

THE *ARTES* AND THE EMERGENCE OF A SCIENTIFIC CULTURE IN THE EARLY ROMAN EMPIRE

This book offers the first full-scale, synthetic account of the Latin technical treatises called *artes*, arguing that their flourishing in the early Roman Empire represents the emergence and development of a uniquely Roman scientific culture. It introduces the Roman *artes* on architecture, agriculture, land-surveying, medicine, and the art of war to those without specialist knowledge of the disciplines, and advances a new argument for their significance vis-à-vis a common intellectual culture. It unpacks the sociopolitical, literary, and especially philosophical and scientific dimensions of these writings. It characterizes the scientific culture which the *artes* constitute and traces significant themes in their construction of disciplinary expertise, examining the effects of the tension between theory and practice as well as their systematic, explanatory, and interdisciplinary presentation of specialized knowledge. In presenting a novel interpretation of the *artes*, this book aims to add a new chapter to the history of science in Greco-Roman antiquity.

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For Katie and Cyrus

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I did not set out to write a book arguing that the now-seldom-read Latin technical treatises of the early Roman Empire constituted an interesting and unified scientific culture because I did not know that they did. In the earliest days of this project, I merely had a set of puzzles that I had encountered in readings outside of the canon and a conviction that these texts – treasured and transmitted for millennia while so much else of great worth has been lost – had more to say to us today. I am fortunate many times over to have had mentors then who did not extinguish the first sparks and steer me back to more conventional territory, but rather kindled my intellectual curiosity and encouraged me to follow where it led.

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Note on Texts and Abbreviations

I Ancient Works

In general, editions of Greek texts follow the *Thesaurus Linguae Graecae*. Editions of Latin texts follow those in the corpus provided by the Packard Humanities Institute (<http://latin.packhum.org/>), or, failing that, those in the Library of Latin Texts provided by BREPOLiS. In general, ancient works are abbreviated according to the conventions of the *Oxford Classical Dictionary* (4th ed.). For the abbreviation of Latin authors and texts not given in *OCD*, I follow the *Thesaurus linguae Latinae*. Note, however, that I always print “u” in place of lowercase “v” in abbreviations of Latin authors and works (e.g. “Ou.” not “Ov.” for “Ovid”). For Greek authors not in *OCD*, I follow the conventions of LSJ (see §II), except for Galen’s works, which are abbreviated according to the appendix printed in the volumes of the Cambridge Galen Translations series.

The principal authors and texts handled in this book have been abbreviated differently than according to the aforementioned rules and are often cited in editions other than those in the standard corpora. Abbreviations are presented at the introduction of each author in Chapter 2 (except for Onasander, introduced in Chapter 6) and are repeated in subsequent chapters. The principal edition used for each text is introduced in a footnote at the first extended quotation of the author (usually, but not always, in Chapter 2); in this same note, other editions or translations consulted are cited. For convenience, I gather the abbreviations and principal editions used for core authors (author–date references are to the general references), with a parenthetical reference to the footnote in this book detailing editions consulted:

xviii		<i>Note on Texts and Abbreviations</i>
[–]	<i>CAR</i>	<i>Corpus agrimensorum Romanorum</i> (Ch. 2, n.135). All texts in <i>CAR</i> are cited by page and line number of Lachmann et al. 1848–52 (“L”) and, where applicable, Thulin 1913 (“T”), for example “L 176.7–8 = T 141.2–3.”
Cels.	<i>DM</i>	Celsus, <i>De medicina</i> , ed. Marx 1915, with Ollero Granados 1973 and Capitani 1974 for the material in Book IV transmitted by MS Toledo 97.12 (Ch. 2, n.72).
Col.	<i>RR</i>	Columella, <i>Res rustica</i> , ed. Rodgers 2010 (Ch. 4, n.4) [note also [Col.] <i>Arb.</i> in next list].
Frontin.	<i>Agr. qual.</i>	<i>De agrorum qualitate</i> , ed. Thulin 1913 (Ch. 2, n.145) [for citation see earlier entry on <i>CAR</i>].
	<i>Art. mens.</i>	<i>De arte mensoria</i> , ed. Thulin.
	<i>Contr.</i>	<i>De controuersiis</i> , ed. Thulin.
	<i>Lim.</i>	<i>De limitibus</i> , ed. Thulin.
	<i>Strat.</i>	<i>Strategemata</i> , ed. Ireland 1990 (Ch. 2, n.123).
Hyg.	<i>Const.</i>	“Hyginus Gromaticus” or “Hyginus minor” or “Hyginus 2,” <i>Constitutio limitum</i> , ed. Thulin 1913 (Ch. 2, nn. 150, 151, 157) [for citation see earlier entry on <i>CAR</i> ; see later entries for other works ascribed to a “Hyginus”].
Onasander	<i>Str.</i>	Onasander, Στρατηγικός (<i>Stratēgikos</i>), ed. Illinois Greek Club 1923 (Ch. 6, n.29).
Vitr.	<i>DA</i>	Vitruvius, <i>De architectura</i> , ed. Rose and Müller-Strübing 1867 (Ch. 2, n.17).

The following list contains additional references or abbreviations (some standard but given here anyway for convenience) that pertain to ancient authors or texts cited in this book. As noted earlier, bare author–date references are to general references.

