PAPPUS'S COLLECTION

Pappus d'Alexandrie. La Collection Mathématique. Œuvre traduite pour la première fois du Grec en Français, avec une introduction et des notes. By Paul Ver Eecke. Paris and Bruges, Desclée De Brouwer, 1933. 2 vols. 128+364+507 pp.

It seems strange that such a notable classic as the *Collection* of Pappus should never have been completely translated into any modern European language until M. Ver Eecke undertook the task of preparing it for this French edition. Commandino had put it in Latin in 1588, this being the best way of making it known to scholars of that time; but even this translation, elaborate as it was, has since been shown to be quite imperfect. Three centuries had then to elapse before any attempt was made at a definitive edition of the work. This edition was the work of Dr. Friedrich Hultsch, a scholar of highest rank, and it presented both the Greek and the Latin versions based upon a critical study of the earliest and most complete manuscripts extant. Sir Thomas Heath speaks of it as "one of the first monuments of the revived study of the history of Greek mathematics in the last half of the nineteenth century." Upon this edition M. Ver Eecke bases his translation. It should be said, however, that there were numerous partial translations, such as that made by Dr. Gerhardt, of Books VII and VIII (Halle, 1871).

Since the publication of the Commandino edition the date of Pappus has been more clearly fixed, and we now know that he flourished in the reign of Diocletian (284–305). Out of his many works, most of which are lost, his *Mathematical Collection* (*Mathematikai synagogai*) is the best known. It is a kind of synthesis of mathematics as known in his time, with many historical notes, and is the source of much of our knowledge of the works of the classical period.

In an elaborate Introduction of more than a hundred pages M. Ver Eecke gives a general survey of the known facts relating to Pappus, a statement of the nature of each of the extant Books of the *Collection*, and a list of the various editions consulted. The great value of the translation lies not only in its apparently careful rendering of the Greek in French, but in the footnotes. The latter contain much information concerning the work itself, together with a large number of proofs in modern form and of bibliographical notes.

The contents of the several Books, beginning with the fragment of Proposition 14 of Book II, are so fully stated by Sir Thomas Heath in his *History of Greek Mathematics* (vol. II, pp. 361–439) as to call for little further notice of the subject. It should be said, however, that the arrangement followed by Pappus differed greatly from that of Euclid or of Appollonius. The work is rather, as the title indicates, a collection of notes on geometry, the number theory, and the geometric algebra of the Greeks, than a textbook on any one of these subjects. Of the several divisions, Book IV is of particular interest because of Pappus's treatment of the generalized Pythagorean Theorem; of the *arbelos* (shoemaker's knife) with its inscribed circles; of the spirals studied by Euclid, Archimedes, and Conon; of "a certain line used by Nicomedes for the duplication of the cube" (the conchoid); and of the *tetragonizousa gramma*, which in the Latin of Commandino appears as the *linea quadrans*, known at the present time by the late Latin term *quadratrix* (French *quadratrice*). Book V is also particularly interesting because of its geometric content, especially as relates to isoperimetry; maximum and minimum lines, surfaces, and solids; the treatment of the sphere and cylinder by Archimedes; and the regular and semiregular solids. Book VII, the *Analuomenos topos* (Treasury of Analysis), gives the clearest statement of the Greeks relating to the distinction between analysis and synthesis. It also contains the theorem relating to the volume generated by the revolution of a plane surface about an axis, the so-called Guldin Theorem. Book VIII treats of theoretical mechanics, and Sir Thomas Heath mentions the fact that Carpus (*fl.* about 100 A.D.), to whom Pappus here refers, "seems in reality to have been anticipating the modern view of an angle as representing divergence rather than distance" and to have had the idea of rotational as distinct from linear measure.

The French language has been the medium used by two noteworthy historians of mathematics in the present century, Paul Tannery (most of whose works have been edited posthumously by or under the direction of his widow) and M. Ver Eecke. The latter has given us other excellent translations of the Greek classics,—the works of Archimedes, Apollonius, Diophantus, Theodosius, and Serenus,—a remarkable achievement in only a few of the years allotted to man. Neither of these historians was a member of a university faculty; neither was closely connected with any of his country's schools; Tannery held a post in the French tobacco monopoly, and Ver Eecke is an "Ingénieur des mines" in Belgium and "Inspecteur général honoraire du travail." Each carried on the traditions of such laymen as Vieta, Fermat, Descartes, and Leibniz—great leaders in the discoveries of knowledge and in opening new vistas to all "who have eyes to see."

One regret will be voiced by all scholars who have occasion to read these volumes, the publication of which has been made possible by the Fondation Universitaire de Belgique—they have no index either to each part or to the two together. There is not even a table of contents. Without such aids the books lose much of their value. A reader who wishes to find a reference to Guldin, the quadratrix, or the glossocome, for example, must thumb through more than 800 pages, and even then will be fortunate if he finds what he seeks. It is no spirit of fault-finding criticism which will prompt scholars generally to express regret that such an omission should be allowed to detract so much from the value of a work of this importance.

That this and the other translations of M. Ver Eecke, mentioned above, should be in every college or university library need hardly be suggested. They are invaluable to all students of the history of Greek culture in general and mathematics, physics, and astronomy in particular.

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