

## Reference

Cunningham, C., 2020. Review of *Mathematical Disquisitions: The Booklet of Theses Immortalized by Galileo*, by Christopher Graney. *Journal of Astronomical History and Heritage*, 23, 414–415.

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**Ptolemy's Philosophy: Mathematics as a Way of Life**, by Jacqueline Feke. (Princeton, Princeton University Press, 2018). Pp. xi + 234. ISBN 978-0-691-17958-2 (hardback), 160 × 240 mm, U.S. \$39.50.

Most reviews of this important book have dealt with its theological, philosophical and mathematical aspects. Here I will focus on those elements most closely associated with history of astronomy, which is an integral part of the elucidation of the philosophy of Ptolemy by author Jacqueline Feke. She is Assistant Professor of Philosophy at the University of Waterloo (Canada), where I earned my degrees in physics and classics.

Feke identifies “Franz Boll, a nineteenth-century philologist ... [as] the only scholar besides myself to attempt a complete study of Ptolemy's philosophy.” (page 15). Considering all the subsequent scholarship on Ptolemy, that is indeed a sobering realisation, but in the few instances in which Feke mentions Boll's analysis, it is only to agree with him. This may be a testament to the genius of Boll, although I find it perplexing she did not engage more fully with what he wrote, or express any divergence between his findings and hers. Certainly, Feke's scholarship on Ptolemy's philosophy extends that of Boll, but in what areas and to what extent are left for the reader to imagine. This is all the more regrettable as “Boll was a scholar of great originality, with that rare ability to combine astronomy, religion, and literature ...” (Weinstock, 1951), the very elements Feke has shown such proficiency in with this book.

A key argument of the book can be found on page 70:

According to Ptolemy, the study of mathematics and, in particular, the contemplation of the constancy, good order, commensurability and calm of astronomical objects makes makes the individual a lover of divine beauty and transforms his soul to a state similar to the one contemplated.

While the relationships between constancy, good order and commensurability are quite intuitive and well explained by Feke, it is not

obvious how an astronomical object can be calm. The fact there is no index entry for any of these four attributes does not help the reader, nor does the fact that when the qualities are reiterated on page 71 she omits ‘calm’. In the conclusion to the book, she writes

I suggest that in Ptolemy's philosophical system both astronomy and harmonics produce the virtuous transformation of the human soul. (page 204).



An entire chapter is devoted to *harmonia*, in which she quotes the third century novelist Antonius Diogenes “... who depicts Pythagoras as singing paeans at dawn in order to calm the soul.” (page 76). Relying on a novelist who lived some eight centuries after Pythagoras to support the attribution of calmness to astronomical objects in the philosophy of Ptolemy strikes me as a bit tenuous. Nonetheless, I found her statement that for Ptolemy “... none of the stars make music ...” to be of great moment. Rather

... the same ratios that describe the relations in musical systems exist in the movements and configurations of heavenly bodies. (page 112).

Feke's study of rays from the stars is masterful, and culminates in an unexpected way. First, she interprets the stars' rays to be material: “As rays act upon material objects, bodies and souls, they too must be material.” (page 181). This leads her to examine the movement of the rays, concluding “... the

stars' rays leave their proper system and move rectilinearly through the heavens. This interpretation is highly unorthodox ..." she admits, but can "... explain how stars' rays move throughout the entire cosmos." (page 183). Only by abandoning the idea that rays move in a circular motion can one explain what Ptolemy intends.

She also makes a powerful point against modern scholars who have over-interpreted the overthrow of Pierre Duhem's 1969 'instrumentalist interpretation' of Ptolemy, which stated that "Ptolemy did not believe that his astronomical models corresponded to what exists in the heavens." (page 130). Historians now, she states,

... make quick work of arguing for Ptolemy's realism with the simple observation that he wrote the *Planetary Hypothesis*, which renders his astronomical models physical.

Feke demolishes this scholarly short-cut by noting "... that Ptolemy's astronomical and, in general, mathematical realism is not dependent on his physical realism." (page 130).

A key understanding that animates this study is Ptolemy's argument

... that both physics and theology are conjectural and that mathematics alone yields knowledge. This complex claim ... is unprecedented in the history of philosophy and would have been extraordinarily controversial in the ancient Greek philosophical milieu. (page 26)

The implication for astronomy is that certainty is conditional:

Astronomy ... utilizes reason and perception to establish that spheres, eccentric and

epicyclic, exist in the heavens, but the determination of these spheres' sizes and period depends on observation alone. The certainty of astronomy extends only as far as the existence of the spheres. (page 137).

(Ptolemy's claim that physics is conjectural was not confirmed until the rise of quantum theory in the twentieth century.) This leads Feke to dip a toe into the perennial controversy surrounding Ptolemy's observations reported in the *Almagest* (which, by the way, does not contain the word *astronomia*). She suggests that

The uncertainty Ptolemy discovered in the quantitative aspects of his astronomical models may have been a contributing factor to the notorious fabrication of some of his observations. (page 141).

In this book that places Ptolemy's oeuvre in a new light, Feke succeeds in showing that by integrating ideas from both the Platonic and Aristotelian traditions, he produced "... a philosophical system that upended the entire edifice of ancient philosophy." She goes so far as to characterise this seamless blending as possessing a "... radical and even subversive character." (page 4). Like all important books, this one is quite likely to establish a new trajectory in scholarship.

### Reference

Weinstock, S. (1951). Review of Franz Boll, *Kleine Schriften zur Sternkunde des Altertums*. *The Journal of Roman Studies*, 41, 167.

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