

The Archaeology of Roman Hourly Timekeeping

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Table of Contents

List of Tables.....	xiii
List of Figures.....	xiv
Appendices	
Appendix I: Object Catalog.....	500
Appendix II: List of Sites.....	848
Chapter 1: Introduction.....	1
Chapter 1: Introduction.....	7
Key Concepts.....	10
Short Time & the Hour.....	11
Roman Hours.....	16
Timekeeping Technologies.....	20
Accuracy.....	27
How Romans Thought About Time: Chronos and Kairos.....	32
Roman Timekeeping Assemblages.....	35
Chapter Outlines.....	40
Chapter 2: The Archaeology of Hourly Timekeeping.....	52
An Archaeology of Hourly Timekeeping.....	55
Timekeeping Devices as Artifacts.....	62
Timekeeping Devices as Installed Features.....	66
Timekeeping Devices as Infrastructure.....	68
Introduction to the Catalog.....	72
Sundials.....	87
Portable Sundials.....	92
Clepsydrae.....	95
Monuments.....	98
Inscriptions.....	105
Representations of Short Time.....	107
Conclusions.....	111

Chapter 3: Roman Landscape of Hours.....	113
Locating Timekeeping Devices.....	119
Pompeii.....	137
Public Spaces.....	143
Baths.....	145
Temples.....	153
Fora.....	156
Palaestrae.....	159
Funerary Contexts.....	161
Public Spaces Conclusions.....	165
Private Spaces.....	168
Sundials in Elite Residences.....	170
Subelite Spaces.....	179
Middling Groups.....	184
Representations of Time.....	189
Depictions of Time.....	190
Graffiti.....	192
Absence.....	196
Conclusions.....	199
Chapter 4: The Social Role of Hourly Timekeeping in the Roman World.....	204
What Hours Do.....	209
Hourly Time and Social Relations.....	212
Hours in “Everyday” Lives.....	220
Slaves and the Hour.....	225
Free Non-Elites.....	234
Hours and Water Systems.....	240
Conclusions.....	265
Chapter 5: Hours and the Image of the Roman City.....	270
Timekeeping Devices as a Feature of the City.....	277
Timekeeping in the Forum.....	290
Hours and Roman Civic Identity.....	301
Sundials Urban Image: Thamugadi & Lambaesis.....	303

Monumental Sundials and Urban Image.....	314
Conclusions.....	320
Chapter 6: Timekeeping in Urban Experience.....	324
Timekeeping in Urban Experience.....	329
Experiencing Time Systems.....	335
Timekeeping at Ostia.....	338
Finding Time in Ostia Antica.....	352
Villa at Tor Paterno.....	353
Entering the City.....	355
Apartment Living.....	363
Leaving the City.....	376
Timed Movement in Ostia.....	386
Conclusions: Weights, Measures, and Schedules.....	401
Chapter 7: The Hour in Imperial Administration.....	404
The Emperor & The Hours.....	408
Civic Munificence and the Hour.....	419
The Coattails of Imperial Time.....	424
Timekeeping Devices Dedicated to Emperors.....	426
Offices Responsible for Timekeeping.....	434
Hellenistic Offices.....	444
Financial Roles: Quaestor & Procurator Provincarum.....	446
Aediles.....	449
Duumviri, Triumviri, & Quattuorviri.....	451
Censor.....	455
Military Positions.....	457
Conclusions.....	462
Chapter 8: Conclusions: Hours and the Social.....	466
Future Directions.....	474

List of Tables

Table 2.I	Timekeeping object counts in existing catalogs	78
Table 3.I	Pompeian houses with timekeeping devices	169
Table 5.I	Roman sites with administrative changes near installation	314
Table 6.I	Timekeeping devices of Ostia.....	339
Table 7.I	Timekeeping inscriptions with donor names/offices.....	436

List of Figures

Figure 1.1	Earth's tilt and seasonal hours.....	17
Figure 1.2	Seasonal hour lengths for Rome, 8 CE.....	18
Figure 1.3	Sundial with features named.....	22
Figure 1.4	Schematic drawing of portable sundial.....	24
Figure 2.1	Conical dial from Stabian Baths, Pompeii (#513).....	61
Figure 2.2	"Ship's prow" sundial from Delos (#206).....	80
Figure 2.3	Sundial from Herculaneum with multiple types (#270).....	83
Figure 2.4	Map of distribution of all objects in catalog.....	84
Figure 2.5	Map of all devices, by century.....	85
Figure 2.6	Reconstruction of Hercules Sundial, Ravenna (#887).....	100
Figure 2.7	Clepsydra at Athenian Heliaia (#93).....	102
Figure 2.8	Drawing of the Tower of the Winds (#100).....	104
Figure 3.1	Total count of devices by modern country.....	122
Figure 3.2	Count of devices by site for sites with more than one object	125
Figure 3.3	Devices and inscriptions by location type.....	127
Figure 3.4	Map of location type by site.....	129
Figure 3.5	Location type of devices by period.....	132
Figure 3.6	Map of representations by site & location type.....	134
Figure 3.7	Location type of representations by period.....	135
Figure 3.8	Map of devices in Pompeii, <i>in situ</i> vs. <i>ex situ</i>	141
Figure 3.9	Map of devices in Pompeii by location type.....	143
Figure 3.10	Oscan inscription from Stabian Baths (#513).....	147
Figure 4.1	Plan of the House of the Menander, Pompeii, with pathways	231
Figure 4.2	House of the Menander peristyle with sundial.....	232
Figure 4.3	Inscription (<i>CIL</i> VI, 1261) with water system hours.....	244
Figure 4.4	Shaw's (1982) guide to Lamasba water decree.....	247
Figure 5.1	Map of representations of devices and their depiction of..... space	280

Figure 5.2	Puteoli “souvenir flask” etchings with <i>soalria</i>	282
Figure 5.3	House of the Small Fountain (Pompeii) fresco (#497).....	287
Figure 5.4	Hortulus of Potitus (Pompeii) fresco (#995).....	288
Figure 5.5	Map of devices installed in <i>fora</i>	292
Figure 5.6	Forum of Thamugadi with monumental sundial (#728).....	309
Figure 6.1	Map of Ostian devices, by location type.....	340
Figure 6.2	Hercules sundial from Tor Paterno (#444).....	344
Figure 6.3	Spherical dial from Ostia (#446) with later inscription.....	345
Figure 6.4	Sarcophagus from Ostia (#435) with planar sundial.....	351
Figure 6.5	Functional devices in funerary contexts by century.....	380
Figure 6.6	Map of Ostian traffic patterns.....	390
Figure 6.7	Chart of elite Roman daily activity by hour.....	393
Figure 6.8	Proposed elite route through Ostia.....	395
Figure 6.9	Mosaics depicting Romans running late.....	399
Figure 7.1	Excavated portion of <i>Horologium Augusti</i> (#643).....	412
Figure 7.2	Timekeeping inscriptions with name / office by century.....	441
Figure 7.3	Map of inscriptions with names / offices.....	442
Figure 7.4	Cerialis’ fragmentary letter from Vindolanda.....	460
Figure 7.5	16 th century sketch of <i>horologiarius</i> inscription (#999).....	461

CHAPTER 1: INTRODUCTION

AURORA HORA AUREA
(Hildenborough, Kent, England, 1865)¹

ἕκαστος ἀναγινώσκει ἀνάγνωσιν αὐτῷ δεδειγμένην ἄλλος γράφει, ἄλλος ἠθοποιεῖ. εἰς τάξιν ἀναγορεύουσιν ἕκαστος κατὰ τὴν δύναμιν εἴ τις καλῶς ἀνηγόρευσεν, ἐπαινεῖται εἴ τις κακῶς, δέρεται. γίνεται ἀπόλυσις ἀπολυόμεθα ἐγγύς τὴν ὥραν ἐβδόμην.	quisque legit lectionem sibi subtraditam; alter scribit, alter meditatatur. in ordinem recitant quisque pro posse; si quis bene recitavit, laudatur; si quis male, coercetur. dimittimur fit dimissio: circiter horam septimam.	Each one reads the reading assigned to him; one writes, another practices, they recite in order, each one according to his ability if someone has recited well, he is praised; if someone badly he is punished. The dismissal happens: we are dismissed around the seventh hour.
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(C. 39b-3, trans. Dickey 2015)

Reportedly copied from the grammar book that Cicero wrote for his own sons,
this passage describes a young student learning to write in a new language by
translating a simple story about daily life. Here the student, either a Latin speaker

¹ The epigraph of each chapter in this work is a sundial motto, taken from Gatty's (1900) *The Book of Sundials*. Though sundial mottos did not arise until after the fall of the Roman empire, they offer reflections on time and timekeeping that were often inspired by classical thought.

learning Greek or vice versa, would translate the story of a boy very much like himself from Greek on the left column to Latin on the right (with english added here for our benefit). The passage feels familiar to learners of ancient languages today, who know well the highs of a successful reading in front of the class and the lows of a disappointed teacher when they struggle. The mechanics of this ancient classroom are familiar in another way, though, as the character in the passage appears to have one eye on the clock at the end of the day. While the passage does not explicitly state that class ended *because* the seventh hour² had arrived, it nevertheless betrays a familiarity with breaking one's day into numbered hours. Reading between the lines, this passage tells us that the student in question was aware of the time of his dismissal, either because it had been announced or because he had access to, and an ability to accurately read, a timekeeping device. The notion of the hour appears at several other points in this and similar grammar books, as well: one vignette includes a boy asking time and, hearing that it is the 8th hour, sending his slave to prepare for a trip to the baths (*Mp.* 13g-14a), another contains a comment about the law court's opening at the third hour (*C.* 73a), and an aside that a student's father has a particularly long day as their work begins at the first hour (*H.* 9e). The lessons touch on time even after the sunset, with a dinner scene ending with this brief exchange:

² As hours in antiquity were counted from the rising of the sun, the seventh hour equates to around 1pm. The reason that I say "around" 1 pm is further explained later in this introduction.

πόσαι ὥραί εἰσιν
τῆς νυκτός;
Ἦδη τρεῖς

quot horae sunt
noctis?
Iam tres.

What time of night is it?

Already three

(*Mp.* 20d, trans. Dickey 2015)

During the hours of the night,³ when the sundials commonly found across the Roman world were incapable of tracking time, the student was presented with a case where telling the time took the form of numbered hours. Not only is the use of hours notable, but that such an answer was readily available to our characters further emphasizes just how mundane telling time with hours had become by the 1st century BCE. Day or night, the grammar book's imagined protagonists working through the normal events of a day in the life of a young Roman elite could be reasonably expected to know the hour. Numbered hours appear throughout the literary record of ancient Rome, from these school exercises to Julius Caesar's reflections on his campaigns in Gaul to the barbs of poets like Martial and even in obscure laws regulating the traffic flow of provincial cities.

I argue in this dissertation that the sundials and water clocks of the Roman empire were a prominent feature of the built environment, and that as such those

³ Night hours were counted separately from daylight hours in antiquity. Both day and night were divided into twelve hours each, with varying lengths depending on the season. The intricacies of their division are discussed in detail below.

objects made particular social interactions happen; they provided a temporal structuring device for coordinated action, the framework for the enforcement of temporal restrictions in civic administration, and shaped the tempo of daily life across class, status, and location in the empire. Specifically, this dissertation focuses on the Roman Imperial period to demonstrate a rise in the frequency of hourly timekeeping devices and the impact of this rise on social relations and imperial administration. Hourly timekeeping devices were able to shape social relations because of their materiality, their physical presence that granted them “efficacy” (following Bennett (2010)), or the ability to make things happen. Hourly timekeeping devices were able to effect Roman culture through their participation in timekeeping assemblages, the interrelation of objects, human actors, concepts, and temporally informed actions at the core of a functioning time system. This dissertation shows that timekeeping assemblages were such an important part of life during the Roman empire they should be considered vital infrastructure. An infrastructural understanding of hourly timekeeping allows for a fuller appreciation of its social impacts, the affects and effects of hours in the ancient Mediterranean. This dissertation shows that sundials and water clocks fit within current understandings of infrastructure, recently defined as “built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space” that “shape the nature of a network, the speed and direction of its movement, its temporalities, and its vulnerability to breakdown” (Larkin 2013: 328).

Timekeeping assemblages fulfill all of these criteria, as the “material and mental constructs” (Rojas 2019: 63) that underlie hourly time both “shaped the nature” of their own network as well as impacting Roman practices across the board; they defined Roman temporalities, allowed for specific types of coordinated action, and served as a locus for the creation and contestation of Roman identities.

An important caveat about the hour in antiquity is that it cannot be reliably tracked without the help of an object. Hours are a type of short time, the “sub-division of] the span of the visible daily circuit of the Sun” (Miller & Symons 2020: 2), and though the hours of antiquity translated natural phenomena into the current time those hours were ultimately a human creation. There are key natural cues that enable some types of short time, such as the rising and setting of the sun, but the time in-between can be difficult to measure reliably based on only observable phenomena in nature. There are even some points of coincidence between hours and nature, like the sun’s position at its highest point of the day at noon. To keep hours reliably and predictably, though, humans require the intervention of tools specifically designed to translate natural phenomena into counted units. The Roman empire was no different, relying on complex mathematics and astronomy (much of which was developed before Rome’s rise to prominence) to develop a system of hours that followed the same rules everywhere the Romans held sway.

The timekeeping devices of ancient Rome had remarkable longevity; the practices of measuring time developed in the Hellenistic period persisted throughout Rome's rise and fall, and carried on beyond the empire as well. Scholars have also long held a fascination with the hourly timekeeping devices of the ancient Mediterranean, sundials and water clocks. These objects retained special interest in even the earliest stages of development for the discipline of archaeology, finding their way into the learned treatises, and occasionally the personal collections, of excavators and their patrons from the very beginnings of scientific excavations; Giuseppe Fiorelli, who introduced scientific excavations at Pompeii in the late 19th century (Cooley & Cooley 2004: 192), made special note of recovering a sundial in the presence of Empress .

Despite their persistent presence, both out in the world and in scholarship, hourly timekeeping devices still present us with fascinating and unanswered questions. In the introduction to her book on time, Barbara Adam states that "the clock tells us the time, but it does not tell us what time *is*" (2004: 3). Scholars have long focused on what time, and most relevantly here the hour, *was* in ancient Greece and Rome by studying the science and technology behind timekeeping devices. This fascination extends even back to antiquity itself, as evidenced by Vitruvius' writing on the development and functioning of the timekeeping devices of his day (Vitr. *De arch.* IX). The task of understanding what time was in the ancient world continues today, with projects such as the Edition Topoi Excellence Cluster project on Ancient Sundials (BSDP) (Graßhoff et

al. 2016) that maintains a database of known timekeeping devices complete with 3D scans to better understand their underlying design parameters.

With centuries of study on the devices that made hours in antiquity, it may seem that the topic is sufficiently explored to make a doctoral dissertation on ancient timekeeping redundant. The innumerable contributions of scholarship on the issue of ancient timekeeping, however, still leave tantalizing questions unanswered. In the vein of Adam's example of exploring what time *was* in antiquity, there is still room for contributions what time *did* in the ancient Mediterranean. This category of question has been the target of inquiry in more recent scholarship, and archaeological focus on such questions in the ancient Mediterranean in particular have seen a flourishing in the opening decades of the 21st century.

CHAPTER 1: INTRODUCTION

The next chapter addresses the methods and evidence used in this work in greater detail, but some questions at the core of this work are worth introducing here. Each of the questions below has explicit answers, but also contributes to the overarching question of the role of hourly timekeeping in the social relations of the Roman Empire.

What was the social role of hourly time in the Roman empire?

Where were timekeeping devices found in the ancient Mediterranean, and who had access to them?

How did these distributions change with cultural and political movements throughout the rise of Rome as a major power in the region?

How did different members of Roman society use hourly time as a structuring principle in daily life? Did the hour condition social interactions, and if so did it condition them differently for people of different stations?

What effect did hourly timekeeping have on the ancient understanding of cities and those that lived in them? Were hours an important component of civic identity?

How was hourly timekeeping experienced by citizens under Roman rule? How was it experienced by administrators? Outsiders?

What symbolic associations were held by timekeeping devices themselves? How were those devices implicated in indirectly shaping daily life (i.e., how did hourly timekeeping shape life even when a timekeeping devices wasn't being actively consulted)?

