A

Archimedes: Reception in the Renaissance

Jens Høyrup
Section for Philosophy and Science Studies, Roskilde University, Roskilde, Denmark

Abstract

With only Apuleius and Augustine as partial exceptions, Latin Antiquity did not know Archimedes as a mathematician but only as an ingenious engineer and astronomer, serving his city and killed by fatal distraction when in the end it was taken by ruse. The Latin Middle Ages forgot even much of that, and when Archimedean mathematics was translated in the twelfth and thirteenth centuries, almost no integration with the traditional image of the person took place.

With the exception of Petrarca, who knew the civically useful engineer and the astrologer, fourteenth-century Humanists show no interest in Archimedes. In the fifteenth century, "higher artisans" with Humanist connections or education took interest in Archimedes the technician and started identifying with him. In mid-century, a new translation of most works from the Greek was made by Jacopo Cremonensis, and Regiomontanus and a few other mathematicians began resurrecting the image of the geometer, yet without emulating him.

Giorgio Valla's posthumous *De expetendis et fugiendis rebus* from 1501 marks a watershed. Valla drew knowledge of the person as well as his works from Proclus and Pappus, thus integrating the two. Over the century, a number of editions also appeared, the *Editio princeps* in 1544, and a mathematical work following the footsteps of Archimedes was made by Maurolico, Commandino, and others.

The Northern Renaissance only discovered Archimedes in the 1530s and for long only superficially. The first to express a (purely ideological) high appreciation is Ramus in 1569, and the first to make creative use of his mathematics was Viète in the 1590s.

Ancient Latin and Medieval Background

Archimedean mathematics had a certain impact in late Renaissance thinking, and it was important for changes in late Renaissance mathematics; however, much more pervasive, and of much longer duration, was the impact of "Archimedes" as an almost Protean figure, changing with the conditions of the time.

This figure was known to early Humanists exclusively through Latin sources (detailed in Høyrup 2017). These tell about the producer of marvelous military machines used in the defense of Syracuse and admired by Marcellus; about his fatal distraction when Syracuse was taken; about his "sphere," a mechanical model of the heavenly system or his general mastery of astronomy; or, rarely, about his preoccupation with geometry,

M. Sgarbi (ed.), *Encyclopedia of Renaissance Philosophy*, https://doi.org/10.1007/978-3-319-02848-4_892-1

yet without indicating that this is more than a field dealing with figures drawn with a *radius* (Cicero, the Elder Pliny, Cassiodorus). Vitruvius ascribes to Archimedes a number of technical manuals that cannot be understood if one does not know natural philosophy and also tells the story of Hieron's crown. Archimedes' overall subtlety was proverbial in Cicero's time and circle.

Only two writers give hints that Archimedes made advanced geometric *theory* (yet in a way that can only be understood by readers who know already): Apuleius, in the *Apology*, says that Archimedes' study of convex and concave mirrors outshines his general admirable subtlety in geometry, and Augustine, in *De utilitate credendi*, asks rhetorically who would take Epicurus as his guide to Archimedes' geometrical writings – "against which he spoke with much tenacity, in my opinion without understanding them."

Medieval Latin culture until 1100 took very little notice. In the late eighth century, Paulus Diaconus borrowed some lines from Orosius referring to the role of Archimedes' machines in the defense of Syracuse, and around 810 Dungalus Reclusus took over from Macrobius that Cicero and Archimedes agree about the order of the heavenly spheres.

The twelfth century brought translation from the Arabic of a few Archimedean works (and of works drawing on Archimedes). Two translations of the *Measurement of the Circle* were made (one possibly by Plato of Tivoli and the other by Gerard of Cremona). The latter circulated well among mathematically active university scholars – witness the production of at least nine revised versions from the twelfth through the fourteenth century (Clagett 1964). Archimedean material was contained in the *Verba filiorum* of the Banū Mūsā, similarly translated by Gerard. The well-circulated *De curvis superficiebus* compiled in the late twelfth or earlier thirteenth century by John of Tynemouth contained material in Archimedean style; Roger Bacon ascribes it to Archimedes, while he never refers to the genuine works.

In 1269, William of Moerbeke made an almost complete translation of the Archimedean corpus from the Greek (ed. Clagett 1976). Only Witelo appears to have used it in the thirteenth century, but in the fourteenth it was drawn upon by Jean de Murs, Oresme, Henry of Hesse, and Albert of Saxony (Clagett 1978, 3–144) – all linked to Paris University.

