Mark A. Peterson. *Galileo's Muse: Renaissance Mathematics and the Arts*. Cambridge, MA: Harvard University Press, 2011. vi + 336 pp. $28.95. ISBN: 978–0–674–05972–6.

Although Galileo Galilei (1564–1642) was principally a mathematician and physicist, he had a lifelong interest in literature and the arts. His father, Vincenzo, was a musician and music theorist, and Galileo himself was a skillful lutanist. He wrote critical notes on Petrarch's *Rime*, Ariosto's *Orlando furioso*, and Tasso's *Gerusalemme liberata*, and composed a number of sonnets and occasional poems himself. He gave two lectures before the Accademia Fiorentina on the dimensions of Dante's hell. His opinions on painting were sought by practitioners, and he was himself an accomplished draughtsman. Even his more rigorously scientific works are prose masterpieces and full of references to music, poetry, painting, and the other arts.

In *Galileo's Muse*, Mark A. Peterson argues that it was precisely the recovery of ancient mathematics in the Renaissance arts that captured Galileo's imagination, prompting his mathematical physics and the Scientific Revolution in general. According to Peterson, advanced mathematics never arises in the abstract, but always together with practical problems and applied science. This premise gives rise to his novel account of ancient science, in which Pythagoras and his followers practiced mathematical science at a very high level but, because of their secrecy, this science was mostly lost. Nevertheless, despite discouragement from Plato and Aristotle, Hellenistic mathematicians (especially Euclid, Apollonius, and Archimedes) continued advanced mathematical science in the Pythagorean tradition. Unfortunately, when the Romans conquered the Hellenistic world, all of this suppositious science was lost, perhaps having been deliberately hidden from the conquerers, leaving only the abstract mathematics. Thus in the Roman world abstract mathematics came to be divorced from the scientific practice that supposedly had arisen with it. Ptolemy put the last nail in the coffin by loading mathematics with "a moralizing baggage" and by restricting its application to the heavens, making a mathematical description of earthly things impossible. (This startling accusation arises from an egregious misreading of the beginning of the *Almagest*.) There mathematics lay, abstract, useless, and meaningless, for 1,500 years, until, through the arts, it was reconnected with the practical science of earthly things.

There then follows a series of vignettes, each supposedly illustrating the recovery of the true meaning of Hellenistic mathematics in Renaissance poetry, painting, music, and architecture. Here are some highlights. In the poetry section, as an instance of the reemergence of advanced mathematical thinking, we are told (implausibly) that Dante imagined the cosmos to be a hypersphere (the three-dimensional surface of a four-dimensional sphere); and that, since he held that the cosmos was both spherical and finite, he rejected Euclidean geometry (which supposedly had long been thought of as purely abstract rather than spatial anyway) and the parallel postulate, thus inventing a non-Euclidean space. We are also told that in his final vision of God, Dante gave almost a paraphrase of Archimedes's proof from the *Measurement of the Circle* (though there is no evidence that he knew it), thus grasping the key insight to calculus (rather than merely describing a vision of Christ's two natures). In the painting section, the whole of perspectivist optics is dismissed as useless, except for what led Piero della Francesco to develop linear perspective from Euclidean geometry, which then became again the description of real space. In the music section, Peterson gives a good elementary account of Vincenzo Galilei's dispute with Zarlino over tuning and temperament, and repeats Stillman Drake's plausible suggestion that Galileo had learned from his father how to deal with real physical measurements. In the architecture section, Peterson describes Galileo's lectures on the dimensions of Dante's hell and how he corrected, much later, his error there concerning scaling. There follows a chapter on Renaissance mathematics, where we are told that, although geometry was moribund, the dispute between Tartaglia and Cardano is proof that mathematics, especially the new algebra, was now worth fighting over. Finally, after a brief attempt to explain how Galileo had avoided Ptolemy's prohibition and rediscovered through the arts the true meaning and earthly uses of mathematics (mainly parabolic trajectory), the book ends with the implausible suggestion that a minor *Oration in Praise of Mathematics,* published under the name of one of Galileo's students, was in fact by Galileo himself.

Peterson's account in *Galileo's Muse* of the history of science and mathematics, although presented as simple fact, is fanciful and largely unsupported by scholarship; his interpretations of primary sources are often factitious, his historical arguments often tendentious, his conclusions unreliable, his opinions eccentric. *Galileo's Muse* is meant for a popular rather than a scholarly readership, which is perhaps why Harvard University Press apparently neglected to subject it to the assessment and editing that could have purged it of these faults. As it stands, I cannot recommend it to anyone. Those curious about Galileo's literary and artistic interests and their influence on his science would do far better to consult the first few chapters of John Heilbron's lively and reliable *Galileo* (2010).

W. R. LAIRD
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