What was the role of the hour in the political and administrative realms of the Roman Empire? Who was responsible for creating timekeeping infrastructure, and how did they benefit from it?

How can archaeological approaches contribute to our understanding of short time and hourly timekeeping in the ancient Mediterranean?

Addressing the social role of a hourly timekeeping devices across centuries of culture is a complex task, and thus calls for a series of specific questions to focus research. This project seeks to address the questions above in order to gain clearer understanding of the social impacts of hourly time writ large. The questions presented above, however, are far from a comprehensive list of those that can be asked of, and answered by, the timekeeping devices of the ancient Mediterranean. The list grows even larger when factoring in the material and written remains of ancient culture relevant to hourly timekeeping beyond just the devices themselves. This dissertation seeks to

contribute to a rich body of existing scholarship on the objects through both novel questions and greater focus on the social context of hourly timekeeping devices. This work is indebted to previous scholarship that located, cataloged, and described the timekeeping assemblages of the ancient Mediterranean, particularly given the context of a global pandemic that made direct object or site investigation impossible for most of the writing here. The works of Gibbs (1976), Severino (2011), Winter (2013), Bonnin (2015), the BSDP (Graßhoff et al. 2016), and Schaldach (2021) were essential to creating the basis of the catalog here, as well as shaping some of the questions to follow. In particular, Talbert's (2017) targeted study of portable timekeeping devices served as a guide given this dissertation's explicit application of those objects to the question of ancient geography; the in-depth investigation of a class of timekeeping artifacts and their influence beyond marking the measured hour inspired much of the approach here. The questions of this work are generally broad scale, though addressed through specific case studies where possible.

Key Concepts

Given this dissertation's focus on the impact of hourly timekeeping devices on the social realm, it has less of a direct focus on the science behind hours in antiquity than many other works interested in the topic. This is not to say that the two are topics are divorced; the underlying science and technology of ancient timekeeping are directly responsible for the functioning, and thus the impacts, of ancient hours. Rather, this

work devotes more attention to the contextualized use and experience of timekeeping devices than it does the astronomy, gnomonics, and mathematics behind the development of ancient hours in their particular form. There are key concepts of these sciences and technologies, however, that are essential to understanding the function and structure of hours in the Roman world.

This section briefly addresses some key concepts of the ancient hour required to make sense of the analysis to follow. First, this chapter expands on the definition of “short time,” the timescale most central to the following work. Second, the hours of antiquity are briefly explained; while hours may appear self evident to modern readers given the continued use of the unit, hours in antiquity were defined differently than those displayed on our smartphones and computer screens today. The chapter then briefly discusses the issue of accuracy in ancient timekeeping devices, both in the sense of its determination and its significance for ancient users. The chapter then introduces Roman conceptions of time, situating the counted hour in culturally specific discussions on timeliness, time scales, and temporality. Finally, the section discusses the particular understanding of the term “assemblage” used throughout this work and its impact on the functioning and analysis of ancient hourly timekeeping practice.

Short Time & the Hour

This work focuses on “short time,” those timekeeping units shorter than a completed rotation of the earth on its axis. In essence, the term applies to any time

period shorter than a day. For the contemporary world, the hour, the minute, and the second are the most commonly used units of short time. Each of these units is colloquially understood in relation to one another (i.e. a day is 24 hours, an hour is 60 minutes, a minutes is 60 seconds, etc.), though has a more complex underlying definition. These more complex definitions are both derived from and predominantly utilized in the natural sciences (both today and in antiquity), especially astronomy and physics. The unit of the second, for example, has been adopted as the base unit of time by the International System of Units, which defines the second as “the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom” (Bureau International des Poids et Mesures 2006); rather than being simply derived from easily observable natural phenomena, a definition was constructed by the intergovernmental agency responsible for standardizing weights and measures (the International Bureau of Weights and Measures) in such a way that the second could be universally defined, removing all margins of error from less exact measuring devices or from inconsistent or imperfectly defined events in nature that may otherwise serve as a base. As an aside, this obscure cesium-derived base unit for the second is itself an attempt to further standardize a previous definition, as Simon Newcomb attempted to define the second as $1/86,400^{\text{th}}$ of

an average solar day (Birth 2012: 5).⁴ For this dissertation, the colloquial definitions of short time units are relied upon unless explicitly stated otherwise, owing both to their general comprehensibility and to the interest here in broad social engagement with short time.

The ancient world relied on a different set of base units than does the world today, and indeed the units differed across time and place in antiquity. Ancient Mesopotamia, for example, used the *bēru* (equivalent to two modern hours), the *UŠ* (equivalent to four minutes), and the *NINDA* (equivalent to 4 seconds) (Steele 2020). In ancient Greece and Rome, the focus of this work, the hour was the standard of non-specialist timekeeping, though astronomers in particular devised a myriad of other measures including units down to 1/45th of an hour (Hannah 2009: 125). This is not to say that smaller units never found their way into Roman life outside of the most highly trained specialists; indeed, Greek *choes*, or jugs used as water clocks for measuring speeches in court, granted speakers about 3 minutes each with Aristotle claiming that the number of *choes* granted per speech determined by the value of the matter under consideration (Hannah 2009: 100-101). While these shorter units were present, hours are the most widely used unit regularly available in surviving evidence, and almost no hourly timekeeping devices had smaller units demarcated on them.

⁴ To even further complicate the story, Newcomb used January 1st, 1900 as the basis of his calculation, though later studies have shown that his calculations were actually more accurate for a day in the 1820's (ibid.).

Measured units are not the only way that short time can be used, though. Short time can also be marked by natural phenomena or other man-made delineations (Steele 2020: 94). This idea applies equally in today's world as it did in antiquity. "Dawn," for example, is a period of time shorter than a day that names the time from the first sight of sunlight to the sun's breaking of the horizon. The distinction between measured time and time based on natural events existed in the ancient Mediterranean as it exists today; an inscription conveying timed access to a community's water system (discussed in Chapter 4), for example, has one period defined as "*ab hora sexta ab occasum solis*" (CIL 6.1261), "from the sixth hour to sunset." In Roman hours, sunset always corresponded with the end of the 12th daylight hour, though in the above inscription we see an alternate reference used.

Finally, it is important to note that time indicators, and especially those relevant to short time, often have multiple or complex meanings. The word "noon" in modern English is an excellent example of this complexity for discussing the often polysemic nature of language around time. Firstly, the word is etymologically derived from the Latin *nona* or nine, as it referred to the 9th hour of the day when the medieval Christian church observed afternoon prayers. Over time, the word took on the meaning of midday, slowly moving from the midpoint between the sun's zenith and its setting to only refer to its zenith (Dohrn van-Rossum 1996, 31). In contemporary usage, noon has come to be conflated with 12pm. Given the hour's decoupling from sunrise and sunset

in the modern world, the constant counting of hours from midnight to midnight regardless of the length of daylight or night on a given day, 12pm no longer always falls on the moment of the sun's zenith in the sky. A further complication is introduced by the wide usage of daylight saving time; the sun's zenith on March 13th, 2021 was one hour earlier in the day than it was on March 14th, 2021 because an hour was skipped in order to move clocks forward. So in all, a word derived from the Latin for "nine" represents both midday and 12pm, and 12pm moves in relation to the earth's rotation that defines it twice per year.

The semantic variation of noon serves to illustrate that terminology in timekeeping, and often times themselves, can have more than one meaning. Context is key in understanding these terms, as knowing that a written reference to noon comes from 14th century France allows a reader to properly interpret the word as it was originally intended, rather than by current Western standards of its meaning. The importance of contextualizing references to time is an essential lesson for the investigation of time in antiquity, especially in regard to written sources discussing the hours. When Horace states, for example, that it took one hour to load the barge he sailed on from the *Forum Appii* (Hor. Sat. 1.5.17-22) (discussed in Chapter 6), he may have been closely watching the time, or he may be roughly approximating, or he may have been intentionally misrepresenting the length of time for satirical effect. Indeed, early references to ὥραι in Greek literature refer to less well defined time units from the

seasons in Homeric Greek to more defined parts of the day (i.e., morning, afternoon, evening, etc.) to eventually the measured hour under study in this dissertation. While the meaning of *hora* in Imperial times most typically referred to the measured hour, it did still sometimes have a broader referent in poetic usage. Nevertheless, the presence of the hour in Horace shows the influence of the hour in Roman thought on time; lengths of time were most easily conveyed by reference to the measured unit, and one could expect their readers, or even non-literate members of society who heard retellings of the tale, to understand roughly how long an hour was.

Roman Hours

Saying that an audience would understand “roughly” how long an hour was presents an important distinction between Roman and contemporary hours. To begin, the Roman hour was not the same as hours used today. Rather than being a uniform measure of time, $1/24^{\text{th}}$ of the Earth’s daily rotation in today’s reckoning, the hours of antiquity were defined as a division of the daylight or the night, respectively. That is to say that rather than $1/24^{\text{th}}$ of the Earth’s rotation on its axis, an hour in the ancient Mediterranean was either $1/12^{\text{th}}$ of the daylight on a given day or $1/12^{\text{th}}$ of the nighttime on a given day. This distinction greatly changes the nature of the hour given that the length of the daylight changes seasonally due to the Earth’s tilt.

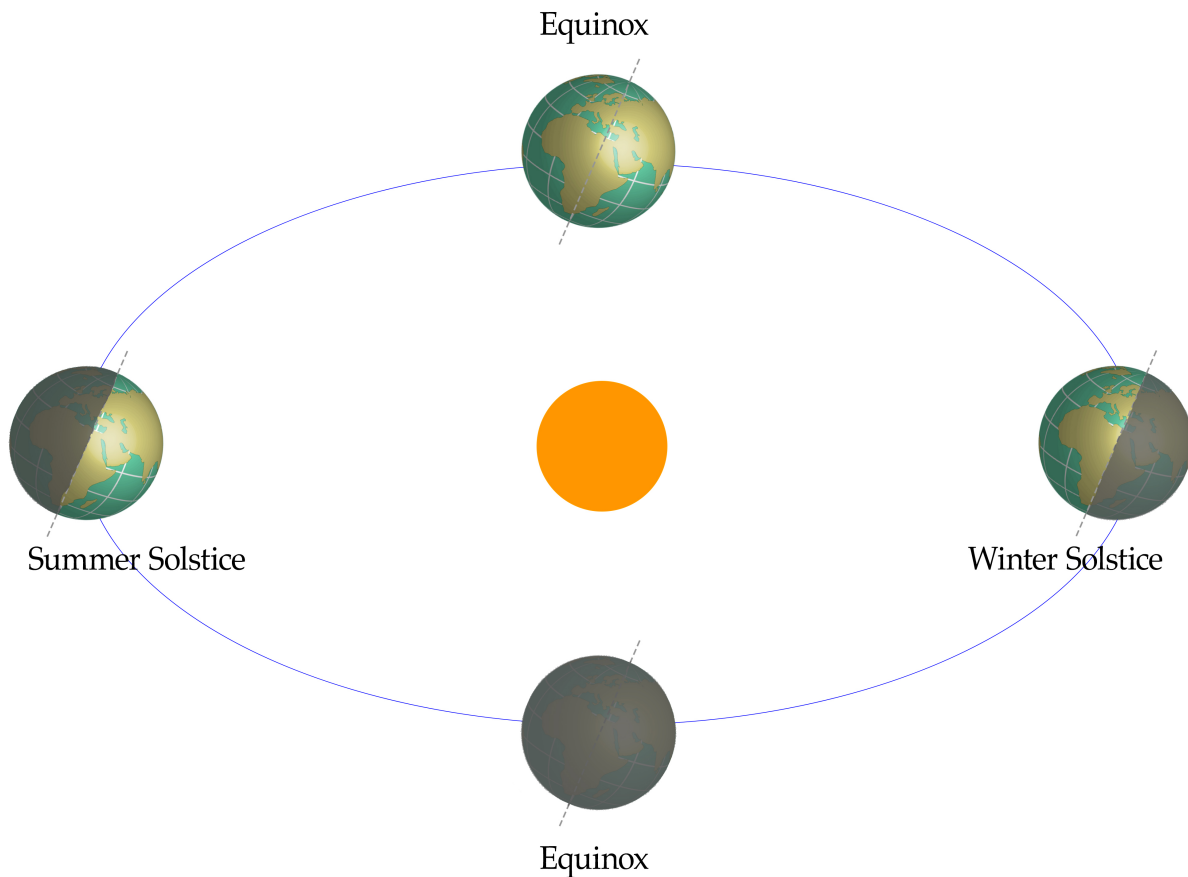


Figure 1.1 - Earth's tilt and its effect on sunlight length throughout the year.

The earth maintains a tilt in its axis of roughly 23.5° ⁵, though this tilt remains consistently oriented (Figure 1.1). The nature of the tilt causes the northern and southern hemispheres to receive different amounts of daylight at the extreme points of the Earth's orbit, the solstices, and has limited effect on these lengths on the equinoxes. This phenomenon produces the famed midnight sun of locations above the arctic circle, as the Earth's tilt prevents the sun from ever setting below the horizon in portions of the summer. The effects of the axial tilt are diminished the nearer a location is to the

⁵ There is some variation in this tilt, as over a period of about 40,000 years the tilt ranges from 22.1° to 24.5° . For the sake of simplicity, this explanation uses the current standard of 23.5° .

equator. In the Roman world, this axial tilt means that settlements in Britannia experienced greater variation in the length of their hours between summer and winter than did Rome, and Rome experienced greater variations than did settlements in Numidia.

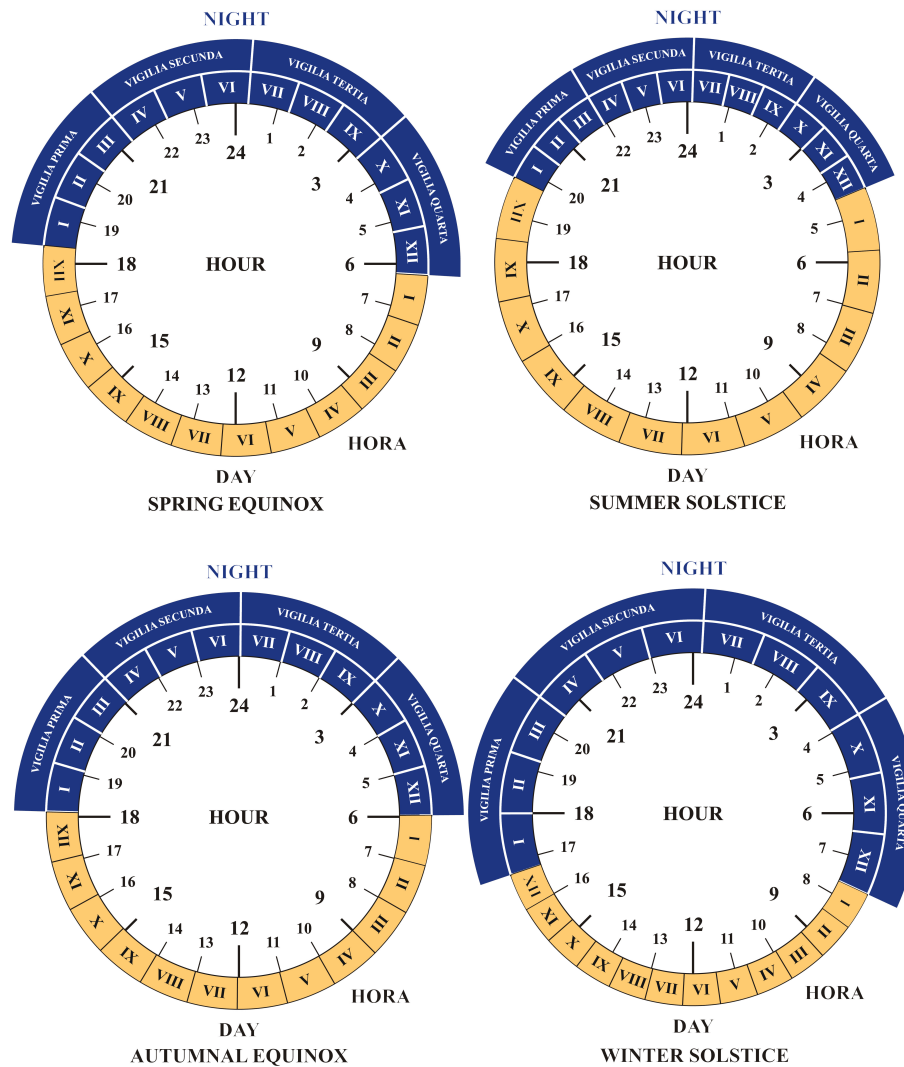


Figure 1.2 - Hour lengths for the latitude of the Forum Romanum in 8 CE at key points in the calendar. Modified from original on Wikimedia Commons by user Darekk2 CC BY-SA 4.0.

