

clearly a very slippery matter. There is much clearer evidence for the existence of witches, ghosts, and murderous Scotsmen to be found there than rings of Saturn.

Usher believes such telescopic data came from Thomas Digges and his son Leonard. The Diggeses and William Bourne (all working in England) had an optical 'solution' that involved a convex lens and concave mirror, it seems. This could work, sort of. Unfortunately, the state of the evidence prior to 1608 is confused and tantalizing, partly because people then were just feeling their way along with no useful theory to guide them. They did not know what they had or where it could lead. As for claims of telescopes in England before Thomas Harriot, and seeing the rings of Saturn, there is no scientific evidence. Shakespeare is sublime, of course, but so is Homer. And sweeping claims about archaic Greece and the actuality of the Trojan War, based on the Homeric poems, is just as much wishful thinking as telescopes in England before 1608. I highly doubt Usher's book will change that.

It seems clear that a combination of convex plus concave eyeglass lens did exist as early as the late fifteenth century. There are claims for such a device (of very low power) attributed to Leonardo da Vinci, and they certainly existed by about 1590. Essentially a 1× device existed as a curiosity before 1608—a kind of vari-focus eyeglass. This required no better glass quality to work than was found in common spectacle lenses. But it could not possibly resolve the rings of Saturn.

That said, it is certainly true that literary scholars for a century or more have delighted in telling readers that Shakespeare evinced no interest in the Copernican worldview. This is false, as Usher and others have recently shown. Likewise, literary scholars have said the same about John Milton, but this view has also been conclusively proven false as well (Cunningham, 2016; Leonard, 2013). Thus, a large swath of astronomy as expressed in English literature of the seventeenth century has been distorted and misrepresented. One must give due credit to Usher for his detailed study in this book.

However, I must give some detail of just one of several conclusions that could best be characterized as jaw-dropping. The setting is scene 5 of *Hamlet*, where he encounters three skulls. Hamlet, Usher writes, "... immediately recognizes Skull 1." First likening it to a politician, "Hamlet says that Skull 1 also could be that of a 'courtier ... and might be my Lord Such-a-one.'" Usher takes this to sur-

mise that

Lord Such-a-one could be a bishop and since Copernicus was a canon in the Church, he owed the bishop deference ... A canon shows deference to a bishop just as a courtier shows deference to a sovereign.

This leads to a final, stunning, conclusion by Usher:

Skull 1 appears to have been knocked about the mazard with a sexton's spade ... The recent unearthing and reconstruction of the skull of Copernicus reveals a broken nose which Shakespeare must have known when misleadingly he attributes the skull's damage to a sexton's spade. (pages 74–75).

The book has two typos: "by the its motion" on page 3; on page 78 "as well the stick" should read "as well as the stick". Also, the assertion (page 154) that the magnitude scale was invented by Hipparchus is spurious.

At the outset of the book, Usher states

... my goal is limited to seeing whether evidence is self-consistent and sufficient to advance the thesis that astronomy and cosmology played a significant role in Shakespeare's life and work.

Since so little is known of the Bard's life, that goal is really unattainable; but Usher admirably fulfills the goal regarding Shakespeare's work despite making connections of astonishing audacity. This book will certainly generate a lot of impassioned examination in the world of Shakespearean scholarship, and that is a very good thing, as it has for far too long been in the thrall of literary scholars who know nothing about astronomy.

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Publishing Sacrobosco's De Sphaera in Early Modern Europe: Modes of Material and Scientific Exchange, by Matteo

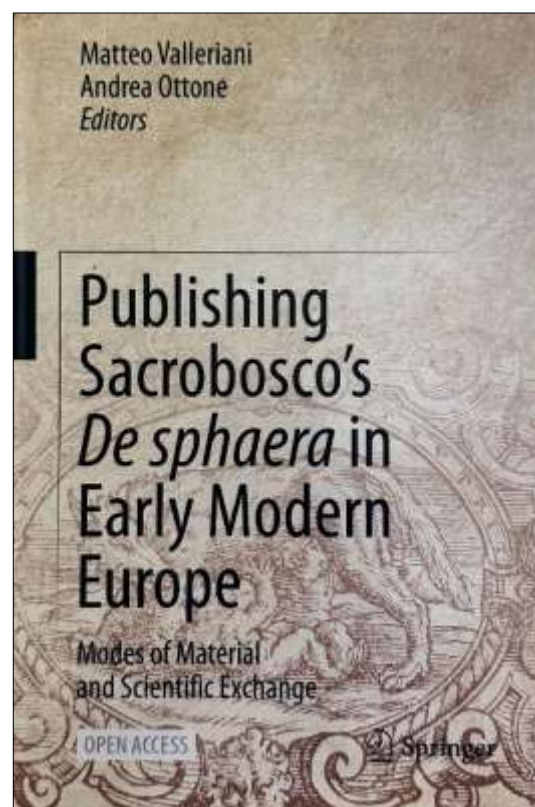
Valleriani and Andrea Ottone, eds. (Cham, Springer, 2022). Pp. xiv-492. ISBN 978-3-030-86599-3 (hardback), 160 × 240 mm, US\$59.99; free with Open Access.