Outside this restricted circle, only Gerard's *Measurement of the Circle* had repercussions. Around 1250, Vincent of Beauvais combined in *Speculum historiale* V. XLIII (1624, 149) quotations from Orosius (the machines and the defense of Syracuse) and Valerius Maximus (the death story) with a reference to Archimedes's *Measurement of the Circle*, "of which Aristotle says that it can be but is not known" (*Categories* $7^{b}31–33$). A century later, Walter Burley (1487, b ii^{v}) added to this a long *verbatim* borrowing from Valerius Maximus. On the whole, however, the Arabo-Latin as well as Moerbeke's Greco-Latin translations circulated in isolation from interest in the person – and information about the person was drawn from very few sources: Orosius, Macrobius, and Valerius Maximus.

Humanism from Petrarca to Alberti

As a rule, fourteenth-century Humanists were interested in neither the works nor the person (attitudes to Archimedes are dealt with under different but compatible perspectives in Laird 1991 and Høyrup 1992). Petrarca was, however, though only in the person. To judge from his letters, Archimedes was admittedly not central to him – he is mentioned only twice. Nonetheless, Petrarca did produce two biographical notices. In *De viris illustribus vitae* (1338), within the biography of Marcellus (Petrarca 1874, I, 280–282), he narrates in his own words Valerius Maximus' stories about Archimedes' powerful war machines and his death, with his own observations, twists, and additions: that even though Firmicus Maternus disparages Archimedes as a mechanic, he was formidable both as an astrologer and a geometer; that the figures he was drawing were astrological or geometrical; and, finally, that Cicero found Archimedes' grave. In *Rerum memorandarum libri* I.23 (1343) (Petrarca 1943, 22–24), an arrival in Syracuse offers the occasion to expand Livy's single line about Archimedes' unique observation of the heavens and the stars into a general praise of Archimedes' study of nature and of his sphere

which allows understanding of the celestial motions not only by the mind but also by our eyes. Even more praiseworthy were his terrestrial mechanical feats; his fatal distraction, on the other hand, is slightly censured as "immoderate." On both accounts, Platonizing celebration of the pure intellect is outside the perspective. The value scale is that of Cicero and the Roman elite, and Archimedes is *almost* perfect when measured thus. Archimedes was part of the legitimate ancient heritage, respected because of his sophisticated machines, his planetary model as well as those that could serve efficiently in war. Even Petrarca's aversion for astrology only induces him to compare modern astrologers unfavorably to Ptolemy, Archimedes, and Firmicus Maternus, not to denigrate this aspect of his "Archimedes."

Other fourteenth-century Humanists were not interested in the Archimedes figure at all. That changed to some extent in the fifteenth century, as "higher artisans" (architects, painters, military engineers, etc.) and their ambience began to have intercourse with Humanists. Engineer artists like Mariano Taccola and Filippo Brunelleschi were known, respectively, as the "Archimedes of Siena" and a "second Archimedes." None of them were mathematicians. What they had in common with the "Archimedes" known at the time was to be skilled engineers and architects, designers of machines.

The main source for the admiration of Archimedes among the higher artisans is Vitruvius, a colleague. Leon Battista Alberti – the earliest outstanding Humanist who was also active as a higher artisan, Brunelleschi's partner in the creation of perspective technique – takes over Vitruvius's version of the crown story in the *Ludi matematici*. However, his *De re aedificatoria* shows that increasing familiarity with Plutarch's biography of Marcellus was also influential. It cites Plutarch for the tale of Archimedes moving a loaded ship on the ground and for the promise to be able to move this world if he could only go to another one.

As informative as borrowings is the way they are filtered. Alberti distances himself from part of what he reads and omits an essential part of Plutarch's Platonizing message. Plutarch's insistence that Archimedes considered mechanical work and even mechanical treatises improper is not argued against; it goes unmentioned – it would indeed disparage Alberti's own undertaking. Neoplatonism and esoteric Platonism remain unthinkable. Further, Alberti declares not to intend to be Zeuxis in painting, Nicomachus in the manipulation of numbers, or Archimedes when dealing with angles and lines; he will stick to the basic principles and that which gives honor and fame to the architect. Admitting that Archimedes had been the supreme geometer (Plutarch says so), Vitruvius distances himself from this aspect of the hero.