The hours of the ancient Mediterranean therefore varied according to the time of year and the latitude of a given place, as these are the factors that influence the length of daylight. Figure 1.2 above shows the respective length of daylight and night in the Forum Romanum for the year 8 CE.⁶ The inside of each circle shows the 24 hours of the day as conceived today, with the interior ring showing Roman *horae* and the external ring showing an additional division of the night used commonly in the ancient world. The equinoxes (left circles) produce seasonal hours that are functionally the same as hours in the contemporary world; because the equinox has equal lengths of daylight and nighttime, each of the 24 hours of the day (12 day and 12 night hours) is the same length. For this reason, hours that are uniform in length are also referred to as equinoctial hours. These equal hours, those that mark durations most like the hours of today, were known in antiquity but appear to have been used only in specialized areas (such as astronomy)(Evans 2015: 1592). The summer solstice (top right) has the longest daylight of any day of the year, thus producing the longest daytime hours and shortest nighttime hours. The winter solstice (bottom right) inverts this relationship; it has the shortest daylight of any day, and thus has the shortest daylight hours and the longest nighttime hours. In addition to the division of the day and night into hours, the night

⁶ This example cites a particular year as there are other phenomena that cause finer degrees of variation in day (and thus ancient hour) length, but this introduction does not go into further detail.

was also regularly divided in four *vigiles* or watches, following the same principle as the hours as a proportional division of the nighttime on a given day.

The variation in daylight naturally produced variation in the length of each hour, by today's definitions. These variations can best be described using modern hours and minutes as a baseline. The shortest daylight of the year in Rome came in late December, when there was a total of about 10 modern hours of daylight in a day, which means that each *hora* lasted roughly 45 minutes by today's reckoning. The longest days fell around the summer solstice, which had close to 15 modern hours of daylight and thus *horae* of about 75 minutes in length (Houston 2015: 300). Nighttime *horae* would, naturally, reverse this relationship with longer night hours in winter and shorter night hours in summer.

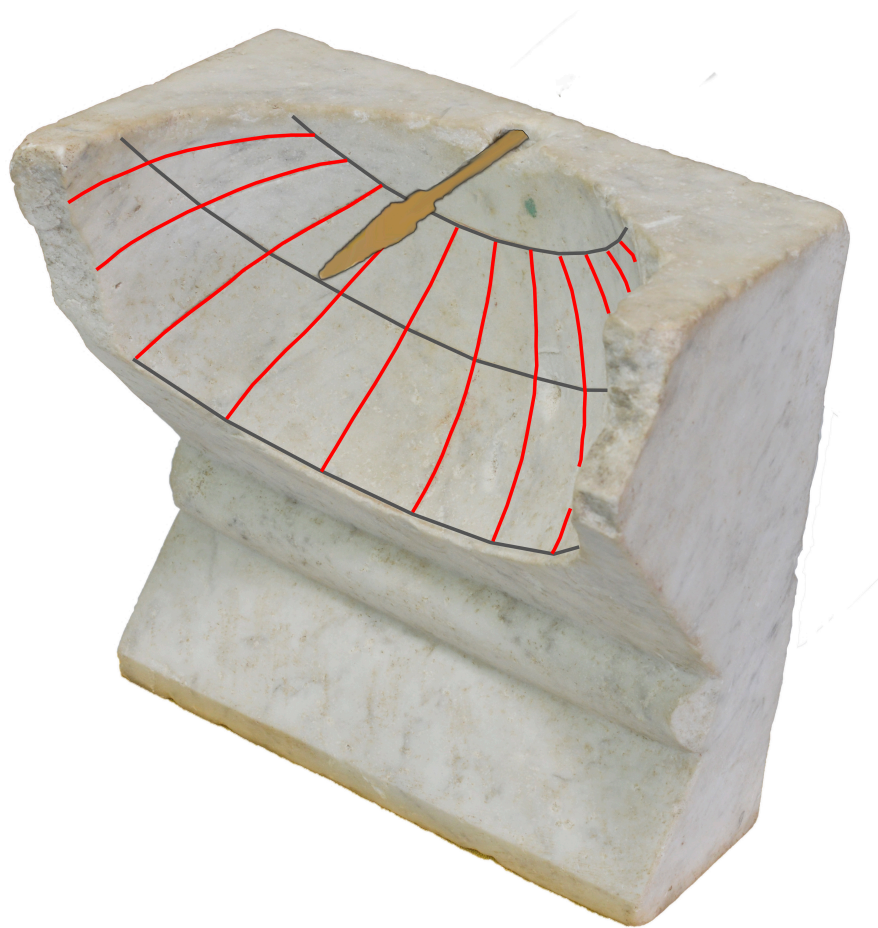
Timekeeping Technologies

With this brief introduction to the seasonal hours of Roman antiquity, it is also necessary to discuss the basics of ancient timekeeping technologies. The next chapter more explicitly explores the typologies of timekeeping devices, but it is nevertheless worthwhile to establish the components of Roman timekeeping devices and their functions in order to make the differences in various types more immediately apparent. Given the more direct relationship of sundials to the geographical and celestial issues addressed in the previous section, I begin with a discussion of sundials before moving on to the water clocks of antiquity. For the sake of clarity, the example presented here is

based on a spherical sundial, as this type is the easiest to relate back to the “underlying cosmological structure” upon which sundials are based (Hannah 2009: 116). The other dial types, which are introduced in full in the next chapter, simply offer alternate technologies to approximate or recreate the “underlying structures” discussed here.

Spherical sundials present an inverse image of the dome of the sky (ibid.); put another way, the sundial creates an inverted model of the sky as it curves around the Earth. This model preserved the geometry of the sky that it modeled, or what is known as the celestial sphere. The first task of the sundial, then, is the projection of the sun's position onto this model of the sky, which it does using a fixed point (the tip of a gnomon) to cast shadow onto the immovable face of the dial. In order to translate the sun's position into the hours, the typical Roman sundial also had a grid consisting of two sets of lines inscribed (or painted, or both) on that immovable face. The first set of lines project declination circles, arcs representing the path of the sun across the sky on a given day, are typically referred to as “day curves” or “day lines.” The Earth's tilt relative to the position of the sun causes the sun to move higher and lower in the sky relative to the horizon over the course of the year, thus making the sun travel on a slightly different path through the sky from day to day. Sundials in antiquity typically had three day curves representing the sun's path on the summer solstice, the equinoxes (a shared line as the sun's path is the same during both annual equinoxes), and the winter solstice for a given location. The gnomon's shadow, again representing the

position of the sun, ranges between these curves over the course of the year. The second set of lines on the grid marks the hours, fittingly known as “hour lines,” by dividing the sun’s path along each declination circle⁷ into 12 parts. As the tip of the gnomon’s shadow moves across both of these axes, the sundial “shows not only the current seasonal hour of the day but also the current stage of the year” (Jones 2017: 184).



⁷ While only three such declination as typically inscribed on ancient sundials, the sun moves along such a circle every day of the year. While these declination circles are too close together to be individually represented at the scale of ancient timekeeping devices, the sun’s motion across the sky always follows such an arc.

Figure 1.3 - Schematic of a sundial, drawn over a spherical dial from Pompeii (#533). Day lines are drawn in grey, hour lines in red, and gnomon in gold. Image modified from BSDP, Image of Dialface ID 23, Pompei Inventory Nr. 6100, 2015, Ancient Sundials, Edition Topoi, NC-SA 3.0 DE

Figure 1.3 shows a spherical dial from Pompeii (#533) with key aspects of the device highlighted. Roman dials most often had three date lines, shown above in grey, though simpler devices sometimes had only the center, or equinox, line or even none at all. A complete dial would have 11 hour lines, shown above in red. These lines would divide the shadow receiving surface of the dial into 12 segments representing the 12 hours. The gnomon, represented here by a gold pointer, would typically extend to the center point of the sphere, though these aspects of ancient sundials are rarely preserved given that they were typically made of metal inserted into holes in the top of the dial.

Sundials of other types generally followed these same principles, but used different geometric principles to project the sun's movement across the celestial sphere onto devices of different shapes. The most common other shapes for dials were cones and flat planes, the later sometimes arranged across two flat faces joined perpendicularly to one another (see Bonnin 2015b for details). The portable sundials that arose later in antiquity offered the greatest deviation from these basic principles, coming in either of cylindrical, pillbox, or "geographic" varieties. Talbert (2017) explains the devices in great detail, fully cataloging all known examples. Those objects are included in the catalog here, though given their lack of permanent use contexts are discussed less than other types. In order to work at different latitudes, portable sundials came with a series of known latitudes inscribed on one side. The user would set the

device to the correct latitude (or as precisely as they could given their knowledge of their location), set the date by aligning the gnomon and shadow receiving surface with date marks on an outer ring of the device, and hang it so that the sun hit across the object's face in the correct way. In these devices, the gnomon and hour lines were part of a single piece, with the shadow caster raised on one end and a curved strip containing the hour lines extending away from it. In essence, these devices allowed a user to set the shadow receiving surface and gnomon to the correct declination circle for a given date and location.

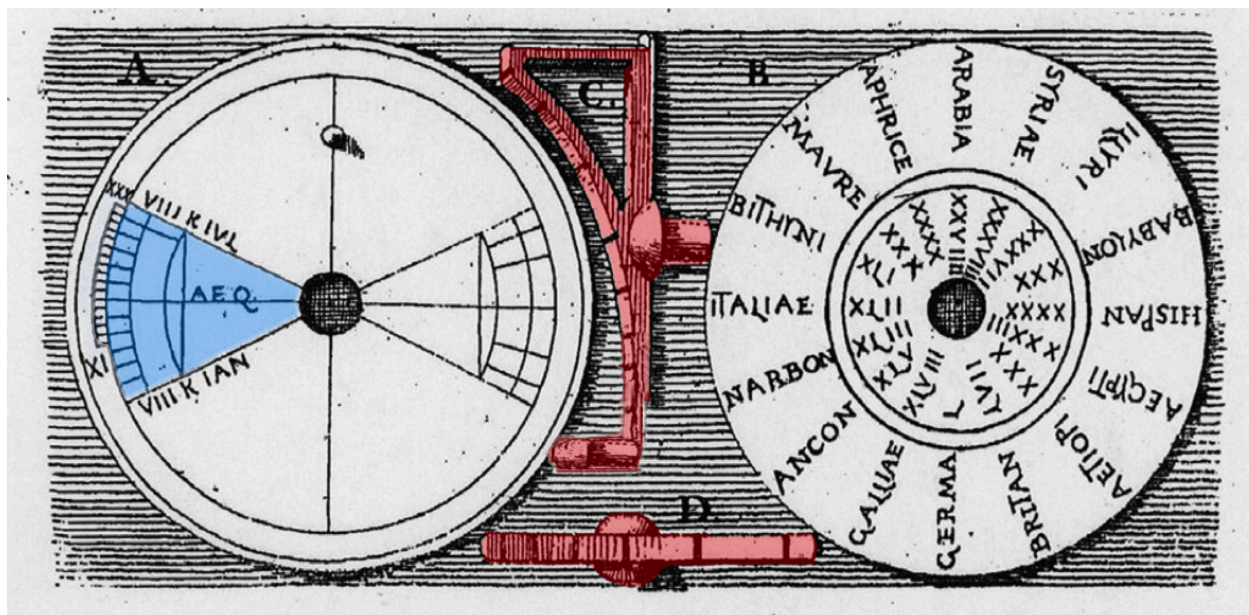


Figure 1.4 - Drawing of a geographic portable sundial by Gianfrancesco Baldini (1741). Modified to complete shadow caster, highlight shadow caster and hour lines in red and date adjustments in blue. Taken from Talbert 2017: 25.

An early record of a Roman geographic portable sundial comes from Gianfrancesco Baldini (1741), who provides an instructive drawing (Figure 1.4) of such a dial. The reverse side (B in the drawing) bears place names and their associated

latitudes. The places listed are generally entire provinces, though cities also appear on the objects, showing that the accuracy of the settings was not always consistent. The interior ring of the device would be turned to match the equinox line (labeled AEQ. in A) to the latitude along the outer ring of the device. After setting the location, the shadow caster and hour lines (in red, with two views labeled C & D) would be aligned with the proper date within the blue area. The outer boundaries of the blue area in this example are labeled VIII K IUL and VIII K IAN, or the 24th of June and 25th of December in the Julian Calendar. These points near the solstices represent the maximum adjustment made for the date on the device. Once all of these settings were applied, the tall piece at the end of part C would cast shadow along the curve rising from it, with each inscribed line across serving as an hour line.⁸

Clepsydrae, or water clocks, measure a fundamentally different type of time, though could be (and were) adapted to tell the same seasonal hours as sundials. *Clepsydrae* measure duration, the amount of time something takes to happen, rather than tracking the time based on the natural phenomena of celestial objects moving across the sky. The basic tenets of *clepsydrae* gauge time by measuring how long it takes a predetermined amount of water to drain from a container. The technology was also reversed, though, with water clocks that also measured time by water flowing into a

⁸ The number of hour lines on this example is incorrect, as it is partially reconstructed from an incomplete device.

container. In addition to using a pre-measured amount of water, the devices needed to maintain a consistent water pressure in order to drain (or fill) at a consistent rate.

The units measured by *clepsydrae* were more varied than were the hours of sundials; references in Greek literature refer to *choes* (small jugs) and *amphora* (large storage vessels) worth of water being used to time different increments of time. Because of their design parameters that emphasized constant rates of flow, it was easier to design a *clepsydra* for equinoctial hour than for seasonal hours; a single measure of water could be used to mark every equinoctial hour the year round, while the daily variation in seasonal hours would also require daily variation in the measure of water used. Given the prevalence of seasonal hours, though, accommodations for these variations were created in a variety of ways. For example, some “calendrical *celpsydrae*,” discussed in depth in Chapter 4, had a series of markings lining their tanks to mark the amount of water needed on a given day to measure an hour (or all 12 hours). A key advantage of the water clock was its independence from the sun; water clocks could track the hours at night and on days where the sun was obscured by clouds. Sundials, often made of substantial blocks of stone, have survived the trials of time better than have *clepsydrae*, and so make up a significantly larger proportion of the known timekeeping devices from antiquity. Both types of device, though, were widely used.

After briefly introducing the major types of short timekeeping devices in the ancient Mediterranean, it is important to make a brief comment on ancient terminology.

Despite the great variety in devices, which is even greater than presented above given the subtypes of each to be introduced in Chapter 2, the ancient terminology for the devices was often less varied. The Greek ὥρολόγιον, Latinized to *horologium*, was applied to hourly timekeeping devices no matter their type. The broad use of this term sometimes makes it unclear what type of device is being discussed by an ancient source, particularly in brief dedicatory inscriptions. *Horologium* also saw several different spellings over the course of antiquity, but it does not appear that these variations were tied to formal differences (see Winter 2013: 111-142 for an in-depth discussion of ancient terminology). There were, however, other terms with clearer referents; *clepsydra* referred only to water clocks, *solarium* was sometimes used to refer to sundials, and others appear in less frequent usage (such as referring to *clepsydrae* by the size of the vessel to which their tank was equivalent). Generally, this work uses *horologium* when relying on ancient terminology, unless the specifics of a given object call for another term (i.e., the discussion of *solaria* in Chapter 5).