This collection complements the earlier *The 'Sphaera' of Johannes de Sacrobosco in the Early Modern Period: The Authors of the Commentaries*, ed. by Matteo Valleriani, 2020.¹ Both volumes present the results of the research project “The Sphere: Knowledge System Evolution and the Shared Scientific Identity of Europe”, directed by Matteo Valleriani and hosted at the Max Planck Institute for the History of Science in Berlin. In addition, all the studies in both volumes are linked to the database *Sphaera Corpus* (<https://db.sphaera.mpiwg-berlin.mpg.de>) and provide access to the digital reproductions of the *Sphaera*'s printed editions and to its commentaries from the first printed edition in 1472 to 1650; that is, when the work ceased to be seen as an adequate introduction to astronomy and cosmology. If the 2020 volume dealt with the theoretical aspects of Sacrobosco's booklet and the commentaries that presented, clarified, discussed and expanded its content in connection with recent developments in astronomy, the one under review studies the printed editions of the *Sphaera* from the point of view of the history of the book as a product that, with the collaboration of authors, was designed and produced mainly by printers and publishers for the market of students and professors of the Arts Faculties in European universities.

The central role of printers and publishers is synthetically addressed by the two editors in the first chapter (“Printers, Publishers, and Sellers: Actors in the Process of Consolidation of Epistemic Communities in the Early Modern Academic World”). From their examination it appears that the most important publishing centers of the *Sphaera* in the fifteenth and early sixteenth centuries were Paris, Venice, and Leipzig. The studies by Richard Oosterhoff, Catherine Rideau-Kikuchi and Richard L. Kremer are concerned with this early phase of the *Sphaera*'s printing history.

Oosterhoff (Chapter 2: “Printerly Ingenuity and Mathematical Books in the Early Estienne Workshop”) examines the first phase of the Parisian editions of the *Sphaera*. A decisive moment in this phase is Wolfgang Hopyl's edition with the commentary by Lefevre d'Étaples in 1495,² after a first edition of Sacrobosco's text in 1489. Oosterhoff points out that the 1495 edition showed the printer's ambition to be recognized as more

than a mere mechanical craftsman by the ‘ingenuity’ displayed in the making of a book that taught the Parisian arts students to perform with the aid of Lefevre's commentary the mathematical calculations pertinent to astronomy. The new editions of Lefevre's *Sphaera* by Robert Estienne I and Simon de Colines are typographically more elegant, and culminate with the introduction of an elegant Roman Type in Colines' 1521 edition. Oosterhoff points out the progressive configuration on the one hand of the title page in substitution of the colophon and on the other hand the figured frontispiece as a representation of the technical-instrumental and literary character of astronomy, whose combination of practice and theory extends to the work of the printers-publishers.



C. Rideau-Kikuchi (Chapter 3) studies the first phase of Venetian editions, focusing on Erhardt Ratdolt, the most innovative and influential printer on the European market. The first Italian editions (1472–1478) contained only the *Sphaera*, but in 1478 Franz Renner, a Venetian printer who had pirated two former editions of Ratdolt, printed the *Sphaera* together with the *Theorica planetarum* of pseudo-Gerard of Cremona. Sacrobosco's text was accompanied by three images (concentric spheres, climates, eclipses). Renner's initiative was successful and had several imitators, among them Ratdolt's replica in 1482. In turn, Ratdolt published the

Sphaera together with Regiomontanus' *Disputationes contra Deliramenta Cremonensis* and Peurbach's *Theoricae Novae*, thus improving over Renner's edition, since it showed greater theoretical consistency by dispensing with the old *Theorica* and linking Sacrobosco's work with the most advanced astronomy of the time. A further improvement came with Ratdolt's 1485 edition, which published the *Sphaera* with the same texts as the previous edition, but using Roman characters. Thus, Ratdolt consolidated an editorial program that would be typical of later Venetian editions and would culminate in the in-folio editions of several hundred pages that from 1499 to 1531 comprised a large number of astronomical texts including several commentaries to the *Sphaera*. In addition, Ratdolt introduced a large number (24) of geometrical figures³ that illustrated and facilitated the understanding of the text. The illustrations were immediately copied throughout Europe, starting with the Venetian 1488 edition by Johannes Santritter.