Return of Archimedes the Mathematician

Even among Humanists with no direct links to architecture and engineering, there seems to have been some interest in Archimedes, probably because of what the Latin sources tell about him. In 1423–1424, rumors circulated that an Archimedes manuscript had been brought back from Byzantium. However, nobody ever saw it, and some 25 years passed before more happened among Humanists. Around 1450, however, Jacopo da San Cassiano Cremonensis made a fairly complete translation (d'Alessandro and Napolitani 2012). Of the works translated by Moerbeke, *On Floating bodies* is missing in the new translation, while *The Sand Reckoner*, absent from Moerbeke's Greek manuscript, is translated by Jacopo. None, of course, knew *On Method*. Whether Jacopo's translation was made while he was still in Mantua or after his move to the Papal court is not clear, the undertaking agrees well with Nicholas V's broader translation program. This translation is the basis for Regiomontanus' judgment from 1463/64 (1972, 45) that Euclid was

> followed by Archimedes citizen of Syracuse, and by Apollonius of Perga, customarily called the Divine because of the height of his genius, of whom it is not easy to say whether one is to be preferred to the other. While, namely, Apollonius described the elements of conics in eight books, which have never been put into Latin, the first rank appears to belong to Archimedes the Sicilian

> by the variety of publications, which under Pope Nicholas V were rendered in Latin by a certain Jacopo of Cremona.

Both Jacopo and Regiomontanus were connected to Bessarion's circle, though at different moments. Bessarion himself was interested enough to get a copy for his library, and Cusanus expressed his gratitude to the Pope for having put the manuscript at his disposition (which, however, did not affect his idiosyncratic approach to mathematics much). Apart from that, echoes among Humanists cannot be discerned during the first decades. It is noteworthy, moreover, that Jacopo himself had a thorough training in university philosophy, while Regiomontanus was an accomplished university astronomer, already familiar with the medieval direct and indirect Archimedean tradition before being introduced to Humanism by Bessarion (Clagett 1978, 343–354). Both therefore had a substantial fundament allowing them to understand Archimedes as an awe-inspiring geometer; Humanists with no similar background could only take such Latin sources on faith as claimed without specifying that he was ingenious. Even Regiomontanus, however, did not go beyond recognition – his own mathematics is not marked by Archimedean inspiration (after all, his primary interests were astronomy and astrology).

Among writers in the vicinity of the abacus tradition and the higher artisanate, there was a certain impact. Piero della Francesca, who had access to Jacopo's translation, has some Archimedean name-dropping in *De quinque corporibus regularibus* for matters that already appear without reference in his earlier *Trattato d'abbaco* (Clagett 1978, 396–398). Luca Pacioli, too, must have seen Jacopo's translation (ibid., 448, 460), but mostly draws on the direct and indirect medieval traditions for Archimedes' mathematics, giving only quite imprecise references; on the other hand, in the *Summa de arithmetica* . . . (Pacioli 1494), he refers in the dedication to Duke Guidobaldo to "the great Syracusan geometer Archimedes" who with "his machines and mechanical inventions kept Syracuse safe for long." The passage is repeated almost verbatim in his *Divina proportione* (Pacioli 1509: b ii^{r}), now addressed to Ludovico Sforza of Milan and characterizing Archimedes as a "noble ingenious geometer and most worthy architect" and pointing out that he defended his *patria*; in the same work, Pacioli gives further imprecise references to Archimedes' results.

The case of Leonardo da Vinci is similar but not identical. He appears to draw on recent as well as medieval Archimedean mathematics (Clagett 1978, 478); he understands that Archimedes "never squared any figure with curved sides" but "only squared the circle minus the smallest portion that the intellect can conceive, that is the smallest point visible" (Leonardo da Vinci 1883, II, 446). Also insightful at least as to the conditions of his own epoch, Leonardo believes Marcellus wanted to find Archimedes in order to make use of his services – but when drawing on sources, he does so from approximate memory.

The Greek Text and Latin Printing

One late-fifteenth-century pure-breed Humanist manifested interest in Archimedes the mathematician: Giorgio Valla. He bought the manuscript from which Moerbeke had made his translation, and he at least saw Jacopo's translation (Clagett 1978, 462). He also possessed a manuscript of Proclus' commentary to *Elements* I, copied in part by himself (Rose 1975, 47). His posthumous *De expetendis et fugiendis rebus* (Valla 1501) returns to Archimedes' time and again, sometimes referring to what *could* have been be known from Plutarch and the Latin sources but which Valla draws instead from Proclus (using almost every passage in Proclus' commentary referring to Archimedes); sometimes Valla discusses Archimedes' mathematics (not merely quoting or using results). Valla's "Archimedes" builds upon the same sources as his acquaintance with Archimedean mathematics – he has no need, neither for Plutarch nor for Latin anecdotes, even though he presents much of their substance.