Accuracy

Not only was the definition of an hour different in the past, but so too was what it meant to keep to the hour. Ancient mathematicians and astronomers produced timekeeping tools with astonishing capabilities for accurately predicting or tracking time and regular phenomena, the most famous of which being the Antikythera mechanism (see Jones 2018 for history and analysis of the device). While this impressive

degree of accuracy was possible in certain instances, the vast majority of timekeeping devices were decidedly less accurate than today's standard of internet enabled devices regularly synchronized globally throughout the day. So too were ancient devices less precise than the atomic clocks of today or even the customary (i.e. non-scientific) use of minutes, which wasn't widely adopted until the 14th century CE (Dorhn van-Rossum 1992: 282). While there is clear evidence for administrative policies and record keeping that counted in half-hours (discussed in later chapters of this work) and the use of smaller time increments in specialized contexts, especially in astronomical sciences, almost all surviving short-time devices used hours as their base measurement.

In order to be accurate, sundials had to account for latitudinal position and its corresponding variation in the angle of sunlight. The importance of this accounting is most clearly exhibited on dials with day curves (or day lines), as the shadow cast on such a curve would be present for the entire demarcated day and there were robust calendar systems against which they could be checked. The Greek development of trigonometry allowed for the advancement of sundials, such as the arithmetical determination of hour line placement rather than geometrical (Vincent 1998: 13). A key component of these advancements was the ability to construct sundials in such a way as to consistently track hours within a given context. While even the simplest gnomon can accurately demarcate noon and the extremes of the length of its shadow throughout the year the solstices (Evans 1998: 205), the Earth's tilted axis and curvature cause a

gnomon's shadow to advance at different rates throughout the day. The gnomon of vertical dial placed at the equator, for example, casts a shadow that moves at a uniform rate of 15° per hour (Mills 1993: 85), while increasing distance away from the equator introduces greater variation in the rate of movement.

A high degree of accuracy was certainly possible using ancient methods of production. Scholars have long been interested in reverse engineering the timekeeping devices of antiquity, particularly sundials, to assess the device's ability to accurately track seasonal hours in the location in which it was discovered. Gibbs (1976) was a main proponent of this type of approach in order to establish the "intended" latitude of a device and whether or not this agrees with its provenance, to be able to replace missing gnomons (which remain fully intact very rarely), or to identify other characteristic patterns used in the construction of timekeeping devices. The correspondence between "intended" latitude and provenience has been used as a reflection of the accuracy of local dial makers, as in Houston's observation that 8 of 10 measured sundials at Delos were constructed with cardinal parameters within 2° of their find location and dials at Athens, Cos, Dacia, Caria, Rhodes, Oplontis, and Wiesbaden are accurate to within 1° (Houston 2000: 301). Jones (2020) has recently treated the issue of displaced sundials in great detail to prove, however, that the inaccuracies of incorrect placement would be relatively minor. The greatest difference would be observable in the calendrical function of a sundial, as the gnomon's shadow would either exceed or fall short of the markers

for the equinoxes owing to the difference in the angle of the sun's rays between locations. The difference in movement between hour lines would be less severe, likely only observable when directly compared to a more trusted locally calibrated device.

In order to mark time both consistently and accurately, both the hour lines and the day curves of a sundial had to take account of the object's location. Modern scholars can solve the "inverse problem" of determining the cardinal parameters of a sundial from whole or fragmentary objects, though must make some allowances for ancient accuracy (Hüttig 2000: 164).⁹ Unfortunately, it was not common practice in the Roman world to inscribe the intended location of use on sundials (Talbert 2017: 8).¹⁰ Roman knowledge of latitudes was well developed; Ptolemy's *Geography* included a list of 6,345 locations with known latitudes (ibid.: 111).

Pliny the Elder's account of one of the first sundials in Rome describes significant inaccuracy; the sundial was brought into the city after its removal from Catania and was used for 99 years before it was realized that the device was inaccurate at Rome's latitude (Pliny, *H.N.* 7.214). Even after 99 years of tolerating the miscalibrated timekeeping device, Pliny conveys that the Sicilian sundial was not replaced but rather had a correctly calibrated one constructed next to it by Censor Q. Marcius Phillipus. The

⁹ For example, in Hüttig's case study of a conical sundial from Tyrrheion, he proposes both multiple possible interpretations of the cardinal parameters for the fragmentary device and allows for about 2mm of error as a matter of technical issues in production.

¹⁰ Except, of course, for a class of portable sundials of the later empire that usually contained a list of cities and their latitude with which one could calibrate the device. Even among portable sundials, there were types that could only function accurately at a particular latitude (Talbert 2017: 11).

4 1/2° difference between the latitude of Rome and that Catania affected the original sundial in two ways; it caused error in its reckoning of the hours and the accuracy of its date lines. Calculations for this discrepancy in latitude were made for a popular type of sundial (Pliny does not provide a detailed description of the object itself, and found that the difference would account for a maximum discrepancy in hours of just 4.2 minutes but would cause the shadow to never fall on the day line for the summer solstice and to cross the line of the winter solstice twice (Gibbs 1976: 96). While the former of these errors would be difficult to notice given the expected level of accuracy for ancient sundials, the two types of error nevertheless serve to illustrate how the cardinal parameters impact the time shown on a dial.

The problem of calculating hour lines for a sundial is the result of the particular technologies used during the Roman (and preceding Greek) period. Equatorial sundials, those in which the face of the dial is placed at the same angle as the Earth's axis with a perpendicular gnomon facing the celestial pole,¹¹ were not used in the Roman world. In such a device, hour lines for the 12 daylight hours are equally measured at 15°. Sundials from the Roman world were either planar, with a flat horizontal or vertical face, or cut with a rounded surface (either hemispherical or conical) that received shadow from a gnomon oriented to face south (Houston 2015: 299).¹² Since these dials did not recreate

¹¹ The North Celestial Pole in the Northern hemisphere and the South Celestial Pole in the Southern.

¹² At the time of his writing, Houston estimated that roughly 80% of known ancient sundials were of the latter design.

the Earth's axis and a direct association with the celestial pole, hour lines needed to account for the device's imperfect representation of the celestial sphere and correct for it. In vertical sundials, for example, projecting the celestial sphere onto a planar surface can lead to hour line spacing that varies from 12° to 18.7° within a single dial (Vincent 1999: 16). More common errors in hour lines come in the form of poor implementation, wherein the lines are either incorrectly spaced or poorly cut (too wide for accuracy or not straight, for example) (Houston 2015).

Sundials with inaccurate day lines must be contextually understood within broader patterns in the Roman period, and especially the Imperial period, to de-emphasize the calendrical functions of sundials. Houston cites "ample evidence" that Roman dial makers were "not at all concerned" with the accuracy of their day lines (2015: 301), and this lack of concern appears to have increased over time. As noted above, these shifts in the level of accuracy of day lines (or even their inclusion at all, as many Imperial period dials lack the feature entirely) may indicate a shift in temporal concepts and valuations in which the hour became a more significant feature. The margins of error in the hours presented by a sundial were less significant and much less observable than those in day lines.

How Romans Thought About Time: Chronos and Kairos

As a final brief introduction to the people under study here and the temporal culture they abided by, there are two important concepts of time necessary to

understand the role of the hour in Roman antiquity. Both terms are rooted in Greek thought, though were carried on throughout the Roman empire. The key temporal categories are *kairos* and *chronos*. *Kairos* is the notion of proper timing derived from Greek rhetoric, what Miller calls “the uniquely timely” (Miller 2002: XIII) or Smith the “time of opportunity” (Smith 1969: 1). An ancient elite that had missed his 9th hour invitation to dinner lacked this virtue, for example, was said to be *akairos* (without *kairos*). *Kairos* can work across different systems of time reckoning, as timeliness can be based on a time of day, the proper moment in discussion or debate, the development of crops to be harvested, or any number of other “moments that demand decision” (Kim 2017: 148). *Kairos*’ counterpart is *chronos*, a more quantitative approach to time. Smith describes *chronos* as such:

the fundamental conception of time as measure, the quantity of duration, the length of periodicity, the age of an object or artifact, and the rate of acceleration as applied to the movements of identifiable bodies, whether on the surface of the earth or in the firmament beyond (1969: 1).

Hourly timekeeping, the establishment and counting of divisions of time within the day, is more apparently related to *chronos* than *kairos*. The division of each day into units of equal duration (at least on a given day or night in antiquity) is exactly the foundation of a system of time measurement. While the hours of modernity are the true standard of a uniform measure of time, the seasonal hour of antiquity was at least uniform in its conception as 1/12th of the daylight hours of a given day. Water clocks in particular amongst the ancient corpus of timekeeping devices can be seen as tools of *chronos*; early

uses of Athenian water clocks appear to have been based on the hours of the shortest day of the year, thus measuring equal hours (in the sense of modern understanding) at the expense of accounting for all of the daylight on a given day (Allen 1996: 163).

Clepsydrae were also not tethered to the hour as a unit of measure; legal oration measured by water clocks rarely coincided with the hours of the day, and clepsydrae were typically used to measure units equivalent to 3-6 minutes as measured today (Wolkenhauer 2019: 227). These examples show the role of duration in forming timekeeping devices, and thus their connection to *chronos*.

The influence of the concept of *chronos* on timekeeping, however, does not exclude *kairos* from remaining a significant facet in both the conception and practice of hourly time. Hippocrates himself opens his *Praeceptiones* by stating “*Chronos* is that wherein there is *kairos*, but *kairos* is that wherein there is not often *chronos*” (Hp. *Praec.* I.313-315, trans. adapted from Kim 2017: 148).¹³ Timing occurs within the broader frame of time itself, but time itself does not necessarily have to contain ideal moments for action. *Chronos*, then, can be an empty container with or without human (or other) action taking place at opportune moments, but all opportune moments, and essentially their attendant actions, occur within that broader field of time. While *chronos* can exist without *kairos*, the two often appear together in Roman conception and iconography. Kim (2017: 148) explains this relationship by noting that “*chronos* without *kairos* fails to

¹³ “Χρόνος ἐστὶν ἐν ᾧ καιρός, καὶ καιρὸς ἐν ᾧ χρόνος οὐ πολὺς.”

explain the critical points of human experience.” It is exactly that human experience that this work seeks to address.

Roman Timekeeping Assemblages

Core to the analysis of Roman hourly timekeeping presented in this dissertation is the concept of the assemblage. More importantly, this concept is essential to understanding how hourly timekeeping happened in the ancient world. Keeping hours on its face seems like a simple proposition, even with the use of complex timekeeping devices to do it; one looks at a timekeeping device and learns the current time. There may be additional steps to ensure the proper function of the device being consulted and the accuracy of the time it keeps, such as the winding of a watch or the dreaded resetting of the non-synchronized clocks of a modern home after a power outage. Even these basics of operating and consulting timekeeping devices, however, are just small components of a broad assemblage of objects, actors, and ideas that are essential to a coherent time system, and particularly one that is used in coordinated fashion by multiple people in multiple places.

“Assemblage” is traditionally defined in archaeology (here represented through the leading introductory textbook for the field) as “groups of artifacts from a particular time and place” (Renfrew & Bahn 2016: 130); the archaeological assemblage of an excavated context, for example, may be the entirety of artifacts recovered during its investigation. The field has also, however, embraced definitions of the term developed

in philosophy (particularly Deleuze) that seek to include a broader suite of phenomena and actors in the assemblage. Hamilakis briefly summarizes this broader definition as “temporary and deliberate heterogeneous arrangements of material and immaterial elements” (2017: 169).¹⁴ This dissertation embraces the latter of these two definitions, as there is much at play in the use of timekeeping devices beyond only the collection of those devices themselves (or even the surrounding artifactual assemblage collected from the same context). In order to avoid confusion between the traditional and more theoretical definitions of the term, this work will not refer to collections of artifacts as “assemblages,” instead reserving the term for the broader suite of material and immaterial things further discussed below. For example, in referring to all the timekeeping devices recovered from a particular site this dissertation calls such collections of objects the “corpus” of devices from that place.

The “material and immaterial elements” at play in timekeeping assemblages are varied, differing by context and moment. The timekeeping devices themselves are central to the analysis here, and could not be replaced by any other object (nor even switched out with one another) without creating a new and different assemblage. The form of an individual object, its associations, and its history all effect the assemblages in which it participates. A timekeeping assemblage also includes the rest of the

¹⁴ Hamilakis’ own definition, rather than the broad-stroke summary of theory present in the body above, also goes on to specify further that “sensoriality and affectivity, memory and multi-temporality are key features of assemblage thinking, and that assemblages also imply certain political effect” (2017: 169).

“traditionally defined” archaeological assemblage in which it existed. The walls of Pompeii’s House of the Menander, for example, and the other surrounding artifacts recovered archaeologically participated in an assemblage with the sundial recovered from the structure’s garden. So, too, did the people that populated that and the surrounding space at a given time; timekeeping is a practice carried out by actors who in turn rely on timekeeping devices for their knowledge and understanding of the time. Finally, the concepts surrounding timekeeping also played a vital role in the types of assemblages under study in this dissertation.

To pull these many and varied factors together, a timekeeping assemblage can be seen as the material objects that tell time, the objects surrounding them that influence the experience of those devices and/or the actions that the devices influence, and the actors that undertake the action of reading the time and acting based on that information (along with myriad other influences). Those actors and actions are conditioned by cultural understandings of time, thus those understandings must also be considered; since it was important to not be late to a dinner invitation at the 9th hour of the day for elite Romans, their interactions with and actions around time took on particular meanings that are inseparable from the timekeeping assemblage.

Though this dissertation is focused on the material objects at the core of these timekeeping assemblages, such assemblages are perhaps best represented in the Roman world through a work of fiction. Petronius’ character Trimalchio, a rich freedman

appearing in the author's *Satyricon*, presents a glimpse into the timekeeping assemblages of elite Roman life. The passage describing a dinner at Trimalchio's house presents timekeeping devices, people who interact with them, and ideas behind their use that are all instructive of a Roman timekeeping assemblage. For example, an invitee's slave describes a device found in Trimalchio's home, saying "Trimalchio, a most laudable man, has a *horologium* complete with a trumpeter in his *triclinium*, so that he can always know exactly how much of his life has gone by" (Petron. *Sat.* 26.9).¹⁵ This brief passage is already a rich glimpse into the assemblage at play here: Trimalchio has a water clock with either an attendant or an alarm (see Magnusson 2000 on interpreting the passage as an alarm or cuckoo-clock), the passage shows that the device is known to the enslaved members of other households, and we are even presented with a reasoning behind the device's installation in the form of Trimalchio's awareness of his mortality. The preceding part of the passage also clarifies that information about the clock is presented in order to dissuade the guests from skipping out on dinner. Not only is there a remarkable timekeeping device in Trimalchio's house, but it is such a draw that weary guests dare not miss it.

Trimalchio also discusses his plans for another timekeeping device while hosting the dinner, this one to be placed on his own tomb. In describing his elaborate plans for

¹⁵ Trimalchio, lautissimus homo in horologium in triclinio et bucinatorem habet subornatum, ut subinde sciat quantum de vita perdederit.

his own funerary monument, Trimalchio ends by noting it will feature “a sundial in the middle, so that anyone who looks at the time will read my name whether he likes it or not” (Petron. *Sat.* 71.).¹⁶ Here again we see a timekeeping device, installed on a tomb according to common Roman custom, and learn of its intended users as those that happen to be passing by (though surely others would also interact with the device, such as those specifically seeking to pay respects to Trimalchio). This passage also shows the intention behind the device, here to draw in the eye and force anyone in sight to read Trimalchio’s name whether they care to or not.

The timekeeping devices of Trimalchio provide many insights into the timekeeping assemblages of the Roman world. They include both a sundial and a water clock, the two main technologies of timekeeping throughout Roman history, and reflect on how the form of each effects the broader assemblage. The water clock with its trumpeter serve as an unavoidable reminder of time and a novelty too interesting to miss. The sundial is presented as so useful that everyone that passes by will consult the device, thus being drawn into Trimalchio’s trap. Both devices are placed in common contexts for timekeeping in the ancient Mediterranean, among the household of elite Romans and in the roadside tombs that can be found across the empire. The first device is not only a draw to dinner, but is also important to the organization of dinner plans: elite Roman custom had a specific start time for invited diners (the 9th hour of the day).

¹⁶ Horologium in medio, ut quisquis horas inspiciet, velit nolit, nomen meum legat.

