

has shed a light on current ideas as to the existence of periodicity in various phenomena which may have the effect of clearing up many doubtful points in sunspot and other periods.

All these matters are here set forth. While giving in each case a concise story in which references to the original sources form a conspicuous element, Miss Clerke has at the same time made the volume eminently readable. It constitutes a valuable complement to her well-known work on the history of astronomy.

ERNEST W. BROWN.

Opinions et Curiosités touchant la Mathématique. (Deuxième Série.) Par GEORGES MAUPIN. Paris, C. Naud, 1902. 332 pp.

THE first volume of the *Opinions et Curiosités* appeared in 1898, and was reviewed in the *BULLETIN*, Volume 6 (1900), page 255. The present volume is made up of two parts. The first contains miscellaneous extracts from works mainly of the sixteenth and the seventeenth century, touching such subjects as the rotundity of the earth, the number of chemical elements, the nature of comets, the figure of the moon, ancient navigation, the capacity of Noah's ark, origin of the notion of the infinite, the squaring of the circle, etc.

The second part, covering 162 pages, is given up to biographical notes on Simon Stevin and Albert Girard, and to extracts from the *Oeuvres Mathématiques* of Stevin, edited by Girard and printed in 1634. The great historical importance of Stevin's book, as well as its rarity, justify this course. We find here quotations giving Stevin's argument "que l'unité est nombre," which are of value in tracing the development of the number concept. Several extracts exhibit Stevin's notation in decimal fractions and other parts of arithmetic. His great independence of thought is shown in his protest against calling incommensurable numbers like $\sqrt{8}$ "absurds, irrationnels, irréguliers, inexplicables, sourds, etc." A number of physical and mechanical subjects are also touched upon, notably those relating to the tides, the formation of rain, the size of the earth, the center of gravity, the equilibrium of bodies.

The two parts of Maupin's book, taken together, make an interesting and entertaining volume. It is of value in exhibiting vividly certain stages in the progress of thought. It is good supplementary reading in a course on the history of mathematics and of physical science.

In former centuries mathematics was, in many minds, intimately interwoven with mysticism. A conspicuous example of this, given in Maupin's book, is the proof offered by Kepler, when he was a young man, that there cannot be more than six principal planets. He imagined the planets moving along great circles of concentric spheres so placed with respect to the five regular solids, taken in a specified order, that each solid was inscribed singly in one sphere and circumscribed about the next inner sphere. Since God created everything according to number and measure, these five regular solids determine the radii of six spheres in such a way that the radii are proportional to the distances of the planets from the sun. As there are no more than five regular solids and the number of spheres in the above arrangement cannot exceed six, there cannot be more than six principal planets.

In this early speculation Kepler is careless as to his assumptions, and does not allow himself to be controlled by the facts. Later, intercourse with Tycho Brahe and Galileo taught him the importance of accurate experimental data. Kepler's maturer reflection, in which his imagination was incessantly controlled and corrected by the facts in the case, ended in the brilliant discovery of "Kepler's Laws."

FLORIAN CAJORI.

Leitfaden der Projections-Lehre. Ein Uebungsbuch der konstruierenden Stereometrie. Von Professor Dr. CARL HEINRICH MÜLLER, Oberlehrer am Kaiser Friedrichs Gymnasium, Frankfurt a. M. und Professor OTTO PRESLER, Oberlehrer an der städt. Oberrealschule, Hannover. Ausgabe A. Leipzig, Teubner, 1903. 293 pp., 233 figs.

THE German student is taught the principles of drawing, perspective, and the elements of descriptive geometry before leaving the gymnasium. While not, on the whole, having as much of what is usually taught in America under the name of solid geometry, the average student who has completed the course in a realgymnasium or realschule has much more definite ideas of the visual properties of space than the average freshman in our colleges and technical schools.

Until recently, very few good books existed on constructive geometry, as it is taught almost entirely by use of a brief syllabus and a great deal of practice. The present volume is therefore somewhat of an innovation, representing the modern tendency to prepare text-books on all elementary mathematical subjects.