fundamentalsatzes
der Algebra.* Erster Teil. Leipzig, Teubner, 1920. 58 pp.

The title of this pamphlet is sufficiently explanatory of its general character. As it forms only the first part of the eighth volume of the series, it is incomplete in some respects. However, it does contain an interesting and well rounded discussion of Gauss's part in the development of the concept of number and an arithmetization of his first proof of the fundamental theorem of algebra. A corresponding treatment of the fourth proof, together with detailed criticisms of the two proofs, are apparently to be given in the second part of the volume.