This device and those elsewhere in the surrounding city worked together with diners and the preparers of the meal to undertake coordinated action. For the 9th hour dinner to occur on time, the food and drink had to be prepared on schedule and the diners had to arrive in a timely fashion. There were social consequences to tardiness, shown when Trimalchio complains about having to cut short his time at the baths to properly greet his guests (implying that the social penalties for his tardiness were too great to make luxuriating longer worthwhile).

Going forward, this dissertation will engage with timekeeping assemblages at varying scales and moments across the spread of the Roman empire. While these assemblages are highly varied, they share in common their basis in a heterogeneous collection of material and immaterial elements. These elements are usually not recoverable in full; we will never know the exact extent of objects, people, and ideas that are involved in archaeologically recovered timekeeping assemblage and especially not all the ideas that influenced the objects and actors around them. Nevertheless, the particulars of a given timekeeping assemblage and the trends among identifiable assemblages are still greatly informative of hours in the past.

Chapter Outlines

The introduction to this dissertation thus far has largely focused on the terms, tools, and ideas behind hourly timekeeping in the Roman world. This information is most useful here, though, in order to address the research questions of the project.

While a list of some core questions of the work was presented above, this chapter concludes with a roadmap to the rest of the dissertation. Each chapter addresses some of the questions posed above, all in service of answering the broader question at the center of this work: what was the impact of hourly time on social relations in the Roman Empire?

Chapter 2

Chapter 2 introduces the archaeology of hourly timekeeping, the contributions of the field to understanding hours through the material remains associated with them.

Archaeology may not be the first discipline that comes to mind when considering the hour in the ancient Mediterranean; one cannot excavate an hour, after all, nor the moments in antiquity where the hour was used as an organizing principle.

Archaeological approaches are, however, perfectly situated to elucidate the timekeeping devices that made that made hours possible, since hours could only be made by material objects working together in assemblages with people. This chapter explores the three main categories of archaeological object that sundials and water clocks fall into: artifact (individual object), feature (permanent installation), and infrastructure (built network).

The chapter begins by arguing that timekeeping devices are first of all archaeological artifacts; they are discrete objects with individual biographies that can be excavated, cataloged, and studied in ways similar to other archaeological finds. The

particulars of their use, however, also make the study of these devices as installed components of the built environment a worthwhile avenue of investigation. Most timekeeping devices, certainly among surviving examples and likely generally in antiquity, were permanently or semi-permanently installed in a particular location, to which they were either designed from the beginning or calibrated to function. This sited-ness allows for particular types of analysis, especially regarding the contextualization of the devices and their use. These analyses, in turn, open avenues for exploring the creation of the ideas and practices surrounding hourly time and adherence to those hours during the Roman empire. Finally, the devices are defined by their participation in wider networks of timekeeping infrastructure; in order for hours to be as widely used as they were in the Roman world, they had to tell similar times and be widely accessible. Knowing the hour in isolation would be helpful for scientific purposes like measuring astronomical phenomena, but it was the distributed nature of timekeeping and its wide accessibility that enabled the hour to make coordinated and scheduled action possible.

Following the introduction of these theoretical categories for the interpretation and analysis of ancient timekeeping devices, the chapter concludes by introducing the particulars of the devices themselves as they existed in antiquity and how those objects are presented in the catalog of this dissertation. Given the long history of study on the science and technology of ancient timekeeping, this introduction seeks to present basic

typologies and core concepts essential to understanding the following chapters rather than making significant contributions to the field; the focus here is on hourly timekeeping and social relations, but a primer on the underlying technology is necessary for situating both the objects themselves and the analysis presented here. Finally, the chapter ends with a brief introduction to the catalog of objects assembled for this work, which consists both of functional timekeeping devices as well as representations of those devices and inscriptions that name no longer extant objects.

Chapter 3

The next chapter builds on the typology and catalog introduced previously to define the Roman landscape of hours by contextualizing the devices, representations, and inscriptions across time and space. This is first done in broad strokes, looking at the spatial distribution of known objects across the ancient Mediterranean from the Hellenistic period through to the fall of the Roman empire. The chapter argues that there are distinct patterns for the distribution and use of timekeeping devices between the Hellenistic and the Imperial periods, with a focus on the developments that differentiated the latter. While some of the work of exploring the placement of timekeeping devices across space and time has been started by other investigations of ancient timekeeping, this work does so with the largest yet assembled supporting catalog, given both the discovery of relevant objects subsequent to other publications

and the inclusion here of functional devices, representations thereof, and inscriptions naming said devices.

After this big-picture introduction to the distribution of timekeeping devices across the ancient Mediterranean, the chapter turns toward a specific case study to more closely contextualize surviving hourly timekeeping infrastructure. Owing to both the excellent preservation of both timekeeping devices, the unparalleled contextual information, and a temporal situation at the dawning of the Roman empire and the changes it brought about in the use of hours in antiquity, Pompeii serves as the main case study. The 54 timekeeping devices, representation, and inscriptions relevant to timekeeping devices preserved at the city are the greatest of any known context from the ancient Mediterranean. The volcanic eruption that buried the city also did so at a point of transition in hourly timekeeping practice; earlier parts of Pompeii's history reflect moves toward civic funding and construction of timekeeping devices and the destruction of the city occurred amidst a movement toward greater private investment in hourly timekeeping in individual homes.

While possessing the largest surviving corpus of hourly timekeeping devices out of any ancient site is a strong motivation to study Pompeii, it is the remarkable preservation of the city around those objects that make it truly invaluable for understanding the hours in antiquity. Thanks to the excellent preservation at the site and the long history of scientific investigation there, Pompeii allows for a richer

contextualization of timekeeping than does any other site. Drawing on existing work on the distribution of wealth and luxury goods in the city, the chapter shows that private timekeeping practices flourished most strongly among the most elite members of Pompeian society, who were also largely responsible for the construction and maintenance of much of the publicly accessible timekeeping devices in the city as well. Finally, the chapter explores motivations for these investments in timekeeping, through both social and representational analyses.

Chapter 4

The patterns identified in Chapter 3 inform the next chapter's focus on the ways in which hourly timekeeping shaped social relations. While trends in the funding and location of timekeeping devices show an outsized role for the elite in making and using hourly timekeeping infrastructure, the chapter gives particular focus to the impact of hours on non-elite members of society. Non-elites, though less clearly tied to hour-based schedules in the literary record, are archaeologically shown to have been substantially influenced by the hour. Some of the hour's influence over non-elite schedules was in direct response to the temporal culture of the elite, as those serving patrons or masters were in many cases bound to the schedules of those with greater authority. Hourly time also, though, served as a playing field for the contestation of power dynamics in the Roman world. The chapter explores hours in the lives of both free and enslaved non-

elites to show the ways people outside the upper echelons of society experienced, utilized, and were subjected to hourly time.

After this discussion, the chapter moves on to explore structural relations in the Roman world and the hour's impact on both practice and the social interactions it enabled. Here the role of hours in the management of water distribution systems serves as the central case study. Specifically, the chapter introduces hour-based temporal restrictions on access to water systems in both urban and rural settings. These water systems are integral pieces of evidence of the efficacy of hourly timekeeping in antiquity, as the preservation of laws regarding water access by hourly allotments show the functional use of hours in administrative tasks. Hours not only defined the bounds of permissible access to both public and, in some cases, private water resources, but were also used in the calculation of equitable distribution for this vital resource. Further, hour-based regulations not only impacted the individuals that sought to access water, but also created particular social relations that could not have existed without the hour's particular sort of organizing structure.

Among the unique social interactions made possible by hourly time was the enforcement of measured, timed access to water resources. The chapter explores these relations and the people implicated in them through a novel interpretation of a timekeeping device recovered in modern-day Germany. The device, a portable

calendrical clepsydra (#989)¹⁷, bears an inscription naming the individual that funded its construction and his office as the *subpraefectus aquarum*. The device is situated amongst the regulations discussed above to show that hours were enforced by people in particular roles, and in this case the object itself was likely created specifically to enable the temporal regulation of a water resource.

Chapter 5

Chapter 5 continues exploring the impacts of hourly time on the social realm, here through the lens of civic identity. Timekeeping devices in urban contexts not only created temporal infrastructure, but were also both rich symbols of ideas core to Roman identity and defining features of the daily rhythms of life. Chapter 5 first explores representations of timekeeping devices that are depicted in real space, either in specific cities or in real world scenarios (i.e. depiction within a palaestra, rather than abstract or undefined space). While the settings in which timekeeping devices were shown in art evolved over the course of the empire, these depictions are shown to consistently reflect the objects' positions as defining features of particular settings.

After exploring the symbolic role of literal depictions of hourly timekeeping, the chapter then moves on to discuss functional devices that were installed within the *fora* of ancient Roman cities. These objects became markers of Roman identity through their

¹⁷ Throughout the work, objects present in the catalog are demarcated with their catalog ID number in parentheses.

ability to shape daily practice from conspicuous and ideologically charged positions at the center of Roman cities and towns. This section shows that the installation of timekeeping devices in these key positions was often a component of the redefinition of a city following a change in its administrative status in the empire, such as the granting of *municipium* or *colonia* status.

The bulk of the chapter then looks into the role of public timekeeping devices as key elements in the formation and negotiation of Roman civic identity. This section applies the lessons of previous discussion in the chapter to the case study of imperial cities in Roman North Africa, with strongest attention to Thamugadi and Lambaesis. Many cities in the region utilized timekeeping devices as important tools in defining themselves as Roman, as the devices both symbolized and reified distinctly Roman ways of living. Thamugadi and Lambaesis were particularly zealous in their use of timekeeping devices, with both cities installing monumental sundials in prominent public spaces. These installations were not only key markers of Roman identity, but also served to gentrify the urban cores of both settlements as markers of cosmopolitanism and participation in imperial modes of monumentalization.

Chapter 6

After showing the role of hourly timekeeping in the ways cities defined themselves, Chapter 6 further explores the ways those devices were experienced in Roman urban environments. This chapter takes Ostia as its central case study, as the city

again offers a richly contextualized environment for the discussion of ancient timekeeping despite having a moderately sized surviving corpus of hourly timekeeping with 13 devices, depictions, or inscriptions. The collection of devices at Ostia does, however, contain examples from many of the most common categories of installation sites for timekeeping devices (i.e., private residences, *fora*, baths, funerary contexts, etc.). The high degree of preservation at the city and the variety in its timekeeping devices presents opportunity to explore how timekeeping devices were encountered.

Ostia, despite its close ties to the capital of the empire at Rome, also contains several noteworthy adaptations of general Roman timekeeping practice to the particulars of life in the city. These adaptations illustrate the value, and even the necessity, of hourly timekeeping in conducting daily life according to Roman custom.

Further, Ostia also allows an investigation of indirect impacts of hourly timekeeping on the experience of living and working in Roman cities. The chapter applies what is known about traffic flows and timekeeping from across the Roman world to Ostia, which has well preserved and studied travel infrastructure. While the particular laws that governed movement in Ostia do not survive, hour-based restrictions on movement from Rome and other cities can be reasonably applied to the city to propose a role for hourly time in movement and traffic.

Chapter 7

The penultimate chapter of this work turns its attention toward the inscriptions of hourly timekeeping devices, particularly those that bear dedications to either the funder of a given device or to a figure being honored by its construction. The chapter first explores the role of the emperor himself in the timekeeping infrastructure of the empire, following Augustus' embrace of time as an aspect of his cosmic influence. Emperors over the centuries were sometimes directly implicated in the construction of timekeeping devices, funding their construction in key locales or giving the devices as gifts. Beyond their personal investments in timekeeping infrastructure, emperors were also sometimes presented with the gift of a sundial or water clock in their honor. Situating these dedications, both from and to emperors, allows this dissertation to highlight the role of the ultimate authority figure in the empire in establishing hourly time as an essential component of Roman administration.

Given these efforts by the emperors, figures further down the Roman hierarchy also saw benefits to supporting timekeeping infrastructure in their respective cities or regions. The chapter next explores the role of sundials and water clocks in practices of civic munificence. The imperial period saw a defined rise in the funding of timekeeping devices and their upkeep by civic authorities, though the devices were also at times donated directly by individual donors. The gift of a *horologium* could serve the donor in many ways; such gifts showed a donors generosity and commitment to Roman ideals of

timeliness and order, for example. The chapter introduces the topic of obligated construction of timekeeping devices; for some, their office within local administration required them to see to the construction of such a device at the behest of the local authorities. The chapter shows that even in these cases, however, the individuals named on dedicatory inscriptions stood to benefit from the faithful execution of their charge to construct hourly timekeeping devices.

Finally, the chapter explores all named positions associated with the gift of a sundial or horologium, from Caesar down to “fellow citizen.” Using what is known about the responsibilities of the various offices present in dedicatory inscriptions of the later Republican and Imperial periods, the chapter demonstrates why the holders of each office were invested in the timekeeping infrastructure.

Chapter 8

The eighth chapter brings together the various parts of the dissertation to form conclusions about hourly timekeeping and its impact on social relations in Imperial Rome. The chapter briefly situates the work within broader discourses on time in antiquity, particularly its role outside of specialized usage in the sciences. Finally, this final chapter discusses the significance of this work in archaeology more broadly by expanding the consideration of timekeeping devices beyond a focus on those objects as discrete artifacts, as well as in our understanding of time and its role in the ancient Mediterranean.

CHAPTER 2: THE ARCHAEOLOGY OF HOURLY TIMEKEEPING

NORMA DEL TEMPO INFALLIBILE IO SONO
(Pieve, Italy, 17th Century)

What then, is time? If no one asks me, I know. If I wish to explain it to someone who asks, I know it not. (August. *Conf.* 11.14.17)

Augustine, writing in the 4th century CE, recognizes what was by his time already a longstanding issue in discourse on time: the inability to precisely define the phenomenon. Influential works on time and timekeeping often open with a discussion of the troubling nature of time as an object of study; researchers recount being admonished that time is seen as a fact of life so ubiquitous as to make its study meaningless (Adam 1990: 1) or warn others that it is a concept so widely applied that it is nearly impossible to search in a library (Feeney 2007: 1).

This chapter opens with a discussion of key aspects of archaeological approaches to understanding the timekeeping systems of the past. This section first discusses the archaeological recovery and investigation of timekeeping devices themselves. This dissertation benefits greatly from the existing investigations of timekeeping devices in

Greco-Roman antiquity,¹⁸ particularly the several catalogs of such objects (Gibbs 1976; Winter 2013; Bonnín 2015; Graßhoff et al. 2016), and so the main contribution here is not to compile those objects anew but rather offer a unique archaeological perspective on them. That timekeeping devices are catalogued as discrete objects leads to the next section of this chapter, which argues for the benefits of considering timekeeping devices as features in the built environment, rather than only as artifacts. Archaeological approaches to installed features offer unique opportunity to understand the ways in which timekeeping devices were interacted with, made part of one's daily life in antiquity. Finally, the section discusses how archaeological approaches to both timekeeping devices as objects and as semi-permanent features in the built environment can illuminate the role of hourly time as infrastructure in the ancient world.

Following an outline of the disciplinary contributions of archaeology to the study of timekeeping devices, the chapter then goes on to discuss the surviving corpus of timekeeping devices of Greco-Roman antiquity compiled in the catalog for this work. While the Roman Imperial period is the core focus of this work, trends in both the technological development and social deployment of timekeeping technologies from earlier periods are necessary to properly contextualize the changes in timekeeping and

¹⁸ While this work is focused on the Roman Imperial period, the catalog extends as early as the 4th century BCE. Previous catalogs have also extended from this early date through to the fall of the Roman empire or later. Timekeeping technologies and practices developed in the Greek world, particularly during the Hellenistic period, remained influential in Roman timekeeping practice. Extending the catalog to this early date also allows for a discussion of the changes to hourly timekeeping practice that happened with the rise of the Roman empire.

temporal practice brought on by the rise of the Roman empire. Core technologies and concepts at work in Imperial Roman timekeeping systems reach back millennia, transmitted through Mesopotamian and Egyptian culture from as distant as the 4th millennium BCE (see Steele 2016 for discussion), though this study only includes objects from periods of Greek or Roman authority over the areas under study. Similarly, the influence of Greco-Roman timekeeping technologies and practices continues long after the sack of Rome, particularly given the overlap between the later years of the Roman empire and the rise of Christianity, which itself drastically impacted temporal culture. So, then, while the practice of tracking twelve hours with a shadow dates to at least the 13th century BCE in Egypt (Steele 2016: 52) and the medieval astrolabe likely drew influences from Roman portable sundials (Talbert 2017: 173-174), the catalog presented here focuses on objects produced between the Hellenistic period and the fall of the Roman empire, traditionally dated to 476 CE (Cameron 1993:187).

