

of the mathematicians themselves. The publishers are to be congratulated on having produced a very fine volume, although without doubt the somewhat fearsome price tag of €229 will probably act as a deterrent to all but university libraries. Indeed, it will be interesting to see if Elsevier goes on to produce other books of this kind, such as one covering Western mathematics during the four centuries before 1600. In particular, this reviewer hopes that the success of this endeavor will inspire similar works on landmark writings in *non-Western* mathematics.

Adrian Rice

H. L. L. Busard, *Campanus of Novara and Euclid's Elements* (Stuttgart: Franz Steiner Verlag, 2005), 2 vols. 768 pp. €115. hc. ISBN 3-515-98645-5.

When handing in the last part of the manuscript for his monumental *Introduction*—so the story goes—an exhausted George Sarton muttered ‘nevermore’. This last part appeared 22 years after the first volume. H. L. L. Busard could have said as much when finishing the manuscript for the present work, not because of personal exhaustion (there is no sign of that), but because the task is as finished as it can ever be. Beginning 39 years ago with books I–VI of Hermann of Carinthia translation, Busard has now given us all the previously known high-medieval translations and redactions of the *Elements*, plus one that he discovered himself. Only single manuscripts containing uninfluential personal adaptations (or commentaries) of unidentified scholars remain unpublished.

The present two volumes contain the redaction of Campanus de Novara, which remained the version used by working mathematicians until it was displaced in the later 16th century by Clavius's editions, equally well adapted to the context where they were used (the marginal annotations in 16th-century printed editions containing both the Campanus version and Zamberti's translation of an inferior Greek manuscript show that Campanus was preferred). For this redaction we possess not only information about its author and the approximate date of its preparation—(presumably late) 1250s—but also two very early manuscripts

possibly prepared under Campanus's supervision. Busard's edition is based on the earliest of these (Florence, Bibl. Naz., magl. vol. XI, p. 112, from 1259), collated systematically with New York, Columbia University, Plimpton 156 (from before 1261 and possibly a gift from Campanus to the Patriarch of Jerusalem) and with the earliest printed edition (Venice, Erhard Ratdolt, 1482). Eight other manuscripts from the 13th (in three cases, possibly the 14th) century have been consulted less systematically (in total, 131 manuscripts are known). The notes reveal that Busard has also controlled the printed Paris edition from 1516, which combines the Campanus text with Bartholomeo Zamberti's translation.

The edition itself covers 478 pages, the critical apparatus 146. The edition is preceded in volume I by an introduction of 52 pages, and the critical apparatus in volume II by 80 pages Notes and Commentaries, and eight pages of Bibliography.

Forty pages of the introduction are taken up by presentation of the complete set of Greco-Latin and Arabo-Latin translations of the *Elements*, starting briefly by that of Boethius and the Verona and the ninth-century fragments, but concentrating on the 12th- and 13th-century versions—thus not only on Campanus. All questions of date, authorship, and mutual relations are discussed, together with the character of the single versions, as are the influence of other works on the various redactions as well as use of them in later writings. Obviously much of this draws (at times verbatim) on the author's earlier editions of the single texts, but having it all drawn together from the vantage point of the completed project is very useful; some arguments of importance are also new.

What is said about the Campanus version is obviously not drawn from earlier editions; but it confirms and expands the analysis made by John E. Murdoch and others concerning the didactical adaptation of the work. Close attention is given to the influence of Jordanus's *Arithmetica* and Johannes de Tinemue's redaction ('Adelard III'), both documented beyond any doubt, and to the probable influence of the Greco-Latin translation and the al-Nayrīzī's commentary as translated by Gherardo da Cremona.

Next follows a section *The Man and his Works*, providing in 10 lines the barest biographical facts and then discussing in precise detail the arguments favouring Campanus's responsibility for redactions of Theodosios's and Menelaos's *Sphaerica*, of Aḥmad ibn Yūṣuf's *De proportione et proportionalitate*, and of the anonymous *De figura sectore*, and for additions to a number of manuscripts of Jordanus's *Arithmetica*. Campanus's involvement in a *Quadratura circuli* ascribed to him by Albertus Saxonus is rejected.

The Notes and Commentaries in volume II analyse the relations of a large number of propositions (an abundant half of all) and definitions to the corresponding propositions etc. in other medieval redactions of the *Elements* and to al-Nayrīzī's commentary (at times also to other works belonging to the Latin, Arabo-Latin or Arabic traditions). In cases where Campanus innovates radically (e.g. in his discussion of the non-Archimedean character of horn angles in an addition to vol. III, p. 15), the innovation itself is also taken up together with its further impact.

Some 10 years ago the present reviewer asked Busard, who had then begun the work on 'Adelard III', whether he intended to take up Campanus after that. Busard's answer was no, he saw no reason—the Campanus edition was already available in 16th-century print. Everybody interested in medieval Latin science should be grateful that he changed his mind.

*Jens Høyrup*

Andrew Brown, *J. D. Bernal: The Sage of Science* (Oxford: Oxford University Press, 2005). 554 pp. £25. hc. ISBN 0-19-851544-8.

Although not the first biography of J. D. Bernal (1901–1971), Andrew Brown is the first to have benefited from full access to his personal papers. While previous biographic attempts have been judged either biased or incomplete, Brown, a practicing radiologist and historian of science, is the first to tell the full story. He does so with an impressive wealth of details collected from primary sources, Bernal's extensive notebooks and diaries in conjunction with personal interviews.

From the very first page we follow Bernal from his childhood in Ireland to the undergraduate years in Cambridge, where his encyclopedic range of knowledge quickly earned him the name 'Sage'. Having acquired a degree in Natural Science, he moved to the damp cellars at W. H. Bragg's laboratory at the Royal Institution, where he started pioneering theoretical and experimental research in the new and burgeoning field of x-ray crystallography, a line of research that resulted in substantial contributions to the structural determination of complex organic substances of fundamental importance for biological processes (e.g. proteins and sterols) that later helped to pave the way for the revolutionary discovery of the DNA structure and the new field of molecular biology. Bernal was an inspiring research leader and his disciples included an impressive array of Nobel laureates. He did not win the Nobel Prize himself. The reason may very well be that science was never enough for his wide-ranging intellectual, cultural, and social appetite. During his studies at Cambridge he 'converted' from Catholicism to socialism and soon after again to Freudianism and Marxism, the new religions for young radical intellectuals in the 1920s. Bernal, however, would practice them both for the rest of his life.

In the 1930s, Bernal's political commitments escalated in response to fascism. Authorship of the influential *The Social Function of Science* (1939), his organizational work and pioneering efforts in aerial defense research made him the central figure in the radical scientist movement. All this is well known. As to Bernal's role in the allied war research and his seminal part in the planning of the successful allied D-day landing at the beaches of Normandy, Brown supplies new material enabling him to settle many of the questions, which has surrounded this controversial part of his life. After the war Bernal's pace of activities reached amazing heights. Among other things, he was a driving force in the communist-led World Peace Council, acted as an advisor for leaders of many socialist and developing countries, wrote the four volumes of his *Science in History* (1954), and still managed to direct his research group at Birkbeck College. Bernal's insistent ethical view that the ultimate aim of science in peacetime is to improve human

This is an electronic version of an article published in Centaurus: complete citation information for the final version of the paper, as published in the print edition of Centaurus, is available on the Blackwell Synergy online delivery service, accessible via the journal's website at <http://www.blackwellpublishing.com/cnt>