

potentially capable of transforming itself in all the others, provided the overall cosmic balance is maintained. This theoretical exposition of Seneca's serves as an explanation of the universal flood.

Pasquale Rossi's paper deals with Seneca's study of the Nile's flood and focuses on the philosopher's attitude in analysing and then criticizing other authors' views. What is of great interest in Seneca's work is the fact that he does not suggest an explanation to the problem; thus he provides an enlightening example of the scientific process: although one is not able to give a solution, a critique of ancient theories is needed to make research advance. On the same subject, Daniele Pellacani provides an up-to-date bibliography.

Arturo De Vivo treats the topic of earthquakes in *Naturales Quaestiones*. Seneca encounters this theoretical issue because of his personal experience of an earthquake in Campania, in 62 AD. Scientific inquiry is, then, needed in order to stave off fear. By suggesting his hypothesis (that is, earthquakes were caused by subterranean air), Seneca's narrative style resembles a tale, and represents a historiographical format which is not usual in scientific works.

Francesco Citti recalls Seneca's *De otio* in order to show why, according to the author, research on natural sciences is demanded: it is the most praiseworthy way to reach *res publica maior*, rather than taking part in political life. Hiro Harai shows how Justus Lipsius used Seneca's *Naturales Quaestiones* to make Stoicism compatible with Christian theology. Bardo Maria Gauly's contribution to the volume deals with Seneca's studies on comets. The fortunes of *Naturales Quaestiones* throughout different ages have been exploited by Fabio Nanni and Daniele Pellacani: Seneca's thought seems to be of interest even for Michel Foucault and Georg Cantor.

The papers included in this book represent a rich contribution to research on the history of science dealing with Roman antiquity. Moreover, they are all of high quality and remedy a remarkable poverty in the literature on Seneca's scientific work.

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JOSÉ CHABÁS and BERNARD R. GOLDSTEIN, *A Survey of European Astronomical Tables in the Late Middle Ages*. Leiden: Brill, 2012. Pp. xix + 250. ISBN 978-90-04-23058-3. €107.00 (hardback). doi:10.1017/S0007087413000472

Astronomical tables abounded in late medieval Europe. They survive in hundreds of manuscripts, testifying to their theoretical interest for scholars and, especially, to their practical utility. Their proliferation stemmed from tremendous consolidation efforts undertaken for Alfonso X of Castile (1221–1284), but they depended for their underlying theory and observational data on centuries-old work, most notably that of Ptolemy. This 'Greek' tradition was filtered through centuries of Arabic-language scholarship, whose most significant contributor was al-Battānī (d. 929); alongside it ran a parallel and eventually cross-fertilizing 'Indian' tradition, represented by al-Khwārizmī (fl. 830) and his successors. In addition, a flourishing strain of astronomy in Hebrew, exemplified by Levi ben Gerson (d. 1344), should be mentioned. In the early fourteenth century the work of the Alfonsine astronomers underwent considerable study and modification in Paris; this led to the dissemination of Alfonsine tables, largely in Latin, across western Christendom.

This dissemination of astronomical knowledge is a fascinating story, which is still in the early stages of reconstruction; the tables themselves provide essential evidence in mapping the transit of knowledge. However, so far they have largely been studied as individual manuscripts or, at best, as strands within the wider tradition. Exceptional in this regard are the articles by E.S. Kennedy – 'A survey of Islamic astronomical tables', *Transactions of the American Philosophical Society* 46 (1956), pp. 123–177 – and by David A. King and Julio Samsó, with Bernard R. Goldstein – 'Astronomical handbooks and tables from the Islamic World (750–1900): an interim report', *Suhayl* 2 (2001), pp. 9–105. But such work has not hitherto been undertaken on Western manuscripts.

In their earlier study of *The Alfonsine Tables of Toledo* (2003), Chabás and Goldstein wrote that

a special problem with these tables is that there is no adequate survey of the hundreds of manuscripts preserved in a great many libraries, and it is unlikely that such a survey will become available in the foreseeable future. Further, there is no systematic survey or description of the tabular material generated in Paris in the early 14th century: the tables that later appeared in the *editio princeps* of the Alfonsine Tables (1483) have been the focus of attention, while other tabular material has largely been ignored (p. 244).

It is this deficiency which the authors are working to rectify in the current book. They describe their efforts as

a first attempt to classify and illustrate the numerous astronomical tables compiled from about the 10th century to the early 16th century in the Latin West . . . the aim of this survey is neither to be exhaustive nor to edit tables, but to give a framework, with respect both to the approach and classification, for future studies of medieval astronomical tables (pp. xviii–xix).

As such, this is more than a survey: it is also a guide or handbook, and to some extent a manifesto for further work in this field.