In addition to the extant (and, in some cases, reported) timekeeping devices of the ancient Mediterranean, this chapter also introduces the iconographic representations of those devices that survive. In addition to their literal roles in telling the time, the sundials and clepsydrae of Greece and Rome came to bear symbolic values and meaningful associations. While the broad theme of the representation of time itself is too expansive for inclusion in this work, the literal depiction of timekeeping devices offers insight into the role of hourly time in the consciousness and ideology of the

ancient Mediterranean. A catalog of artistic depictions of hourly timekeeping devices, again built largely on previous works (Bonnin 2015; Olszewski 2015) with both new additions and objects newly interpreted to include timekeeping devices, are presented alongside some core concepts in the art of hourly time that are analyzed later in this work.

Timekeeping assemblages, and the artifacts that participate in and enable them, are the result of the accumulation of generations of solutions to temporal problems that function within a reciprocal relationship to living communities (Birth 2012: 2).

Assemblage-based thinking allows archaeologists to recognize the “commingling and the contingent co-presence of diverse temporal moments” in our objects of study (Hamilakis 2017: 173), to which the objects that track hours add further temporal complexity through their literal creation of a system of defining and tracking time. Timekeeping devices play a unique role in defining and enacting those temporal moments in antiquity. Increased study of objects that track hourly time, particularly those that take a different understanding of hours than is present in contemporary Western thought, enables deeper understandings of ancient mentality and contribute to broader discourse on the cultural construction of time.

An Archaeology of Hourly Timekeeping

Time is, according to different authors or conceptions, ephemeral, fleeting, unceasing, cyclical, linear, banal, indefinite, measured, natural, cultural, and on and on.

Common to many of these concepts of time, especially those born out of enlightenment era thought (Buchli 2016: 26), is the notion that it is immaterial. This is not to say that time doesn't matter or that it is not germane to a given philosophical position, but that time is purely conceptual and does not physically inhabit space; indeed, such positions often posit that abstract time exists as a similar or united field with abstract space.

How, then, can archaeology contribute to our understandings of time when the discipline is, as some argue, the “discipline of things” (Olsen et al. 2012: 1)? Archaeology's grounding in the material world, rather than distancing the discipline from the realities of an abstract time, is precisely what enables it to recover the intricacies of temporal conceptions and practices. As Miller sums his discussion of materiality, “the more humanity reaches towards the conceptualization of the immaterial, the more important the specific form of its materialization” (2010: 75). No matter how abstract the concept of time, its expression and enactment in human societies relies on the physical forms through which it is tracked and known. Therefore, the more questions we raise about time and temporality, the more important its material manifestations. This is even more so the case with time than other immaterial conceptualizations given the role of the material in influencing or even outright creating the frameworks of time's meaning and practice in a given context. While it is possible to tell time through observation of the cycles of the natural world, many cultures have come to rely on “cycles embodied in objects that are manufactured” (Birth 2012: 1), a

pattern that can be observed through the technological and cultural innovations around timekeeping of the Roman period.

Rather than outright refuting the immaterial aspect of time, archaeology can illuminate the particulars of a given culture's "time systems." The phrase time systems can itself be interpreted broadly, as there are temporal implications to much of the work of archaeology that are fundamental to understanding the workings of human societies. As Lucas frames the issue in his work on the archaeology of time, "how a society views the world is inextricably linked to their material relations with the world; that material culture encapsulates the conceptual, symbolic or cognitive structure of a society as much as its technology or economy" (Lucas 2005: 67). This stance is applicable to broad temporal issues like how a culture relates to the past through material culture, including practices of memory and memorialization, the ways past material culture remains in the present, and countless other aspects of material life over time. The relationship between the material world and time also extends to the observation and enactment of time itself; the ways in which time is kept, tracked, measured, and used to organize social action and practice all rely on material objects to which archaeologists can apply their skillset. The objects used to tell time in a given social context allow us to understand the way that time acted in that context.

The study of the objects that keep time cannot solely focus on the technological development of those objects. There has long been recognition in the social sciences that

tracking the development of timekeeping technologies alone cannot provide a wholistic understanding of time and temporality in a given cultural context. Bilfinger (1892) argued, for example, that social and cultural history were inextricably entangled with time and temporality and their differences in different contexts. Perhaps most forcefully, Bergson contends that “time is invention or it is nothing at all” (2009: 458), placing the phenomenon firmly within the realm of human, and thus cultural, creation. A recurring theme in studies inspired by Bilfinger’s call to more wholistic understanding of timekeeping is the role of urbanism in change of time systems, and more specifically a conception of urbanism tied to modernity. Bilfinger himself points to urbanism as a catalyst to the development of modern timekeeping from medieval systems (ibid.: 142),¹⁹ Le Goff seeks to further specify urban economic needs as the driver of that same change (1999: 138), and Landes points to the lack of a “natural sequence of tasks to rhythm [the urban] day” (2000: 53) as a motivator for the development of modern timekeeping. These formulations have come under fire for their simplification of non-urban time (Glennie & Thrift 2009: 24; van Oyen 2017), and at their core accept the notion of modernity that Latour challenges; granting special standing to modernity also “[defines] an archaic and stable past” (Latour 1991: 10).²⁰ Archaeological approaches can

¹⁹ Which, relevant to this study, he ties back further to the practices of Roman antiquity passed on through ecclesiastical timekeeping.

²⁰ This is to say that even historical works have often flattened change prior to the modern period, as in Le Goff’s discussion wherein the “horae canonicae” of the early Middle Ages were handed down directly from Roman antiquity, while the conditions of the 14th century lead to dramatic change by inspiring

further problematize the development of timekeeping systems by similarly challenging the overly-constrained concepts of modernity and modern urbanism that dismiss the role of timekeeping in contexts without mechanical clocks. In his book on ancient Uruk, for example, Liverani argues that the development of new timekeeping systems was as impactful as that of writing for ancient perceptions (2006: 59) and Hesse recognizes the relationship between urbanization and changing perceptions and practices of time in ancient Mesopotamia (Hesse 2010: 81), well before clock time and the modern city made the relationship apparent to historians of later periods. Rather than understanding cities as inherently tied to the development of culturally shaped time systems, their value comes from the density of their networks and assemblages; it is not the city itself that make time separated from natural cycles, but rather the dense accumulations of people and objects present in cities that allows us to uncover the cultural specifics of a time system more easily. In undertaking a contextualized study of timekeeping devices and their portrayal in Roman art and literature, this study seeks to both answer Bilfinger's call for cultural history as well as the critiques of those approaches that both oversimplified ancient timekeeping practice and held an inherent bias toward modern time.

modern timekeeping (1999: 138). The proposed dissertation seeks to challenge these assumptions on multiple fronts, including recognizing that dramatic changes were possible and took place prior to modernity and in finding that some aspects of timekeeping held as novel inventions of modernity have ancient precedents.

Timekeeping devices are efficacious in shaping cognition and practice precisely because they participate in the assemblages of daily life. Archaeology allows us to consider the objects that told hourly time in antiquity as participating in three distinct roles: as individual artifacts, as installed features in the built environment, and as an infrastructural network. These roles, of course, overlap in the daily function one of these objects in its original context. The sundial installed at the Stabian Bath at Pompeii (#513) is an excellent example of these three roles. First, the device is an individual product embodying science, art, and cultural preferences of its day. The conical device uses underlying mathematics and design developed in the Hellenistic period but calibrated for the latitude at which it was placed. The sundial contains a suite of decorative features including sprouting calyx, flower and curling tendril motifs and lion's feet flanking its base. The object is also unique among timekeeping devices for its inscription, both because it is inscribed in the Oscan script and because it is an early example of a municipal authority funding a timekeeping device (Schaldach 2016). Secondly, the device was installed as an architectural feature in the peristyle of the bath house. This installation allowed the dial to impact the production and use of space at the baths, from directly influencing the movement of people seeking to ascertain the time to regulating when particular services at the bath were available. Finally, the dial participated in the broader infrastructure of hourly time in the city. Patrons would not simply arrive at the baths and hope that they were open; rather, other timekeeping

devices, social cues, and observations of the natural world made the time available throughout daily life in the city. While not synchronized to the level of today's automatically updating smartphone clocks or the ultra-precise devices that synch with atomic clocks, the timekeeping infrastructure of the ancient world nevertheless created a shared time that was used to schedule and organize activity.



Figure 2.1 - Conical dial from the Stabian Baths of Pompeii with Oscan inscription (#513). Berlin Sundial Collaboration, Image of Dialface ID 171, Naples, Italy, Inventory Nr. 2541, 2015, Ancient Sundials, Edition Topoi, Creative Commons BY-NC-SA 3.0 DE

Considering objects of time as a type of infrastructure situates timekeeping as both component of the built environment and actor in shaping lived experience. Anthropological approaches to infrastructure have defined the term as “built networks

that facilitate the flow of goods, people, or ideas and allow for their exchange over space” that functioned technically, semiotically, and aesthetically (Larkin 2013: 328-329). By looking at objects of daily timekeeping in this light, this work considers them as participants in a broad cultural assemblage that created the conditions for particular social relations. While timekeeping devices are here seen as efficacious in creating those conditions, they accomplished this, as Smith describes the capacities of material objects, “in addition to (not as a substitution for) the agency of humans” (Smith 2015: 11). For timekeeping devices in the Roman world, this means addressing the efficacy of the objects in their relationships with humans, in their materiality, symbolic value, and imagined capacities.

Timekeeping Devices as Artifacts

In their history of clock time in England and Wales, Glennie & Thrift emphasize the need to “take devices seriously” when studying timekeeping as a social phenomenon, especially since the devices were “embedded in societal networks, making up the fabric of everyday lives” (2009: 53). The surviving record of timekeeping in antiquity has long forced scholars to take timekeeping devices seriously in light of the paucity of archival and literary materials that comprise the core of many studies of later temporal practice. Indeed, ancient authors themselves rue the lack of written materials about timekeeping (Cupcea 2017: 598), though not usually for the sorts of social questions at the core of this study.

Among the earliest surviving examples of writing there can be found complex understandings of natural, cyclical phenomena that form the basis for time systems; a tablet from early 3rd millennium BCE Uruk recognized the separate risings of Venus at different times of the year as the cycle of a single object (Steele 2008: 21). Even from this early period, the construction of time systems is tailored to administrative needs (Liverani 2006: 58), creating culturally specific understandings and practices based on observable natural cycles. By the time the Greco-Roman world came into contact with Mesopotamia and Egypt, both regions had millennia long traditions of astronomy and timekeeping (Steele 2016: 45). These traditions were manifest in the objects that tracked time, and both produced objects tailored to short time, or the division of time at a scale smaller than the day. Both Mesopotamia and Egypt produced water clocks and sundials well before Greeks or Romans, but of the two the Egyptians produced a more similar type to that which would rise to prominence in the period under study here: only gnomons, which told time by measuring the length of the shadow, are known from Mesopotamia while Egypt has several preserved rudimentary sundials dating back to the 13th century BCE (ibid.: 50). The earliest known Greek sundial with hour lines is the dial found in the Amphiareion at Oropos dating to the second half of the fourth century BCE, and there is evidence that hours were commonly understood and used in literature from the third century BCE (Hannah 2009: 74-75). Gibbs argues that early iterations of timekeeping devices in the ancient Mediterranean were only legible to

mathematicians and astronomers deeply invested in engagements with time (1976: 6-7), in clear distinction to the ubiquity of sundials in the Roman Imperial period.

The suggested shifts in the roles of sundials, from objects that served as both calendars and hourly timekeepers to a more specialized role in keeping hours with less concern for accurate calendrical function, fits into broader narratives of Roman timekeeping. Firstly, the sundial itself as a technology of time likely contributed to such a shift in priorities and perceptions. Birth classifies objects of time as “artifacts used to think” (2012: 11), that is tools that create, shape, or change cognitive processes. Objects of time actively constitute time systems through their entanglements with ideas, culture, materiality, actors, etc. The impact of timekeeping and its material manifestations can be more fully understood through a consideration of those objects as things with efficacy as proposed by Jane Bennett, the “capacity to make something new appear or occur” (2010: 31).²¹ Bennett’s notion of agency suggests that it is not only the creators of an object that seek to bring something to be, but rather that such a capacity is inherently an aspect of the objects themselves. Bennett holds that “there was never a time when human agency was anything other than an interfolding network of humanity and nonhumanity” (ibid.). This notion is at the core of this work; timekeeping devices had

²¹ Adam T. Smith extends Bennett’s efficacy yet further by removing the “new” from her formulation (2015: 50), that is to say that things continuously act and react and their efficacy can still be seen in the maintenance of existing as well as in the formation of novel relationships.

real impacts on the world in their own right, and these impacts reached into the realm of social relations.

The practice of reading time without the aid of interlocutors between a device and a passerby allowed an increase in engagements with time reckoning, the ability think systematically about time rather than only be aware of it. Rather than aural cues which indicated time in the early stages of Rome's history, sundials enabled "the employment of 'regular and continuous' divisions of time into structures" (Lucas 2005: 68) that could be used to extrapolate future and past times. Beyond simply marking a moment in time, as the tolling of a bell at noon, sundials function continuously (under the conditions in which they work at all, i.e., during daylight hours on sunny days). Even though the actual length of a Roman seasonal hour varied throughout the year, sundials created a proportional division of each day; they emphasized epoch, a moment in time that could be compared to other moments, rather than duration, the passage of a segment of time (Birth 2014: 396). The growing prevalence of sundials, particularly their observed movement into private and civic contexts, allowed new engagements with the time technologies invented by the Greeks that in turn lead to a shift in priorities that called for near enough accuracy in hours for a dial to function properly. Comparing inaccurate dials from Delos and Pompeii, then, shows us that timekeeping devices became increasingly abstracted from their celestial origin; it became less important to

accurately incorporate refined accuracy into dial faces so long as the hours were near enough to accurate to enable social coordination.

Timekeeping Devices as Installed Features

A further important issue within this study is be the contextualization of timekeeping mechanisms within space, both within the urban environment and in rural settings. While this is easily achieved with the monumental structures that have been a resurgent area of focus, many smaller instances of the materialization of timekeeping are more difficult to place given their excavation or recovery prior to modern archaeological record keeping practices. Gibbs' attempt to catalog all known Greek & Roman sundials notes that these timekeeping devices were often relegated to storage in study collections with other "minor architectural fragments," often without any discussion in publications (Gibbs 1976: 3). Where provenance information is present, however, meaningful analysis can be undertaken. Schaldach illustrates this with his investigation of the specific spatial placement of timekeeping devices, for example tying the Triton sundial at Delos to the gymnasium in which it was uncovered and arguing for its reuse from the city's earlier gymnasium as a means of maintaining ties to scholarly and philosophical traditions (Schaldach 2016: 73). The placement of time within the cultural landscape, then, both serves to shape experience, but also to accomplish very real social and political functions; the Triton sundial manifests the past

within the built environment, thus arguing for continuity of practice and value in its space.

The installed nature of most timekeeping devices in antiquity also allows for an analysis of their creation of social spaces. In discussing the role of spaces in social relations, Trimble lays out three essential themes that serve as the basis for a social reading of archaeological features and their surrounding spaces:

First, social relations have a strongly spatial dimension; what happens between people interacts in complex ways with the immediate environment and the expectations and practices associated with it. Second, these interactions are multidirectional... built and lived space is produced through existing social relations and concepts, but space also shapes these in turn. Third, this means that spatial practices, and with them human conceptions and actions, can be studied in the material record (Trimble 2011: 208)

Timekeeping devices are firmly situated in social spaces, and have similar aspects to those spaces in several respects. First, timekeeping devices both exist within social environments wherein people interact with them, but they also directly influence the “expectations and practices” of social interaction in a given space. This can be seen where hours are used as a delimitating factor in the use of a space, such as the opening hours of a bath complex or the timing of a formal dinner in an elite house. Second, timekeeping is experienced multidirectionally, as timing has a similarly reciprocal relationship to users as space. Finally, timekeeping objects are themselves material and thus survive in the material record, but also effect particular practices, conceptions, and actions that can further be understood through the spaces of timekeeping and timed action.