In Chapter 12, R. Kremer focuses on the early Leipzig editions (1488–1521). Unlike Paris and Venice, the Leipzig editions served a local market, namely, the students of the universities of Saxony (Leipzig, Erfurt and Wittenberg), and provided Sacrobosco's text alone, that is, without any of the astronomical texts included in the Venetian editions. Of the fifteen editions published in this period and examined by Kremer, eight of them come with commentaries by masters from the University of Leipzig: Wenzel Faber, Conrad Tockler and Casper Jacob, whose commentaries are carefully described.⁴ In any case, the Leipzig Sacrobosco is an isolated microcosm, with three printers and the overwhelming dominance of one (Martin Landsberg, printer of 10 of the 15 editions) and with its own characteristics in terms of text, engravings and format (in quarto),⁵ which are repeated in all the editions and are clearly at the service of university teaching. Its existence ended when the fruitful (and internationally successful) adventure of the *Sphaera* produced in Wittenberg began in 1531.

The Wittenberg edition by Joseph Klug in 1531, with a dedicatory letter by Philip Melanchthon to Simon Grynaeus that would become famous and would be abundantly reproduced in later editions of the *Sphaera* in different countries, marked a new stage. The publishers, printers and booksellers of the city, benefiting from the impulse given to this small town by the foundation of the university in 1502, the remodeling of university education promoted by Melanchthon and the devel-

opment of the Protestant Reformation, produced and distributed throughout Europe a new design in octavo format that was widely imitated, even breaking confessional boundaries, in more than 50 editions until the end of the sixteenth century. After Isabelle Pantin's study of the origin, development and diffusion of the Wittenberg model in Valleriani (2020, 265–312), the Wittenberg contribution is considered by two chapters in this volume. In Chapter 4 ("Printers, Booksellers, and Bookbinders in Wittenberg in the Sixteenth Century: Real Estate, Vicinity, Political and Cultural Activities") Insa C. Hennen examines the settlement of these actors in the districts of the small town, their relationships and real estate holdings, as well as their integration into the civic elite and their entry into the city council. With greater attention to the production and marketing of the printed *Sphaera*, Saskia Limbach examines in Chapter 5 ("Scholars, Printers, and the Sphere: New Evidence from the Challenging Production of Academic Books in Wittenberg, 1531–1550") the emergence of Wittenberg, thanks to Luther and the Reformation, as the main publishing center in Germany. Limbach exposes the conditions of the actual production of the book, the constraints of production costs and product sales in a highly competitive market, the hegemony of publishers-booksellers and their sometimes-tense relations with printers and with authors, often complaining about the meagre payment received for their work. She also describes in detail (pp. 162–169) Melanchthon's decisive role in the 1531 edition of the *Sphaera* and the added value represented by his important dedicatory letter as well as his role in the successive entrusting of the edition to the printers Joseph Klug (1531–1540, 5 editions), Veit Kreutzer (1545 and 1549) and finally Johann Krafft (1550–1570, 10 editions). Further information is given on the high price of the book due to the large number of illustrations, the probable print run (a few hundred copies) and the fact that the same woodcuts were used in all editions after the first one of 1531 (pp. 169–176). The result is an excellent picture of the Wittenberg period of the *Sphaera*.

Two chapters deal again with the Parisian fortune. In Chapter 13 ("Publishing Mathematical Books of Parisian Calculatores (1508–1515)") Alissar Levy examines the program of mathematical teaching in Paris promoted by Ciruelo and other teachers of the Iberian provenance in connection with the Parisian edition of the *Sphaera* by Pedro Sánchez Ciruelo (1498).⁶ This program, associated with certain Parisian printers and publishers,

followed in the wake of the fourteenth century Oxonian calculators (especially Thomas Bradwardine) and until 1515 was an alternative to the more classical mathematics teaching program developed by Lefevre d'Étaples and his circle. With the departure from Paris of the Iberian *calculatores* the program ceased to give way, through authors and printers such as Oronce Finé, Simon de Colines, Robert Estienne II and others, to more advanced mathematical texts primarily addressed to an international audience.

