MR1218621 (94k:01004) 01A05 (01A35 01A40)
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★Les mathématiques dans l'Occident médiéval. (French. French summary) [Mathematics in the medieval West]

Mathématiques et Civilisation. [Mathematics and Civilization]
Editions Terre Haute, Lausanne, 1993. vi+352 *pp. ISBN* 2-9700025-0-7

The book under review grew out of a course on the history of medieval mathematics held at the Federal Polytechnical High School, Lausanne, 1977–1980, and it can adequately be thought of as a cross between a sourcebook and a textbook for similar courses.

The first part of the book (114 pages) gives the general background together with the bibliographical apparatus: an "Introduction" formulating the view of history and its relation to mathematics, followed by an 8-page bird's-eye view of the history of Mesopotamian, Egyptian, Chinese, Indian and Greek mathematics; a presentation of the political and cultural context of medieval mathematics (5th to 15th century); and a presentation of "mathematicians" from Macrobius and Boethius to Dürer and Orance Fine (these names will suffice to show that the orientation of the book is broad-minded). A chapter of "synthesis and reflections"—concerned with the nature and achievements of medieval mathematics as well as with what mathematics is—closes the first chapter, arguing for the necessity of an (Aristotelian and Thomist) moderate philosophical realism for the understanding of the nature of mathematics.

Parts 2 and 3 are dedicated to the presentation of sources. Both combine discursive expositions with the translation of select passages (occasionally the original Latin or vernacular is used) and paraphrases by means of modern conceptualizations and symbolism, in a way which is on the whole adequate if intended for a public of mathematics students. When deemed necessary (e.g., in the case of optics and trigonometry), the historical background is presented in a similar way.

Part 2 is concerned with arithmetic and with algebra (thus the heading); as a matter of fact, "algebra" stands for certain aspects of the theory of numbers and for quasi-algebraic techniques such as the single and double false position. For reasons which remain obscure to the reviewer, nothing is told about the al-Khwārizmīan discipline which the Latin Middle Ages baptized "algebra", and while all other chapters in Leonardo Fibonacci's *Liber abaci* are discussed, the final chapter on algebra is forgotten. In the cases of Chuquet and Pacioli we are told about their formalism, but still nothing about algebraic technique.

Part 3 deals with geometry, with optics and perspective, and with trigonometry. The main works representing geometry are Savasorda's *Liber embadorum*; the *Liber de triangulis Jordani*; Bradwardine's *Geometria spectulativa*; Oresme's theory of the latitude of forms (understood as a fully developed theory of functions); Chuquet's *Géométrie*; and Dürer's *Unterweysung der Messung*. The section on optics contains an extensive presentation of Witelo's *Perspectiva*, while perspective theory is portrayed in particular through Brunelleschi, Alberti, and Piero della Francesca. Regiomontanus' *De triangulis* dominates the chapter on trigonometry.

On the whole, the book may serve as a textbook for courses aimed at students of mathematics.

However, a number of shortcomings should be noted (apart from a sometimes slightly perplexing organization of the material, which suggests that three originally separate volumes have been glued together without editorial second thoughts).

First, the treatment of the historical and cultural contexts builds mainly on Will Durant's popular *Histoire de la civilisation*. As a consequence, the point of view is highly traditional, and untouched by postwar historical insights. Much the same can be said about the introductory overview of the history of pre-Latin medieval mathematics. Worse, the author's knowledge of publications that have appeared since K. O. May's *Bibliography and research manual of the history of mathematics* [Univ. Toronto Press, Toronto, ON, 1973; MR0530717 (58 #26679)] is poor. Thus, according to Part 3, p. 240, a study of Piero della Francesca's algebra is needed—17 and 16 years, respectively, after the appearance of S. A. Jayawardene's and M. D. Davis's studies, and 23 years after Gino Arrighi's publication of the text. Marshall Clagett's work notwithstanding, the *Liber de triangulis Jordani* is believed to stem from Jordanus' hand; the list could be extended.

The paraphrasing in modern concepts, though mostly successful, is also occasionally misleading; thus, the author continues the mistake (inaugurated, it is true, by Curtze and Grant) that Oresme's *Algorismus proportionum* deals with fractional powers of rational numbers, and not with the addition, subtraction and multiples of ratios understood as relations between numbers (and then wonders that Chuquet and Pacioli do not list these powers of the algebraic unknown). Evidently, a broad presentation of the ancient theory of proportions, in particular, in its musicological context, would have been just as appropriate as the explanation of ancient optics. Similarly, when the author touches briefly on later developments of an idea (in itself a relevant question) he does not make clear, e.g., where Fibonacci's argument stops and the modern author takes over.

All in all, however, these shortcomings are not decisive; the teacher who wants to use the book will certainly be able to repair them by means of supplementary material and commentary.

Reviewed by *Jens Høyrup*