The production of cultural landscapes is undertaken within a “disparity in power” (Smith 2003: 70) and thereby implicates spatial practices in the field in wider discourses and structures of politics, making attention to the location of timekeeping devices doubly important; they are both objects within cultural landscapes and objects that make possible particular types of landscapes.

Timekeeping Devices as Infrastructure

Uncertainty over, or even outright doubt in, the utility of short time in pre-modern contexts has obscured the role of timekeeping devices prior to the mechanical clock as infrastructural components of the cultures that used them. Scholars have been more willing to embrace the infrastructural impacts of timekeeping after the rise of the mechanical clock, as in Bruegel’s (1995: 548) claim that the “social utility” of timekeeping on work and leisure was felt immediately upon their introduction. This stance contrasts views of time in antiquity, both among those interested in mechanical timekeeping like Bruegel²² and among scholars of antiquity, as overly “flexible” (Houston 2015: 306) or “seldom invoked” in certain aspects of life (Jones 2016: 28). Larkin’s (2013) recent review of infrastructure in anthropology, however, presents a definition of the term that clearly implicates timekeeping devices in antiquity, showing their impact across labor, personal life, administration, and many other aspects of

²² The title of whose cited work here, “Time That Can Be Relied Upon,” is a reference to the introduction of a mechanical clock in a town square in the late 19th century Hudson Valley that implies there had previously been no reliable time there.

culture. Timekeeping devices in the ancient world were built objects, comprised and operated as networks of timekeeping, and facilitated the types of flows Larkin outlines through their enabling of coordinated and measurably timed action. The symbolic and aesthetic prominence of timekeeping devices from antiquity²³ through to the present day speak both to the objects' efficacy in an infrastructural role while also showing their proper situation among Larkin's requirements for infrastructure.

Many of the activities of Roman daily life were restricted to particular places and times (Laurence 1996: 103-112), be it out of necessity (Roman bathing could only happen where proper facilities existed) or convention (elite business was often undertaken in the forum at particular hours of the day, though was not bound to that location by necessity). Temporal regulation enabled such activities in ways that were predictable and accessible (at least to the right people). Harvey describes clock times role in this type of structuring in the modern world as such:

“[clock time] provides a commonly held standard, outside of any one person's influence, to which we turn again and again to organize our lives and in terms of which we assess and judge all manner of social behaviors and subjective feelings. Even when we do not conform to it, we know very well what it is that we are not conforming to” (Harvey 1990: 418)

The organization of one's life around temporal structures is exactly the facilitation of various “flows” at the core of Larkin's definition of infrastructure, here made possible by the network of network of timekeeping devices accessible by a given actor

²³ To be discussed throughout this work in reference to timekeeping devices themselves and their use as iconographic components of a variety of art.

throughout their daily life. The “social behaviors and subjective feelings” that Harvey points to fit both within the flow of people and ideas outlined by Larkin, but also show the ability of infrastructural time to serve as “symbolic and aesthetic vehicles” (Larkin 2013: 329). The hours of the ancient Mediterranean, though different in their nature and level of standardization (or, at least, precision), accomplished these same feats. Laurence (1996) argues that the power of timing on elite schedules was great enough to shape the very arrangements of Roman cities, as elites vied for villas that allowed them to keep to commonly held schedules in overtly visible ways, such as preferring houses from which they could lead a prominent procession to the baths at their opening in the 6th hour. Laurence’s own discounting of the role of infrastructural time in non-elite lives is undercut in his own writing, as he notes that even workers laboring from dawn to dusk usually had temporally prescribed breaks or would similarly tailor their activity to the timing of other happenings around them (such as the operation of certain shops near bath complexes only when those complexes were open) (ibid.).

In addition to the ability to facilitate movement, timekeeping devices came to serve as an important piece of social infrastructure throughout the Roman period. Klinenberg defines “social infrastructure” as “the physical places and organizations that shape the way people interact” (2018: 5). While Klinenberg’s discussion of social infrastructure in 20th and 21st century cities emphasizes their spatial aspects, their ability to host groups of people and thus enable social interaction, the concept can be

meaningfully extended to include timekeeping. Timekeeping devices work as social infrastructure in antiquity firstly because, with few exceptions in the form of portable devices from the Roman Imperial period, the majority of such objects were sited; sundials were generally installed in a specific location, or at least had to be properly calibrated to their location and thus not freely moved, and water clocks that told seasonal hours were similarly (mostly) installed in place. The situation of timekeeping in place allowed the devices to form a nexus around which social interaction of the kind Klinenberg emphasizes took place. This is most apparently true at timekeeping installations in public space, as a myriad of community members would interact with the devices throughout the course of a day. Devices within private contexts, though with smaller overall audience, similarly provided space for particular types of social engagement. This dissertation shows that the growth in prevalence of timekeeping devices in elite households introduced new opportunities for interaction and contestation; access to a timekeeping device could allow the enslaved to escape watchful eyes, for example. Even elite residences without a timekeeping device of their own show the role of such objects in enabling particular social engagements, again seen in several surviving references to sending out the enslaved or servants to acquire the time from public installations.

The social infrastructure label is also apt for timekeeping because of the efficacy of hourly time in making social engagements happen. Klinenberg emphasizes that

robust social infrastructure “fosters contact, mutual support, and collaboration among friends and neighbors” (2018: 5). While accessible spaces are clearly essential for these types of engagements, timing is also a vitally important aspect; little (or at least less) social contact would occur in the Odeon of Pompeii, for example, in the middle of the night with no scheduled performance. This is not to say that all of life in the ancient world was dependent on strictly regulated schedules organized with the accuracy and accessibility we experience today, but rather to recognize the increasingly important role of hourly time over the course Roman history (and, for this study, the Roman Empire in particular). Roman hourly timekeeping, then, functioned both as social infrastructure as defined by Klinenberg, while also being an infrastructure of the social by facilitating the flow of people and ideas in a social world.

Introduction to the Catalog

Having situated the timekeeping devices of antiquity within their relevant categories for analysis, as scientific artifacts, as installed features in the landscape, and as participants in networks of temporal practice that form vital infrastructure to imperial Roman daily life, it remains necessary to classify the devices by their form and function. While this work emphasizes social questions about hourly timekeeping in antiquity, the objects at study remain at their core scientific instruments no matter how broadly they were designed to be used. The section begins with a brief reflection on the scholarship of ancient timekeeping devices, largely as an introduction to the existing

catalogs of such devices relied upon for much of this work. This section next discusses the categories of devices used to accomplish these aims. The devices under study in this work can be broken into two families of objects, the sundial and the *clepsydra* or water clock. Within each of these broad categories there are numerous technologies used to harness either the sun or the flow of water to accomplish the goal of measuring and/or tracking time. Further, there are other devices that track time at different scales and in different ways, such as *parapegmata*, used to track temporal cycles like the seasons, or calendars. Though not the central focus of this work, those objects are also relevant to the workings of short time, as the underlying equations of those cycles were important for accurately designing and using hourly timekeeping devices. This is perhaps most clearly illustrated by calendrical *clepsydrae* like the Frankfurt *clepsydra* (Stutzinger 2001; Meyer 2019) (discussed in Chapter 5) or fragmentary objects found at Vindolanda (Meyer 2013; Birth 2014) and Hambledon (Pearce 2017) that use calendrical *parapegmata* to track the date so that the device can be calibrated to tell the appropriate seasonal hour on a given day.

Sundials are placed into broad formal categories; spherical, conical, planar, cylindrical, globe, and portable. These categories do not offer the finest possible delineation between forms of sundial, as there are multiple types possible within each category, however for the purpose of this work the nuances of individual objects is only discussed where relevant. As an example, there are different scientific calculations and

installation parameters for planar sundials that are installed vertically (such as those on the Tower of the Winds in Athens) (#100) as opposed to horizontal planar dials, like that found at the House of the Figured Capitals in Pompeii (#514). Since the differences in underlying technology between the two planar dials leads to differences in their context and human engagement, the specifics of each are discussed where the devices are mentioned later. These technological differences are but one of many factors that lead to unique engagements between devices, as factors from type to size to material to decoration and beyond all impacted individual interactions. This study seeks to balance the particular nature of individual contextualized objects with the broader trends better served by categorization into the broad groups outlined here.

Clepsydrae make up a substantially smaller portion of the surviving corpus of timekeeping devices, though are frequently mentioned in literary sources on timekeeping from antiquity owing to their use in contexts prone to written recording or commentary (such as legal proceedings). Though the basic mechanics of the devices relied on the flow of water either in (inflow) or out (outflow) of a measured vessel, they nevertheless present an even greater challenge to categorization in reference to their use in hourly timekeeping. Many of the water clocks of antiquity are known only through literary references, likely owing to the poor preservation of materials used in these devices. These references sometimes explicitly identify devices by type, as in Vitruvius' discussion of Ctesibius inventions (*De Arch.* 9.8.2), though are usually more opaque

references to *horologia* of indeterminate type. Water clocks can be divided into inflow and outflow varieties based on how a given device harnesses water to track time, however even this classification is complicated by the fact that some of these objects were not used to track the hours of the day. Clepsydrae were originally used as timers in Greek contexts, devices that measured set amounts of time like the length of speeches in legal proceedings (Hannah 2009: 99). While these devices were useful in creating an iterable measure of time for organized proceedings throughout the Roman period (Ker 2009: 283) and have been argued to represent the fundamental relationship between ideology and time consciousness (Allen 1996), their function is greatly different from that of sundials and their communication of the seasonal hour. Subsets of clepsydrae, however, were able to indicate the current time at a given location through either complex gearing and indicators or through user calibration to a known date.

Writing in 2008, Hannah describes the development of the study of Greek and Roman timekeeping as initially descriptive, then flourishing into a more sociological interest beginning in the mid-1980's, and at the time of his writing only recently being approached as "gateways into the ancient *mentalité* about time" (2008: 740-741). This pattern still holds, with Talbert writing in 2017 that timekeeping devices of the ancient world "have seldom attracted much interest for purposes beyond comprehending their operation and gauging the precision of their timekeeping" (2017: 3). The discourse on timekeeping within the spheres of history of science, philosophy, and sociology has

recently begun to be augmented with archaeological interest in classical timekeeping, though these accounts have largely focused on debates regarding monumental timekeeping devices such as the Horologium Augusti (Rehak 2006; Haselberger 2014) or the Temple of the Winds in Athens (Webb 2017). Less grandiose sundials were initially comprehensively catalogued by Gibbs in the 1970s, following the examples of Deonna's (1938) catalogue of such devices from Delos and Diels & Drecker's presentation on published sundials prior to Gibbs' own publication. Gibbs saw the necessity of bringing together all known dials, arguing that "an adequate analysis of ancient dialing requires complete information gathered in a comprehensive catalogue" (Gibbs 1976: 4). At the same time, Gibbs' interest was firmly focused on the devices' role in ancient science, as her initial description of ancient sundials is that they "form the largest part of the meagre physical evidence for scientific activity of the period" (ibid.: 3). Gibbs' catalogue remained the standard reference for the objects, with occasional site or region-specific catalogs like Severino's (2011) of Pompeii and its environs, until a flurry of interest in the mid-2010's. Winter (2013) produced the first updated catalogue of the objects,²⁴ followed by Bonnín (2015),²⁵ and the Berlin Topoi Excellence Cluster (BSDP) project on Ancient Sundials produced a catalogue of stationary sundials, beginning in 2011 and

²⁴ In addition to adding devices discovered since Gibbs' publication, winter also included inscriptions naming device installations to more fully flesh out the contexts in which timekeeping devices were utilized. Winter also included water clocks, further expanding on Gibbs.

²⁵ Bonnín's work distinguishes itself by also including a catalogue of representations of timekeeping devices, such as sundials depicted in mosaics or carved in miniature on sarcophagi.

published 2016, that includes the geometric properties of each object and open access 3D models of those that were made available for scanning (Graßhoff et al. 2016). In addition to these comprehensive catalogues, Talbert (2017) also produced a catalogue of portable timekeeping devices from the Roman period. Schaldach (2021) has also further catalogued and analyzed Greek sundials separately from objects recovered elsewhere in the ancient Mediterranean.

Each of these works had grander contributions than the already sizable value of expanding the existing catalogue of timekeeping devices. The BSDP project is perhaps the most similar to Gibbs, with its focus on the technological and mathematical functioning of sundials, though with clear improvements to the methodology behind measuring the geometries of the devices. Talbert (2017) focuses on the role of his objects, portable sundials adaptable for use at a variety of latitudes, in both shaping and elucidating geography in the Roman world.²⁶ Winter (2013) and Bonnin (2015) take an approach most similar to that of this work through their interest in the contextualization of timekeeping devices and their use, more so than the technological functioning of the objects. While all of these works have proven invaluable to the present study, the objects in question are both so numerous and influential enough in Roman society to allow many further questions to be explored.

²⁶ Talbert's focus is on a class of object not developed prior to the High Roman Empire, and so falls outside of the broader Greco-Roman framing used in other works.

The varying research questions and academic interests of each of the existing catalogues has led to different definitions of what a timekeeping device. Beyond even the different categories included in each, as in the sole focus on sundials in Gibbs (1976) and the Topoi project (Graßhoff et al. 2016) or the broader inclusion of water clocks and inscriptions detailing no-longer extant objects (Winter 2013 & Bonnín 2015), the way that objects are counted varies as well. This is perhaps most apparent in the Topoi project's numbering based on sundial faces, rather than discrete objects. Graßhoff et al. assign identifying numbers to surface on an object that receives shadow in order to tell the time, while the other catalogues number devices as whole objects. The Topoi project's Dialface IDs 74 & 324, for example, are separate faces on the boat-shaped object from Delos, which Winter (2013: 332-333) labels Delos 5. These variations, both in included categories and classification of objects into them, has created uncertainty in the total number of extant objects from Greco-Roman antiquity that were used to keep the hours.

Catalog	Devices	Inscriptions	Representations	Dialfaces
Gibbs (1976)	264	-	-	-
Winter (2013)	475 *	-	-	-
Bonnín (2015)	594	102	123	-
BSDP (2016)	-	-	-	782

This work	827	73	140	-
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Table 2.I - Table of existing catalogs and their total number of entries.

* Includes inscriptions

Each of the catalogs produced for ancient timekeeping devices has yielded a different number of relevant objects, largely due to the specific aims of each author(s). Table 2.I shows the number of catalog entries for each category of object in the four comprehensive catalogs. Gibbs (1976) produced the smallest of the catalogs, but was also working decades before the other authors. Gibbs' work explicitly targeted extant timekeeping devices that could be mathematically assessed to determine their design parameters, namely the location for which they were designed to function. Her catalog does, though, contain some entries for no-longer extant devices known from photographs or drawings that could not be assessed in such a way. Winter sought to be more comprehensive, including *clepsydrae* and inscriptions that named no longer extant devices to arrive at a more holistic representation of the corpus of timekeeping devices in antiquity. Bonnín (2015) created the most inclusive catalog to date, as he expanded his work to also include iconographic representations of timekeeping devices. There is some redundancy in Bonnín's catalog, however, as timekeeping devices with inscriptions were cataloged twice, once for the device itself and once for the inscription. The BSDP (Graßhoff et al. 2016) offers the biggest departure in methodology for its catalog, as it documents each sundial face independently; the eight sundials surrounding the Tower of the Winds (#100) in Athens, for example, each have an

independent entry in the catalog. This was done with a similar aim to Gibbs, as the project is interested in the design parameters of each face though with updated methodology. Figure 2.2, below, shows a device from Delos with its many associated catalog numbers. An abbreviated version of the catalog developed here can be found in Appendix I.