This new stage is studied by Isabelle Pantin in Chapter 9 ("Mathematical Books in Paris (1531–1563): The Development of Publishing Strategies in a Competitive International Market"). From her vast knowledge of the French scientific books of the Renaissance, Pantin shows how the formation of the 'modern' mathematical book in Paris was the result of a number of factors: printing workshops well supplied with type, engravings and special characters; good quality French paper; a large local market that ensured a sale of production to the large number of students and teachers at the Parisian university and colleges; the cultural policy of the monarchs that promoted the renewal of book design, the teaching of mathematics and dissemination in the vulgar language; the initiative of publishers and booksellers who, with the security of the local market, could embark on the adventure of gaining a share of the international market. Pantin shows the decisive role played in this transformation by Guillaume Cavellat, a publisher specialized in mathematical books, who in collaboration with skilled mathematicians published between 1549 and 1563 76 of the 150 editions of mathematical books printed in Paris, offering the European public a product marked by the beauty and elegance of the printed page together with the clarity and precision of the information.

In Chapter 7 Alejandra Ulla Lorenzo examines the *Sphaera* editions in the Iberian Peninsula and in the New World by the activity of printers and publishers. As already noted in Valleriani 2020,⁷ the Iberian Peninsula differs from the rest of Europe by the predominance of editions in the vernacular (Spanish, Portuguese) over Latin editions. Of the seventeen editions printed, twelve were in the vernacular (2 in Portuguese and 10 in Spanish); the places of publication (Coimbra and Lisbon, Salamanca and Seville) indicate that the target public was the university (students and professors, also served by the Latin editions imported from Venice and Paris) and cosmographers and sailors linked

to oceanic navigation.⁸ In addition to the popularity of the work, present in library catalogues belonging to nobles, doctors, university professors, crown officials and humanists, the *Sphaera* passed, both in Latin (the editions with the commentary by Clavius in the versions of 1570 and 1601) and Spanish, to Spanish colonial America, where it was published, not in Sacrobosco's version, but in the more recent one by Francesco Maurolico (1494–1575), printed in Mexico in 1578, at the initiative of the Jesuit Vincenzo Le Noci, who had studied in Messina (Sicily), the place of Maurolico's birth and education.

In Chapter 8 ("The Giunta's Publishing and Distributing Network and Their Supply to the European Academic Market"), Andrea Ottone examines the history of this important firm of Florentine origin but centered fundamentally in Venice. The Giunta family established branches run by family members in Spain and France, with secondary offices in Italy (Rome and Palermo), constituting a network that, limited to the Catholic confessional area, ensured the efficient distribution of the books printed by the various branches. The chapter focuses on the organization of this

... organic network of distribution as the necessary infrastructure to sustain a consistent effort in specializing their publishing offering toward the higher professions. (page 282).

Since their production was centered in the fields of law, theology, philosophy and medicine, in addition to the liturgical literature, astronomy and the *Sphaera* constituted a marginal interest. The eight editions of the *Sphaera* produced between 1508 and 1579 are quickly examined (pp. 276–282), pointing out their production in the different branches (Venice, Salamanca, Lyon, Florence) with their different modalities, their objectives and the privileges granted by the local powers that ensured the profitability of the investment.

Paul F. Grendler examines in Chapter 11 ("The *Sphaera* in Jesuit Education") an important moment in the fortune of Sacrobosco that had not been covered in the previous volume: the Commentary by the Jesuit mathematician Christophorus Clavius (1538–1612) and the presence of the *Sphaera* in mathematical teaching in the schools of the Society of Jesus. Although Grendler refers for the astronomical and cosmological content of Clavius' Commentary to the studies by Lattis and Baldini⁹ and focuses on the success of the Commentary (numerous editions with abundant changes and additions between 1570 and 1611) and above all on its place in the

teaching in the schools of the Society, his study fills to some extent the gap of the preceding work.