The fifteenth-century "Archimedes" did not disappear completely for that. In 1568, Giorgio Vasari (1846, XI, 98) could still characterize the painter and architect Bartolomeo Genga as "a new

Archimedes" because of his design of fortifications. Within the increasingly important and increasingly competent mathematical professions, however, Archimedes the mathematician came to equal or even overshadow his mechanic namesake.

The sixteenth century brought the printing of Archimedean works. In 1503, the astronomer Luca Gaurico published a small volume containing Archimedes' *Quadrature of the parabola* and *Measurement of the circle* in Moerbeke's translation. In 1543, Tartaglia republished Gaurico's two Archimedean editions together with *On the equilibrium of Planes* and *On Floating Bodies* I, even these in Moerbeke's version. In 1560, Tartaglia further published as Book III of *La quarta parte del general trattato* an Italian translation of *On the Sphere and Cylinder* I.

The *editio princeps* of the Greek Archimedes was published by Thomas Gechauff Venatorius in Basel in 1544. The volume also offered Jacopo's translation as corrected by Regiomontanus. These two, and the new partial translation which Federico Commandino published in 1558 and 1565, were the main sources for later sixteenth- and seventeenth-century Archimedean work (Clagett 1978, 568).

Commandino (1558a) contained *On the Measurement of the Circle*, *On Spiral Lines*, *On the Quadrature of the Parabola*, *On Conoids and Spheroids*, and *The Sand Reckoner*, translated directly from Greek manuscripts, with a separate volume of commentaries (Commandino 1558b). Commandino (1565a) was a revised version of the Moerbeke translation of *On Floating Bodies*, which was absent from the *editio princeps* and from available manuscripts. All were much sounder than preceding translations.

Better text versions and printing are one aspect of the novel way the sixteenth century approached Archimedes. Another aspect is the *use* made of Archimedean theory. Most important in this respect is what was done by Francesco Maurolico and Commandino.

In 1534, Maurolico had composed his own versions of *On the Quadrature of the Parabola*, *On the Measurement of the Circle*, and *On the Sphere and the Cylinder* on the basis of the various direct and indirect medieval traditions combined with information drawn from Valla (Clagett 1978, 773). In *De momentis aequalibus* from 1547 to 1548, he took up the investigation of the centers of gravity of solids (Archimedes had only dealt with those of plane figures). This topic also occupied him later on, and in the 1550s or 1560s, he applied Archimedean mechanics and medieval impetus theory to the ps.-Aristotelian *Mechanica*.

Commandino, too, was to publish on the centers of gravity of solids in 1565b. Giovanni Battista Benedetti, Guidobaldo del Monte, and Baldi confronted the ways mechanical questions were dealt with by Archimedes, Heron, Pappus, Aristotle, ps.-Aristotle, Jordanus, and impetus theory – sometimes in mutual polemics (Rose 1975, 154–156, 230–233, 249–253).

Knowing the Archimedean texts intimately and using them obviously changed the image of Archimedes among competent mathematicians. This can be illustrated by how Cardano, Commandino, and Baldi spoke about him.

In *Encomium geometriae*, read in the Academia Platina in Milan in 1535, we find (Cardano 1663, 443) after a long list of names of geometers (drawn as far as the minor figures are concerned from Proclus' recently published commentary to *Elements* I) that:

> they are all defeated by Archimedes of Syracuse, almost all of whose findings we possess. A man of the highest genius, and who will have shown the circumference of the circle pretty closely, and taught by solid geometry how to interpose two lines between two others in continuous proportion. But that has been lost.

In this context, a praise of geometry, only Archimedes' mathematics finds its place. In *De subtilitate* (Cardano 1550), the situation is different. Book I refers repeatedly to Archimedes in the discussion of mechanical questions; Book IV refers to a book about parabolic burning mirrors (mistakenly) ascribed to Archimedes and to Archimedes setting fire to Roman ships by means of burning mirrors (a story Cardano attributes to Galen). Book XVI, finally, situates Archimedes first in a list of subtle minds (pp. 313*f*):

> not only because of his works which have now been published but also because of his mechanics which, as Plutarch relates in his *Life of Marcellus*,

> discouraged the Roman troops time and again by his inventions, and discourages us no less by Galen's testimony, in both areas not only the first but inimitable.