[Col.] <i>Arb.</i>	[Columella], <i>incerti auctoris liber de arboribus</i> , ed. Rodgers 2010.
D–K	H. Diels and W. Kranz, <i>Die Fragmente der Vorsokratiker</i> , 3 vols. Berlin, 1952 ⁶ .
E–K	Fragments of Posidonius, ed. Edelstein and Kidd 1972–99, cited as “F#.”
Gal. or [Gal.]	Galen or [Galen]. For abbreviations of titles see earlier remarks. Works are cited by chapter/section numbers plus volume, page, and line numbers in the edition of K. G. Kühn (“K”) (Leipzig, 1821–33). <i>Med. exp.</i> is cited by section number and page of Walzer and Frede 1985 (“W–F”).

Note on Texts and Abbreviations

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- SI* is cited by Kühn plus page and line numbers of G. Helmreich (“H”) (Leipzig, 1893).
- Subf. emp.* is cited by section number and page and line numbers of Deichgräber 1965 (“D”).
- Garg. Mart. *Pom.* Gargilius Martialis, *De arboribus pomiferis*, ed. Zainaldin 2020a. Cited by chapter, section, and sentence numbers.
- Hippocr. Hippocrates, plus abbreviated Latin title (for which, see E. Craik, *The “Hippocratic” Corpus: Content and Context*. London, 2015). Works are cited by chapter/section numbers plus volume and page in the edition of É. Littré (“L”) (Paris, 1839–61). The work *De hebdomadibus* is cited in the edition of W. H. Roscher (Paderborn, 1913).
- Hyg. *Cond. agr.*, *Gen. contr.*, *Lim.* “Hyginus maior” or “Hyginus 1,” fragments *de condicionibus agrorum*, *de generibus controuersiarum*, and *de limitibus castrorum* (Ch. 2, n.140) [for citation see earlier entry on *CAR*; see also earlier entries for other works ascribed to a “Hyginus”].
- [Hyg.] *Mun. castr.* “Pseudo-Hyginus,” *De munitionibus castrorum* or *De metatione castrorum* (Ch. 2, n.140) [see earlier entries for other works ascribed to a “Hyginus”].
- L–M A. Laks and G. W. Most, *Early Greek Philosophy*, 9 vols. Cambridge, MA, 2016.
- Ph. *Bel.* Philo, *Belopoeica*. Cited by Thévenot (“T”) page and line numbers.
- SVF* H. von Arnim, *Stoicorum veterum fragmenta*, 4 vols. Stuttgart, 1964 (rpt). Cited by volume and von Arnim’s numbers.
- U H. Usener, *Epicurea*. Leipzig, 1887. Cited by Usener’s numbers.

II Reference Works

The following abbreviations are used for modern works of reference. Works of reference not included on this list are cited in author–date style with corresponding entries in the bibliography.

<i>CIL</i>	<i>Corpus inscriptionum Latinarum</i> . Berlin, 1863–.
<i>DPA</i>	R. Goulet (ed.), <i>Dictionnaire des philosophes antiques</i> . Paris, 1989–.
<i>DGE</i>	<i>Diccionario Griego-Español</i> . Madrid, 1980–.
H–S	J. B. Hofmann, <i>Lateinische Syntax und Stilistik</i> (revised by A. Szantyr). Munich, 1965.
<i>IGRRP</i>	R. Cagnat, <i>Inscriptiones Graecae ad res Romanas pertinentes</i> , 3 vols. Paris, 1906–27.
L&S	C. T. Lewis and C. Short (eds.), <i>A Latin Dictionary Founded on Andrews' Edition of Freund's Latin Dictionary</i> . Oxford, 1879.
LSJ	H. G. Liddell, R. Scott and H. S. Jones, <i>Greek-English Lexicon</i> (with revised supplement). Oxford, 1996 ⁹ .
Maltby	R. Maltby, <i>A Lexicon of Ancient Latin Etymologies</i> . Liverpool, 1991.
<i>NP</i>	H. Cancik and H. Schneider (eds.), <i>Brill's New Pauly: Encyclopaedia of the Ancient World. Antiquity</i> (English ed., edited by C. F. Salazar). Boston/Leiden, 2002–11.
<i>OCD</i>	<i>The Oxford Classical Dictionary</i> , online ed. Oxford, 2015– ⁵ .
<i>OED</i>	<i>The Oxford English Dictionary</i> , online ed. Oxford, 2000– ² .
<i>OLD</i>	<i>The Oxford Latin Dictionary</i> . Oxford, 2012 ² .
<i>OLS</i>	H. Pinkster, <i>The Oxford Latin Syntax</i> , 2 vols. Oxford, 2015–21.
<i>PIR</i> ²	<i>Prosopographia imperii Romani saec. I. II. III.</i> Berlin/Leipzig, 1933–2015 ² .
<i>RE</i>	A. Pauly and G. Wissowa (eds.), <i>Real-Encyclopädie der classischen Altertumswissenschaft</i> . Stuttgart, 1893–1980.
Schwyzler	E. Schwyzler, <i>Griechische Grammatik</i> , 3 vols. Berlin, 1953–66.
S–H	M. Schanz, <i>Geschichte der römischen Litteratur bis zum Gesetzgebungswerk des Kaisers Justinian</i> (revised by C. Hosius), 4 vols. Munich, 1927–59 ⁴ .
Smyth	H. W. Smyth, <i>Greek Grammar</i> (revised by G. M. Messing). Cambridge, MA, 1956.
<i>TLL</i>	<i>Thesaurus linguae Latinae</i> . Leipzig/Berlin, 1900–.