Review of

A Cultural History of Mathematics in the Medieval Age, edited by Joseph W. Dauben, Clemency Montelle and Kim Plofker. (A Cultural History of Mathematics, volume 2). London etc.: Bloomsbury, 2024. Pp. xx+263.

This is the second volume of a six-volume series. Since the reviewer has not seen the others, however, the review does not consider this totality but only the present volume.[1]

The geographical range is broad – Chinese, Indic, Islamic,[2] Byzantine and Christian Latin culture. As the editors apologize, space has not allowed more than episodic inclusion of Korean and Japanese material; the volume has also had to concentrate on the most prestigious languages of the areas in question, allowing only occasional references to Dravidic, Persian, Syriac, Italian and German matters – mainly to their interaction with what in the actual context and in view of available sources must be considered the major currents.

Similarly, the chronological framework is delimited pragmatically. When Europe is concerned, the term "medieval" is used in the standard way (*ca* 500 to *ca* 1500). Though with some backward references to Han (and even Chin) mathematics, China is covered from the end of the Eastern Han until the end of the Ming Dynasty (386 CE to 1644), and India from the early Common Era until the waning of the Mughal Empire in the early 18th century. The Islamic world only emerged as a cultural area in the 8th century, and it is discussed until *ca* 1700.

Thematically, the volume ranges from social to intellectual history, and even to some technical matters; rarely, however, the kind of technical matters one would normally find in a presentation of the history of mathematics – it is taken for granted, for example, that the reader understands what simultaneous linear equations are, and left to other publications to explain how precisely such equations look in Chinese mathematics.

---

[1] Actually, the paper version of the book was stopped by Danish customs that asked for an exorbitant handling fee. The review is therefore based on a not quite finalized digitized version. Since some errors (for instance in numbers) may have been corrected in the final proofs, I shall not deal with them; in any case the number errors are mostly so glaring that any reader will discover they are wrong if they should have escaped the proofreading.

[2] Some of the authors sometimes make use of the neologism "Islamicate" as a way to keep in mind that not everything in the *dār al-Islām* (the "House of Islām") was Muslim; others (whom I shall follow) simply use "Islamic" with the same meaning.

After an extensive introduction, written by the editors, chapter 1 (written by the same) deals with “Everyday Numeracy – a Thousand Years of Reckoning”. It deals not only with number systems and ways to deal with fractions but also with metrologies (including calendars) and with record keeping (both very diverse, and evidently only a small sample can be discussed). It also takes up the social uses of all this – who did what, how were they taught, how were practices controlled?

Chapter 2 (Clemency Montelle and Kim Plofker) discusses “Practice and Profession: the Teacher, the Trader, the Almanac Maker – Livelihoods of Medieval Mathematics”. All these were members of professional groups that made heavy use of mathematics in their trade. At first, examples are given of the professional lives of agents of large commercial enterprises and astronomers; then follow public administrators and astrologers (often in “public” service, too); accountants; the cluster consisting of surveyors, architects and engineers; and the teachers of these “mathematical practitioners”.

Chapter 3 (still Montelle and Plofker), “Inventing Mathematics: the Branches of Mathematics Take Shape” moves from these aspects of social history to the intellectual history of mathematics: namely to the written material surviving from teaching. It is pointed out with due regret that oral instruction, thought of utmost importance, can only be known through its occasional reflection in the written sources (not restricted to the textbook genre, however); further it is observed that when we go beyond the elementary level, the modern distinction between “research texts” and “didactical texts” is irrelevant.

A distinction between “disciplines” might also be inadequate, but the formation of “branches” beyond the four-pronged quadrivium which the Islamic and European mathematical cultures had inherited from classical Antiquity is meaningful. Among those that are discussed, the use of the Rule of Three and the decimal place-value system with appurtenant algorithms may be mentioned along with various kinds of equation algebra; series and combinatorics; geometry and trigonometry; and numerical approximation techniques. On the philosophical fringes of mathematics proper, interest in infinitely large and small quantities and metamathematical discussions are taken up in the end.

Chapter 4 (Joseph Dauben), “Mathematics and World Views: Medieval Views of the World – in the Heavens and on Earth” at first delineates the classical and medieval cosmologies of China and India, and the Islamic modifications of Ptolemaic cosmology. It goes on with “innovative worldviews in Europe” – not least suggested revisions of the Aristotelian system. In the end, atomism in Indian, Islamic and European Latin thought is discussed.

Chapter 5 (Jian-Ping Jeff Chen), “Describing and Understanding the World: Medieval Mathematics of the Heavens and the Earth”, focuses “on how mathematics contributed to describing and understanding the natural world through astronomical modeling and astrological prediction (in particular through trigonometric techniques), cartography and mapmaking, land surveying, and where applicable, optics and actuarial problems, including games of chance”. At first, mapmaking in China and India is spoken of; next timekeeping and clocks in China, in the Islamic world and in the Latin world. Another look at the mathematical writings of India, the Islamic world and Latin Europe follows. Finally the chapter describes the transmission of mathematical knowledge between these areas, as well as the transmission from China to Korea and Japan.

Chapter 6 (Dauben, Montelle, Plofker), “Mathematics and Technological Change: Building and Measuring in the Astrolabe Age”, deals with the astrolabe itself as a minor topic only among the many other instruments that were constructed; it also takes up other constructions, from the Great Wall to Islamic *muqarnas* and Gothic cathedrals, as well as tools such as tables and the Chinese abacus.

Chapter 7 (Sonja Brentjes and Nathan Sidoli), “Representing Mathematics: Formats – Disciplines – Practitioners”, deals with “a set of basic formats that were used in different mathematical sciences” (diagrams and formats of texts) and practices such as sketches or visualizations of arithmetical procedures; in the end it looks at the border area between mathematics and visual arts, in particular representations of astral sciences and divinatory practices.

As can be seen from this survey, the work goes far beyond what can be found in normal broad expositions of the history of mathematics. It is an instance of what in French would be called *haute vulgarization*, “high-level popularization”. Given the expanse of the field that is dealt with (geographically as well as thematically), it goes by itself that the authors, though wide-ranging as well as careful scholars, will sometimes have had to rely on secondary or tertiary literature – occasionally taken over mistakes therein contained. This working is illustrated by the way references are made: sometimes these include page numbers, sometimes they are restricted to identification of the publication that is used, but very often such things as the authors know from their own work are simply stated; many quotations are also taken from the tertiary literature.

This is how *haute vulgarisation* is made. We all do like this, borrowing of mistakes included, if we dare at all approach this demanding genre (not to mention the blunders we commit willy nilly even in our most narrowly oriented work). We should remember what Leopold von Ranke wrote in 1874, summing up a life-long striving to get at least those facts right which he dealt with:

> The question may actually be raised whether the working-out of general views can at all be reconciled with that accuracy of research that alone can give it certainty and specificity. Historical research is indeed by its very nature directed toward particulars. But it will be granted me that it fails its aim if it gets stuck in these.[3]

The aim of the work under review is to offer us a much broader view than usually offered of what mathematics has been during a specific though long historical epoch and thereby (implicitly) also to inspire better informed questions to the culture of mathematics today. That aim it certainly does not fail.

[3] Leopold von Ranke, *Zwölf Bücher preußischer Geschichte* (Leipzig: Duncker & Humblot, 1874), vol. I p. xi, my translation.