Particularly interesting is the exposition (pp. 382–390) of Clavius' effort to expand the teaching of mathematics and astronomy (for which his Commentary on the *Sphaera* served in the successively expanded editions) in the Jesuit educational system and his confrontation with the positions, represented by Benet Perera within the Society and the Roman College, that questioned the scientific status of the mathematical disciplines and their application to natural philosophy. Grendler examines Clavius' various proposals to broaden the teaching of mathematics and to obtain institutional recognition for his mathematical academy at the Roman College on occasion of the prolonged discussion (1581–1599) on the educational system of the Society. Although the *Ratio studiorum*, finally promulgated in 1599, did not satisfy Clavius' aspirations, mainly because of the resistance of the Jesuit provinces to expand the teaching of mathematics, Jesuit schools did teach mathematics to a greater or lesser degree and used Clavius' commentary on the *Sphaera* until mathematical instruction changed in the middle of the seventeenth century.

Finally, two papers approach the editions of the *Sphaera* from another perspective. Ian Maclean (Chapter 6) does so from the declarations of the work in the Catalogues of the Frankfurt Book Fair in the period between 1576 and 1624. Maclean provides interesting information on some editions of the *Sphaera* announced in the Catalogues, such as the Italian edition by Francesco Pifferi (Siena 1604) dedicated to Cosimo II, Grand Duke of Tuscany, and especially that of Frankfurt 1625 with the commentary by Bernardus Morisani, an edition promoted by the exiled French Calvinist Pierre Mareschal. Maclean focuses in particular on the declarations in the Catalogues of Clavius' Commentary. Thus, his study complements that by Grendler. Maclean elucidates the successive editions of Clavius' Commentary which, starting from the first (Vittorio Eliano, Rome 1570), revised and enlarged the text: 1581 (Domenico Basa, Rome), 1585 (D. Basa, Rome), 1593–1594 (Brothers Gabiano, Lyon), 1606 (Giovanni Paolo Gelli, Rome), 1611 (Anton I. Hieratz, Mainz), differentiating them from the opportunistic editions of the Venetian publisher Giovanni Battista Ciotti (1591, 1596, 1601, 1603) and from those promoted by the Brothers Gabiano between Lyon and Saint Gervais (Geneva) in 1602, 1607 and 1608.

In Chapter 10 Matteo Valleriani and Christoph Sander examine ("Paratexts, Printers, and Publishers: Book Production in Social Context") the paratexts of the *Sphaera* editions (specifically, dedicatory letters and poetical compositions) as a means of establishing possible networks between book producers (printers and publishers) in the same city (Venice, Paris, Wittenberg) or on an international scale. This would indicate a possible collaboration or simply a mutual or one-sided awareness of the production by other colleagues active in the same sector of the textbook market, an awareness susceptible to orient and improve their own production, and thus to offer the local market an enriched edition of the *Sphaera* able to interest new buyers. The diffusion of Melanchthon's dedicatory letter to the Wittenberg 1531 edition is the most accomplished case.

Although for those interested in the history of cosmology and astronomy it is certainly the first volume that arouses the greatest interest, the present one is a very useful and enriching complement that substantially expands our knowledge of the long permanence of Sacrobosco's *Sphaera* as the introductory textbook par excellence to astronomy and cosmology in the European culture of the Early Modern Period.

Notes

1. This book is also Springer Open Access, and was reviewed by Miguel Á. Granada in the *Journal for the History of Astronomy*, 52, 352–365 (2021).
2. Examined by Oosterhoff in Valleriani (2020: 25–52).
3. Richard Kremer (Chapter 12, 415, 413) points out the closeness to the most recent group of *Sphaera* manuscripts (earliest copy Cambridge UL, shelfmark Li III 3), which feature 15 diagrams.
4. Faber, pp. 441–445; Tockler 445–446; Jacob, pp. 446–447. Tockler's commentary and career have already been studied by M. Valleriani and N. Citron in Valleriani (2020, 111–136). Interestingly, Kremer shows that the commentary by Jacob, a Cistercian monk (Sacrobosco, 1503), derives almost entirely from the commentary by Francesco Capuano di Manfredonia, 1499 (Venice, Sacrobosco), thus showing a transalpine circulation of knowledge. On the very significant Capuano's commentary, see E. Nenci in Valleriani (2020: Chapter 4) and M. Shank, M., 2009. "Setting up Copernicus? Astronomy and natural philosophy in Giambattista Capuano da Manfre-