Before proceeding to praise the depth of focused scholarship represented by this work, it is perhaps desirable to note what it is not. It is not, as the authors acknowledge, a history of astronomical tables. Nor, despite the publishers' claim that the potential readership includes 'all those interested in the history of science in the Middle Ages', is it particularly accessible to those unversed in the principles and terminology underpinning ancient and medieval astronomy. The authors have explained a number of complex issues as thoroughly as can be expected in a slim volume. They include twenty-six diagrams, which are conducive to theoretical understanding, though in a few places, such as the section on spherical astronomy, the three dimensions could perhaps have been represented with more clarity. On some topics, such as eclipses, the authors have done a marvellous job of summarizing the theory clearly enough to necessitate no further reading. In other areas (notably precession and planetary latitudes), their explanation is unlikely to be sufficient for those not previously familiar with the material, but their watertight referencing makes it easy for readers to consult more detailed explanations of each concept. Readers seeking an introduction to late medieval astronomy will want to work up to the present volume, but might be advised first to seek a more gentle initiation into the basic concepts and terminology, perhaps with James Evans's primer, *The History and Practice of Ancient Astronomy* (1998).

But this volume is first and foremost a survey, not a primer, and as such it presents an unprecedented picture of the variety of tabular material produced in this period, drawn through years of painstaking research (whose finely balanced frustrations and rewards are hinted at in the Preface). It is arranged according to nineteen categories of tables: trigonometry and spherical astronomy, precession and apogees, mean motions and radices, and so on. Within these category chapters, explanations of the theories and their significance are given alongside almost 160 tables, which present material from eighty manuscripts. Most are substantially redacted,

taking from [each] table as much as is necessary to establish its character and to identify the extremal values of the entries or the parameters on which the table is based, for our aim here is not to edit tables but to give the reader the tools to identify and understand them (p. 11).

Some – perhaps the most useful for a general reader – collate historical values for a particular parameter from a wide range of sources. This presentation may exaggerate the heterogeneity of the material, but that is perhaps the inevitable price for such comprehensive coverage.

The authors make no concluding remarks, modestly leaving the wealth of material they have compiled to speak for itself, and to stand as a resource for the analyses and conclusions of other scholars. And it is a tremendous resource. It will perhaps be most useful for scholars studying the work of individual astronomers, who will find invaluable comparative, contextualizing, and explicatory material here. But it is also of interest to anyone seeking to understand the tremendous productivity, mathematical creativity and competence of medieval astronomers. The authors are to be thanked for this considerable contribution to scholarship in this field.

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ALAN STEWART with HARRIET KNIGHT (eds.), *The Oxford Francis Bacon, vol. 1: Early Writings, 1584–1596*. Oxford: Clarendon Press, 2012. Pp. lxi + 1066. ISBN 978-0-19-818313-6. £210.00 (hardback).

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Although now often thought of exclusively as a natural philosopher, Francis Bacon did not publish his first work of natural philosophy, *The Advancement of Learning*, until 1605, when he was aged forty-four. As Alan Stewart observes in his introduction to the latest volume of the Oxford edition of Bacon's works, a number of factors have converged in recent years to encourage new work on earlier parts of his life, when Bacon was an up-and-coming lawyer increasingly drawn to the circle surrounding Robert Devereux, the second Earl of Essex (p. xxvi). Now, in many cases for the first time, we have the opportunity to examine Bacon's written works produced during this time.

This volume contains twenty-three works, almost all of which reflect Bacon's political and legal activities in this period; only a handful of them have previously been published. Like previous contributions to the Oxford Francis Bacon, all are printed here in versions that adhere to the principles of modern editorial scholarship, including the preservation of original orthography and the provision of facing-page translations for works originally written in a language other than English (including, here, Law French). The level of scholarship on display is deeply impressive; not only has Stewart obviously spent a considerable amount of time in archive and library collections, but he has also provided remarkably detailed commentaries accompanying each work. This edition will be considered definitive until new witnesses are (as they inevitably will be) uncovered.

The volume will be of interest to scholars keen to examine Bacon's writings on some of the most pressing political issues of his day: the twin threats of Spain and factionalism (*Letter of advice to the queen* (1584–1585)), the Marprelate controversy (*An advertisement touching the controuersyes of the Church of England* (1589)) and religious toleration (*On the religious policies of the queen* (c.1589)). Those seeking to chart his movements in the tangled politics of the 1580s and 1590s will also benefit from scholarly editions of such works as *Certaine obseruations vppon a libell* (1593), in which Bacon comes to the defence of his uncle Lord Burghley; *A true report of the detestable treason intended by Doctor Roderigo Lopez* (1594), which can be read as a justification for the Earl of Essex's actions against the queen's doctor; and the *First letter of advice to the earl of Essex* (1596), which contains the futile, in retrospect, maxim, 'wyn the Queene' (p. 731). The book also features Bacon's engagements with some of the legal debates of the time, including the status of royal charters (*A discourse vpon the commission of Bridewell* (c.1587)) and advowsons (*Reading on advowsons* (1588)). The political and the legal should not, of course, be thought of as separate spheres; Stewart reminds us, for example, that the *Argument in Chudleigh's case* (1594) coincided with Bacon's furious lobbying for a senior legal position (p. 452). Similarly, Bacon's contributions to contemporary performance culture at the Inns of Court and at court should not be seen as removed from politics; the *Orations at Graies Inne revells* (1594–1595), for example, takes the form of speeches of advice to a prince, a format to which Bacon returned in *Essex's device* (1595).