SHORTER NOTICES

Algebraische Kurven. By Dr. H. Wieleitner. I, Gestaltliche Verhältnisse. Sammlung Göschen. Berlin, de Gruyter, 1930. 146 pp.

This book contains four chapters on general considerations, infinite points and asymptotes, curves as envelopes of lines, and higher singularities. The classical methods of curve tracing are clearly presented, the examples are well chosen and illustrated by nearly one hundred accurate figures. Particularly illuminating are the discussion of the continuous variation of curves, the enumeration of the singularities of quartics, and the paragraphs on the form of curves of class four. There is a brief bibliography confined to German texts.

B. H. Brown

Geometrische Konfigurationen. By Friedrich Levi. Leipzig, S. Hirzel, 1929. vi +310 pp.

This book has for its aim the study of geometrical configurations, principally those composed of points, lines and planes. The author has in mind a unified presentation which will show the relation of this subject to algebra and topology. The approach, through a consideration of the incidences which occur among the elements of the configurations, leads immediately to combinatorial methods.

The introduction defines the equivalence of two configurations in terms of one-one incidence preserving correspondences between their elements. Representations of configurations by means of incidence matrices and automorphisms of configurations are introduced.

In Chapter 1 there is an exposition of those parts of group theory which will be required later on. The group of a function and of a configuration, automorphisms of groups and groups of infinite order are discussed.

Chapter 2 consists of a treatment of the topology of two-dimensional manifolds from a purely combinatorial point of view. The elements making up a manifold and the operations thereon are characterized axiomatically and the theory leading up to the classification of these manifolds is put forth very neatly.

In Chapter 3 there is a consideration of the simplest point-line projective configurations. The group, analytical and topological properties of these figures are discussed in detail. Material on the Möbius tetrahedron and on nets of lines in the projective plane is included.

The next chapter is devoted to polyhedral configurations and the theorem of Desargues. There are incidental sections on kinematics and graphical statics.

Chapter five introduces the Pascal figure and collects an extremely generous quantity of results on points, lines, and conics due to Pascal, Kirkman, Steiner, Cayley, Salmon and Plücker.

The last chapter devotes thirty-six pages to a detailed and systematic exposition of the theory of regular polyhedra. Its conclusion discusses polygonal nets in euclidean and non-euclidean spaces with applications to the topology of surfaces.

In the appendix one finds supplementary and critical remarks on the several chapters of the text. In place of a bibliography there is a reference to the article on the same subject in the German encyclopedia by E. Steinitz. There is a four page index.

This volume will doubtless be of considerable value as a source of extra material in a course on projective geometry.

L. W. COHEN

Number: The Language of Science. A critical survey written for the cultured non-mathematician. By Tobias Dantzig. New York, Macmillan, 1930. xii+260 pp.

While this book was written for the cultured non-mathematician it aims to be useful also to the mathematician even if it demands no mathematical equipment beyond that which is offered in the average high-school curriculum. The headings of its twelve chapters are as follows: Fingerprints, the empty column, number lore, the last number, symbols, the unutterable, the flowing world, the act of becoming, filling the gaps, the domain of number, the anatomy of the infinite, and the two realities. From these headings it may be inferred that the book is largely devoted to a discussion of philosophical questions and deals with an extensive range of ideas. It has the very commendable aim of contributing towards stressing the cultural side of mathematics.

The book contains a number of interesting quotations from the works of eminent mathematicians as well as portraits of the following: Leibniz, Fermat, Poincaré, Euler, Abel, Newton, G. Cantor, Descartes, Gauss, Galileo, and Kronecker. It does not aim to be a history of mathematics but contains a large number of references to historical questions. These are obviously introduced with a view to increase the interest of the reader and slight inaccuracies involved therein are of secondary importance. It may, however, be desirable to note here a few modifications which can easily be incorporated into later editions of this unique and inspiring work.

On page 44 there appears the widespread interchange of the definitions of excessive and defective numbers to which attention was called in School and Society, volume 18 (1923), page 621, and two pages later it is stated that Euclid contended that every perfect number is of the form $2^{n-1}(2^n-1)$. It is true that Euclid proved that such numbers are perfect whenever 2^n-1 is a prime number but there seems to be no evidence to support the statement that he contended that no other such numbers exist. On page 96 it is stated that the arithmetization of mathematics began with Weierstrass in the sixties of the last century. The fact that this movement is much older was recently emphasized by H. Wieleitner, Jahresbericht der Deutschen Mathematiker-Vereinigung, volume 36 (1927), page 74. On page 87 it is stated that the *arithmos* of Diophantus and the *res* of Fibonacci meant whole numbers, and on page 89 we find the statement that in the pre-Vieta period they were committed to natural numbers as the exclusive field for all arithmetic operations. On the contrary, operations with common fractions appear on some of the most ancient mathematical records.

G. A. MILLER