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.

As the author remarks, there can be no doubt that Gauss recognized the sphere of philosophy in investigating the foundations of mathematics, and it is interesting to note that he opposed Kant's view that space is merely a creation of our senses. While Gauss's part in the development of the complex number was probably of relatively more importance, it is pointed out that he made substantial contributions to the modern theory of real numbers. The somewhat controversial subject of the priority of different writers with regard to the former seems on the whole to be treated impartially, although Argand is given less credit than some would doubtless accord him.

It is worth noting that Gauss himself recognized the somewhat unsatisfactory character of his first proof of the existence of roots of an algebraic equation. Any comments on Ostrowski's discussion would seem more appropriate in connection with Fraenkel's criticism of the original proof.

HOWARD H. MITCHELL.

ERRATA.

Vol. XXVI, p. 292, formula (22): Instead of $D=2(n-1)\cdots$ read $D = -2(n-1)\cdots$.

——, p. 293, formula (25): The denominator of the last integral in the value for x should be s^2; and, in the value for y, s^3.

Vol. XXVII, p. 11, line 6 of § 1: Instead of the words *of all functions* read *of all bounded functions*.

——, p. 11, formula (2): Add after the formula $(a < y < b)$.

——, p. 17, line 17: Add after the last sentence the sentence: In order to make sure that the integral (1) shall belong to the class $[f]$, it is necessary to assume also that $K(x, y) - K(x, a)$, considered as a function of x, belongs to that class for every value of y.

——, p. 326: Professor R. L. Borger desires to withdraw, at least tentatively, the theorem he announced on this page, on account of a flaw in the proof near the bottom of page 327, which was called to his attention by Dr. T. H. Gronwall.

——, p. 364, line 17: Instead of $m = -9$ read $m = -91$.

——, p. 385, last line: Instead of Granier read Garnier.