- donia's *Expositio* on the sphere. *Early Science and Medicine*, 14, 290–315.
5. However, the 25 woodcuts in the first edition (Leipzig, Landsberg 1488) are, with some exceptions, derived from Ratdolt 1485 through Santritter 1488, although they strive to provide more information to the reader; cf. pp. 415–428, with some samples of changes in successive Landsberg editions.
 6. Ciruelo's program has been considered by Tayra Lanuza Navarro, in Valleriani, 2020: 53–89.
 7. See Kathleen Crowther, "Sacrobosco's *Sphaera* in Spain and Portugal", *ibid.*, pp. 161–184.
 8. The first Latin edition of the *Sphaera* (Alcalá, 1526) is a reprint of the Parisian edition by Pedro Sánchez Ciruelo of 1498. Curiously, the first Iberian translation (Lisbon, ca. 1510), considered anonymous, is attributed (p. 236) to Pedro Nunes (born in 1502).
 9. Lattis, J.M., 1994. *Between Copernicus and Galileo. Christoph Clavius and the Collapse of Ptolemaic Cosmology*. Chicago, University of Chicago Press; Baldini, U., 1999. *Legem Impone Subactis. Studi su Filosofia e Scienza dei Gesuiti in Italia 1540–1632*. Rome, Bulzoni; idem, 2000. *Saggi sulla Cultura della Compagnia di Gesù (Secoli XVI–XVIII)*. Padua, CLEUP.

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Venus, by William Sheehan and Sanjay Shridhar Limaye. (London, Reaktion, 2022). Pp. 256. ISBN 978-1-178914-585-4 (hardback), 175 × 225 mm, US\$40.

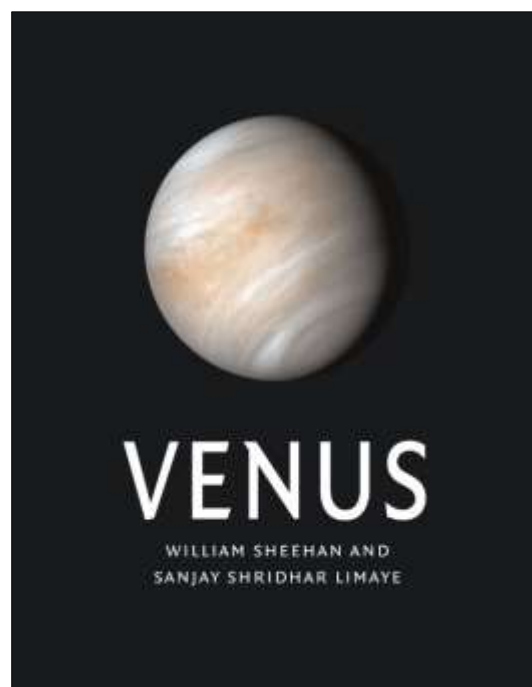
Mystery of the Ashen Light of Venus, by John C. Barentine. (Cham, Springer, 2021). Pp. xvi + 257. ISBN 978-3-030-72714-7 (softcover), 155 × 235 mm, US\$ 29.99.

This book, which I was pleased to see begins with a poem by John Keats, is a delightful and engaging exploration of Inanna, "... the most important deity in the Sumerian pantheon." (page 16). Author William Sheehan delves into the cosmological beliefs of the Sumer-Akkadians, who he describes as "The most assiduous Venus observers of antiquity." (page 13). "The myth of Inanna and her descent into the Underworld clearly reflects the planets' observed path in the sky." (page 17). We are also treated to a full-page colour

photograph of the co-called Venus tablet from the first dynasty of Babylon that records appearances of Venus in the second millennium BCE. In Babylon Venus was worshipped as Ishtar, the Queen of Heaven, an accolade bestowed due to the brilliance of the planet which can reach magnitude -4.8 .

The early days of telescopic research are extremely well covered. Notable in these years was the 1639 transit of Venus, and

Only two men, Horrocks and Crabtree, succeeded in witnessing the only transit of Venus to be observed during the whole seventeenth century. (page 43).



The fine exploration of Jeremiah Horrocks' life in a book by Aughton (2004) is not referenced, but the inclusion of a colour photograph of the stained glass depicting Horrocks (installed in a church in 1872) is a very nice touch and indicative of the Victorian interest in both Horrocks and Venus. In the eighteenth-century William Herschel exercised the right degree of caution when he attributed features on the bright white image of Venus as mostly fanciful, but others embraced fancy as reality. On page 51 we see a globe of Venus with features not only marked but named, based on a map published in 1728 by Francesco Bianchini. The illusions continue with Johann Schroeter's 1798 sketch of a Venusian mountain; while Venus really does have mountains, none is visible from Earth-based telescopes. It was not until 1957 that Charles Boyer made the firm discovery of the rapid rotation of the upper cloud deck of Venus. Instead of just mentioning this discovery, Sheehan gives us a photograph of