Venatorius, in the dedicatory letter introducing his edition of the Greek text, speaks at some length about the mathematics it deals with, but in the end he also comes to the defense of Syracuse and to Archimedes' promise to move the earth if only he might get another globe.

Both Commandino's translation from 1558 and his commentaries contain dedicatory letters speaking about Archimedes. The former, addressed to Ranuccio Cardinal Farnese (to whose household Commandino belonged since years), first explains that mathematics, dealing with the intelligible only, has higher rank than metaphysics and natural philosophy – these depend on matter, and even Plato and Aristotle cannot agree about them. This higher rank is also to be ascribed to those mathematical disciplines which *contemplate* the sensible: mechanics, astronomy, optics, etc. So, nothing is more useful nor more necessary for the human race than mathematics, neither in private matters nor in public management – not only geometry, arithmetic, and proportion but also mechanics and the preparation of instruments. This leads naturally to Archimedes – first his astronomy and sphere and then arithmetic (*The Sand Reckoner*). Though Archimedes is not known for anything in music, Commandino finds it plausible that he excelled even in this discipline. That he was "a kind of God in geometry nobody sane of mind" can deny. Mechanics he first practiced for war and then transferred to peace – specifically, we hear about the ship, the defense of Syracuse, about Marcellus's grief, and about Cicero finding the grave.

The commentaries are dedicated to the Cardinal's brother-in-law, Duke Farnese. This dedication is much shorter and concentrates on military mathematics (the addressee being a warrior). Later the commentary observes (42^{v}) that Maurolico is so "skilled in mathematics that in these times he can with justice be said to be another Archimedes."

Baldi began work on his *Vite de' matematici* in 1575. The biography of Archimedes (from 1595) starts thus (ed. Narducci 1886, 388):

> In all domains there have been some who, having arrived at the peak of excellence, have demonstrated how far the human intellect can advance in that direction. Without doubt Archimedes was such a man in mathematics, since the first place is due for good reasons to him.

Baldi builds as much as possible on Archimedes' own introductory letters; but he also draws on Plutarch, Cicero, Ovid, Ptolemy, Pappus, Proclus, etc., confronting them critically with each other. This allows him to present all the usual stories about Archimedes' life and his mechanical feats and also to speak of his surviving works as well as lost writings known from more or less reliable references. In conclusion (p. 453), Commandino is cited for the opinion that "that one can hardly call himself a mathematician who has not studied the works of Archimedes."

Among the mathematicians of the outgoing Renaissance, Archimedes had thus become primarily a mathematician creating advanced theory; but his fame as most skilled in theoretical as well as practiced mechanics was not discarded. They themselves, often court mathematicians, were also engaged in practical service to prince and state. Their Archimedes was one of their own kind, as had been Taccola's and Brunelleschi's Archimedes in the early fifteenth century – only their kind had changed.

In the Northern Renaissance, references to Archimedes' mathematics are rare and late (none preceding 1530, it seems) and those to the person even fewer. The earliest example of Northern worshipping "Archimedism" is to be found in Petrus Ramus's *Scholae mathematicae* (1569). The presentation of Archimedes begins (p. 26) almost as that of Baldi:

> God has decided that there should be in each art something like a unique idea which everybody studying the discipline would propose to himself as a model – as in eloquence, Demosthenes and Cicero, and in medicine Hippocrates and Galen: thus Archimedes in mathematics.

There is no mathematical substance behind this – Ramus' mathematical level hardly allowed him to understand Archimedes in any depth. Ramus'

ideological Archimedism did not inspire him to become an Archimedean.

The first Northern figure to approach Archimedean mathematics as mathematics and not only as a small collection of famous results is thus Viète, at the very end of the sixteenth century. In *Apollonius Gallus* and *Variorum de rebus mathematicis responsorum liber VIII*, he makes use of *On Spiral Lines*. When it fitted his mathematical intent, Viète was thus an Archimedean; however, there is no general praise of the person (not even a presentation) nor of Archimedes as a mathematician. In double contrast to Ramus, Viète, though sometimes Archimedean, was no Archimedist.

References

Primary Literature

Baldi, B. 1886. Vite inedite di matematici italiani scritti da Bernardino Baldi. Bullettino di Bibliografia e di Storia delle Scienze matematiche e fisiche, ed. E. Narducci, 19, 335–406, 437–489, 521–640.

Burley, Walter. 1487. *Libellus de vita et moribus philosophorum et poetarum*. Antwerpen: Drucker der Mensa philosophica.

Cardano, G. 1550. *De subtilitate libri XXI*. Nürnberg: Ioh. Petreius.

Cardano, G. 1663. *Operum tomus quartus*. Lyon: Jean Antoine Huguetan & Marc Antoine Ragaud.

Commandino, F. 1558a. *Archimedis Opera nonnulla*. Venezia: Manuzio.

Commandino, F. 1558b. *Commentarii in Opera nonnulla Archimedis*. Venezia: Manuzio.

Commandino, F. 1565a. *Archimedis De iis quae vehuntur in aqua libri II*. Bologna: Benacci.

Commandino, F. 1565b. *Liber de centro gravitatis solidorum*. Bologna: Benacci.

de Beauvais, Vincent. 1624. *Bibliotheca mundi seu speculi maioris. Tomus quartus, Speculum historiale*. Douai: Baltazar Bellerus.

Gaurico, Luca. 1503. *Tetragonismus idest circuli quadratura per Campanum, Archimedem Syracusanum atque Boetium mathematicae perspicassissimos adinventa*. Venezia: Giovanni Battista Sessa.

Leonardo da Vinci. 1883. *Literary works*, 2 vols. London: Sampson Low, Marston, Searly & Rivington.

Pacioli, Luca. 1494. *Summa de Arithmetica Geometria Proportioni et Proportionalita.* Venezia: Paganino de Paganini.

Pacioli, Luca. 1509. *Divina proportione*. Venezia: Paganius Paganinus.

Petrarca, F. 1874. Razzolini, Luigi. (ed., trans.) 1874. *Le vite degli uomini illustri di Francesco Petrarca*, 2 vols. Bologna: Gaetano Romagnoli, 1874, 1879.

Petrarca, F. 1943. In *Rerum memorandarum libri*, ed. G. Bilanovich. Firenze: Sansoni.

Ramus, Petrus. 1569. *Scholarum mathematicarum libri unus et triginta*. Basel: Eusebius Episcopius.

Regiomontani, J. 1972. In *Opera collectanea*, ed. F. Schmeidler. Osnabrück: Otto Zeller.

Tartaglia, Nicolò, ed. 1543. *Opera Archimedis syracusani philosophi ed mathematici ingeniosissimi*. Venezia: Venturino Ruffinello.

Tartaglia, Nicolò. 1560. *La quarta parte del general trattato de' numeri et misure*. Venezia: Curtio Troiano.

Valla, Giorgio. 1501. *De expetendis et fugiendis rebus opus*, 2 vols. Venezia: Manuzio.

Vasari, G. 1846. *Le vite de' più eccellenti pittori, scultori e architetti*, 13 vols. Firenze: Le Monnier, 1846–1857.

Venatorius, T.G. 1544. *Archimedis Syracusani philosophi ac geometrae excellentissimi Opera, quae quidem extant omnia*. Basel: Hervagius.

Secondary Literature

Clagett, Marshall, 1964. *Archimedes in the Middle Ages*, vol I. The Arabo-Latin tradition. Madison: University of Wisconsin Press.

Clagett, Marshall. 1976. *Archimedes in the Middle Ages*, vol II. The translations from the Greek by William of Moerbeke. Philadelphia: The American Philosophical Society.

Clagett, Marshall. 1978. *Archimedes in the Middle Ages*, vol III. The fate of the Medieval Archimedes 1300–1565. Philadelphia: The American Philosophical Society.

d'Alessandro, Paolo, and Pier Daniele Napolitani. (ed., trans.) 2012. *Archimede latino: Iacopo da San Cassiano e il corpus archimedeo alla metà del quattrocento*. Paris: Les Belles Lettres.

Høyrup, Jens. 1992. Archimedism, not Platonism: on a malleable ideology of Renaissance mathematicians (1400 to 1600), and on its role in the formation of seventeenth-century philosophies of science. In *Archimede. Mito Tradizione Scienza*, ed. Corrado Dollo, 81–110. Firenze: Leo S. Olschki.

Høyrup, Jens 2017. Archimedes – Knowledge and Lore from Latin Antiquity to the Outgoing European Renaissance. *Ganita Bhāratī* 39:1–22.

Laird, W. Roy. 1991. Archimedes among the Humanists. *Isis* 82: 629–638.

Rose, Paul Lawrence. 1975. The Italian Renaissance of mathematics. In *Studies on humanists and mathematicians from Petrarch to Galileo*. Genève: Droz.

Unreferenced translations. are due to the author.