Figure 2.2 - Object #206, known elsewhere as Dialface ID 75 / 324 (Graßhoff et al. 2016), Delos 5 (Winter 2013), 1072G (Gibbs 1976), and A_553 (Bonnin2015). Berlin Sundial Collaboration, Image of Dialfaces ID 74 / 324, Delos, Inventory Nr. B4367 (577), 2015, Ancient Sundials, Edition Topoi, Creative Commons BY-NC-SA 3.0 DE

This project includes hourly timekeeping devices, inscriptions naming no longer extant devices, and iconographic representations all together. Entries are based on discrete objects rather than aspects thereof; all dial faces are counted together if joined

on a single device and inscribed devices are cataloged as one entry, rather than separate entries for the device and inscription. The catalog here also attempts to act as a concordance list for the existing catalogs, as each entry is explicitly names the associated entry in all other catalogs where present. An unfortunate reality of this process is that there are surely some duplicates among the entries here, due either to differential description between other catalogs and/or the lack of necessary information to properly differentiate all devices. This problem is surely greatest among those objects with unknown provenance, though such devices are also significantly less utilized in the analysis to follow given their lack of context and specific detail. The catalog here also excludes some entries from previous catalogs, mostly due either to firm dating after the period of interest here or the inclusion of rumored / unobserved devices in other catalogs.

The catalogue for this work, drawn mainly from the existing catalogues above, contains 991 total entries. Of those, 794 are extant devices,²⁷ 55 are inscriptions marking the installation of a device, and 142 are iconographic or representational depictions of hourly timekeeping devices. All entires in the catalogue received a number in a single sequence, and thus are referenced by this single number in text with detailed entries provided in the appendices.

²⁷ This category also includes some objects, included in both the Gibbs and Winter catalogues, that are no longer extant though were sufficiently described in past publications to merit inclusion.

Among the surviving devices, objects are broken into the broad categories of sundial, clepsydra, monument, and unknown. The latter category is frustratingly large, with 155 objects, but exact determinations are impossible due to one or more complications, including fragmentary nature, uncertain type from an inscription, and so on. Sundials make up the largest proportion of the catalogue with 602 entries. These objects are further classified by type based on the form of the object, including conical, cylinder, globe, meridian, planar, portable, and spherical. For devices with multiple faces utilizing different technologies, the object is simply placed in multiple type categories. For example, device #270²⁸ (Figure 2.3) includes both a cylindrical and a spherical dialface on a single object.

²⁸ In text citations use the number assigned to an object in this work's catalog, while the assigned identifiers of other catalogs can be found in the appendices. For this object, other identifiers include:
Gibbs: (1976) # 7004G
Winter (2013) Herculaneum 1
Topoi (2016) Dialface 289 & 290
Bonnin (2015) #182



Figure 2.3 - Device #270, from the Villa di Scipio at Herculaneum. Berlin Sundial Collaboration, Image of Dialfaces ID 289 / 290, Rome Inventory Nr. 550193, 2015, Ancient Sundials, Edition Topoi, DOI: 10.17171/1-1-3086. Creative Commons BY-NC-SA 3.0 DE

The broad typology used for objects in this work reflects the specific research questions here, and thus is not as intricate as those found in other works with a greater emphasis on the technological development of or science behind ancient timekeeping devices. While this is partly in deference to the expertise of those who have studied these objects through the lens of the history of science, it is also in recognition that the user base of these objects was mostly not versed in the science or history of the objects beyond the broadest of strokes. In seeking to explore the broad social impacts of timekeeping devices across Roman, and particularly Imperial Roman, culture, it is this group of users that were most effected by the growing prevalence of hourly time.

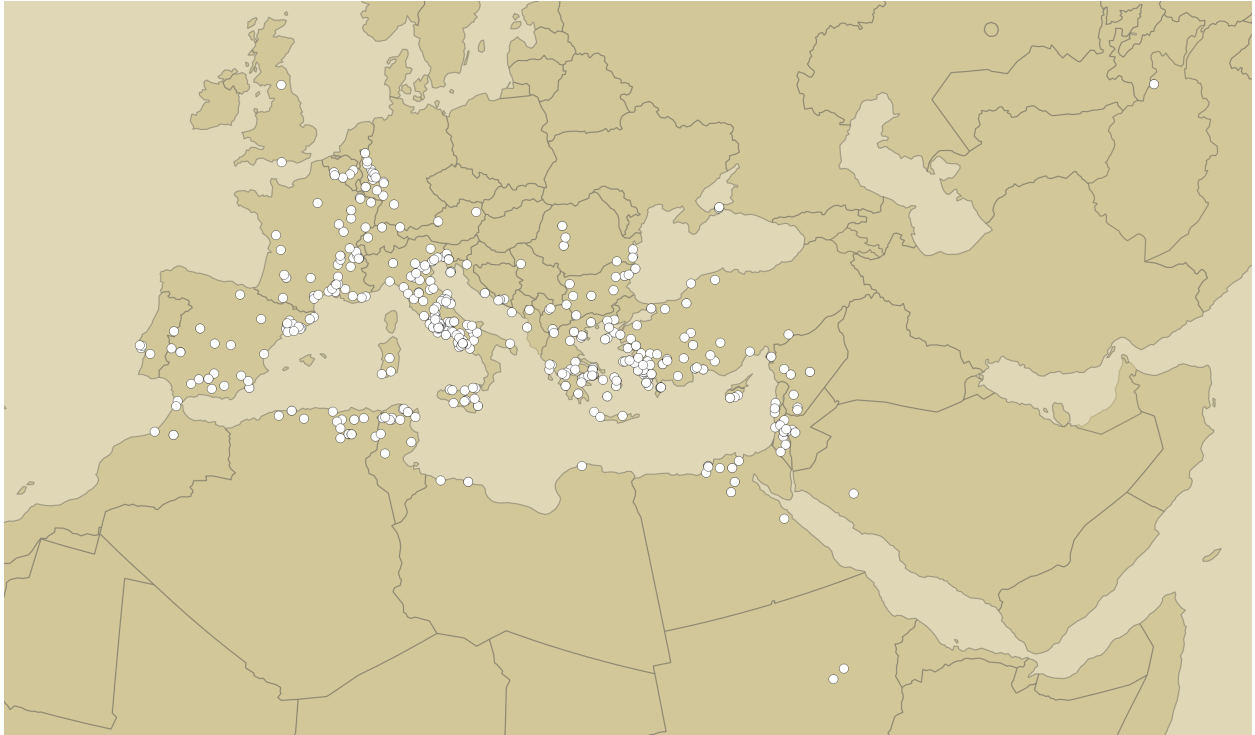


Figure 2.4 - Distribution of all objects included in catalog.

While Chapter 3 goes into greater detail on trends among the objects under study here, I first briefly show the broad distribution of the objects in the catalog. Figure 2.4 shows all entries in the catalog with known location data to at least the level of the site. Mapping in this work is generally done by site latitude and longitude wherever that information is available. Detailed maps of individual sites instead use contextual information from excavation records (for example, devices mapped in Pompeii in Chapter 3 were positioned on a map of the city by structure address). While they provide fascinating case studies themselves, the extreme outlying dials in modern Sudan and Afghanistan are generally excluded from maps in the interest of preserving scale.

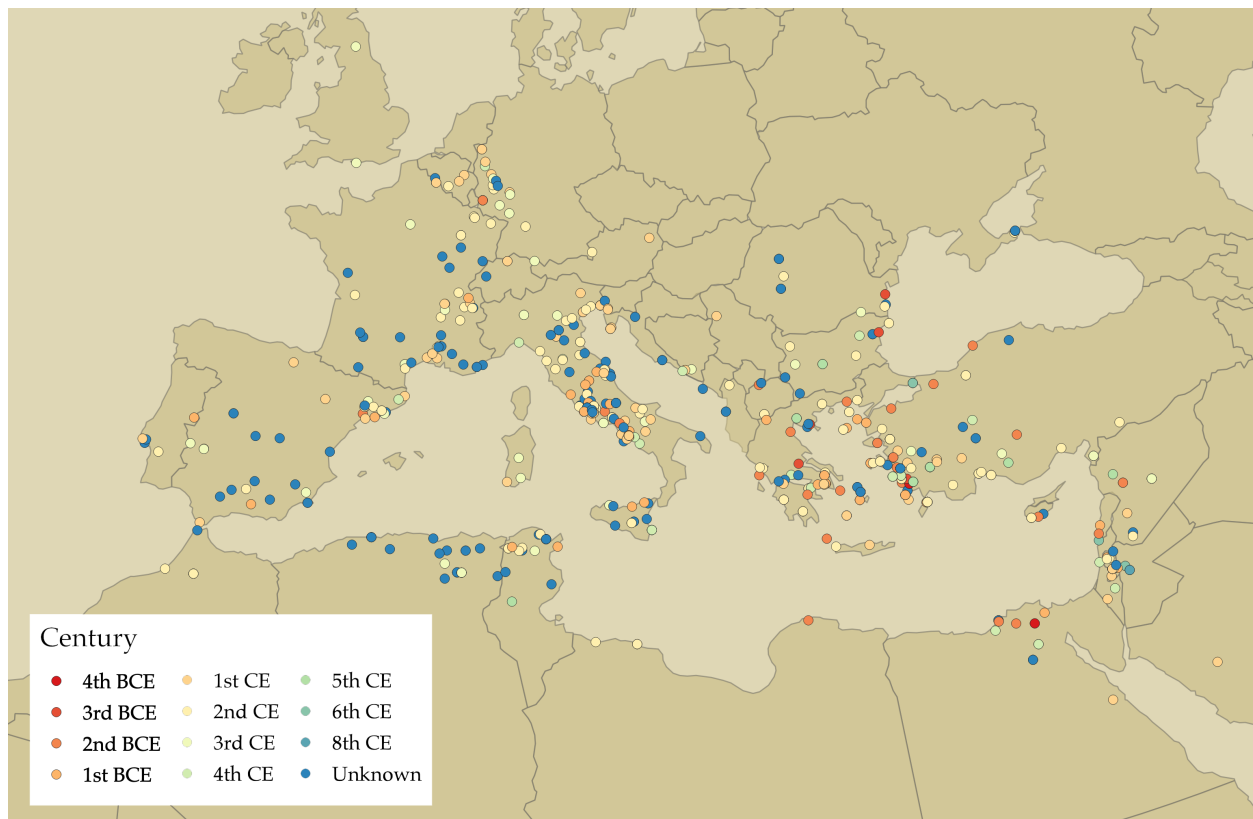


Figure 2.5 - Distribution of all objects included in catalog, categorized by mid-point century.

The catalog also includes dating information, where possible. The precision of dates for the objects under study here varies wildly, from some inscribed objects marking the specific day they were installed to very general dating on stylistic grounds. To strike a balance between these two extremes, this work generally dates objects by the century, and uses the midpoint of a potential date range to assign a century to those objects with ranges that span multiple centuries. Some analysis also uses dating by period, broken down into Hellenistic/Republican (c. 4th BCE to mid-1st BCE),²⁹ Early

²⁹ These periods are presented in charts and figures as a single entity due to the variations in transition between ruling regimes based on location. While some trends observed in the Imperial period begin in the Republican (i.e., the civic funding of sundial installations in 2nd century BCE peninsular Italy),

Imperial (mid-1st BCE to 2nd CE), Imperial (2nd - 4th CE), and Late Antique (4th CE and later). While somewhat imprecise, this periodization generally corresponds to changes in the hourly timekeeping practice of the ancient Mediterranean.

The other major categorization applied to the dataset here centers on the type of location in which hourly timekeeping devices with contextual information were placed. This categorization often applies to the findspot of an object, such as the recovery of sundial #427 from the peristyle garden of Villa A at Oplontis. Some objects, however, can also be contextualized based on specific aspects of the device regardless of its findspot (or most often regardless of a lack of contextual information). The content of an inscription from Igaeditani (#285) in modern-day Portugal, for example, strongly suggests that the device was installed in open public space like a forum. The categories for location include: Agora, Baths, Forum, Funerary, Handheld (for portable devices with no fixed installation point), Palaestra / Gymnasion, Residence, Temple (applied to all sacred locations such as shrines and churches), Theater, Villa Rustica, Other, and Unknown. The “other” category applies to a small number of objects whose findspot is known in good detail but is not easily categorized among the other options (such as the *Horologium Augusti* (#643) in Rome’s Campus Martius).

Hellenistic and Republican timekeeping practices have enough overlap to justify their shared representation in some data visualizations.

Beyond these categories for situating the objects of the catalog in time and place, the objects themselves are categorized by type. Sundials make up the largest category of objects here, with 792 of the objects cataloged here being a sundial of some sort. Objects that fall in the “Unknown” category for type can be safely assumed to be fragmentary sundials, as the other artifact classes are distinguishable enough that they could not be included here without enough identifying features to place them among the other categories. Clepsydra make up 35 objects in the catalog, though this likely severely under-represents the proportion of such devices present in antiquity due to preservation issues. Inscriptions with no associated device are treated separately, as they typically do not differentiate the type of device they were associated with in antiquity. Some inscriptions provide sufficient clues to make educated guesses as to the nature of their associated device, and very rarely do they specifically name either a clepsydra or a solarium.³⁰

Sundials

Sundials became ubiquitous in the Roman world, common across the empire and in a variety of contexts. Devices using shadow to track the passage of hours were “used up and down the length and breadth of the Roman world” (Hannah 2008: 751), with examples dating to the Roman period recovered from almost every large province and

³⁰ The latter is particularly rare, with only an inscription from Nola (#413), one from Compsa (#166) and another from an unknown source (#1039) specifying that a solarium was donated. The term is discussed in more detail in Chapter 5.

as far afield as modern Afghanistan and Sudan (Houston 2015: 299; Catamo et al. 2000). Sundials are at once simple and highly complicated means of keeping time, as the basic notion of a shadow cast by a stationary object moving throughout the day has certainly been in human consciousness from time immemorial. The harnessing of this knowledge into standardized, predictable timekeeping practice requires series of complex developments; a functional dial must account for its position in the world (Talbert 2017: 8) and how that positioning interacts with variations in the sun's movement throughout the day and year. To that end, Roman sundials contain a suite of features that, though they are often expressed in significantly different ways, provided a shared basis of understanding and telling time. Most central to an ability to tell daily time is the hour line, typically an incised line or curve (depending on the particulars of a given sundial and its mathematics). Roman dials generally contained 11 such lines, though some types used fewer sections either marking only half of the daily hours or being passed by shadow multiple times, with edges of the field of hour lines marking the beginning of the first and ending of the last hour. These markings interacted with shadow, most commonly cast by a gnomon,³¹ to track the time as a proportional division of the day. Not all hour lines were created equal, however, in the sense that some were poorly

³¹ Other possibilities include a spherical globe sundial (Gibbs' catalog # 7002G) found at Prosymna that used the inscribed surface's own shadow (Gibbs 1976: 376-377) and various types of "roofed" sundials that entirely blocked sunlight from hitting the hour lines except for small pinholes, therefore the movement of light across shadow marked the time rather than vice versa.

executed (too thick to measure precisely, uneven, etc.) while others were finely done or even further subdivided into half-hour sections.

In addition to hour lines, many sundials also bear day curves, or lines that mark the point of a shadow along an axis (roughly) perpendicular to that of the hour lines. Day curves allow sundials to also function as calendars; the most common such marks show the shadow's path on the solstices (the days of the sun's most extreme angle of the year) and the equinoxes, though marking other days is also possible. By the Roman Imperial period, it seems that the calendrical function of sundials was of little importance (Houston 2015: 314-315), however day curves for the solstices and equinoxes remain a common feature.

The formal variation of Roman sundials matches the breadth of their geographic distribution, as even though general typologies exist there is significant variation between and among them. There are four broad types that occur during the Roman period: spherical (221 devices), conical (244), planar (104), and cylindrical (11), with 2 additional globe³² dials.³³ Further, the science of timekeeping was sufficiently advanced to produce portable sundials, able to account for placement at any latitude known in Roman times. The scientific developments that underlay sundials of the Roman period

³² Globe sundials are sometimes counted among spherical dials, though are placed separately here.

³³ Artifact counts here represent the total number of objects each sundial technology is present on, including objects with multiple faces. As some objects contain multiple sundials faces and some are of unknown type, these counts do not total to the number of extant devices presented above.

have significant temporal depth, with Babylonian and Egyptian precedents, however there appears to be greater variety of form and improved accuracy beginning in about 200 BCE, following Apollonius of Perge's geometric work on conic sections (Schaldach 2016: 71). The initial iteration of the sundial is simply the vertical gnomon, which arose in ancient Mesopotamia as a means of keeping time, often through mathematical schemes to measure the length of a gnomon's shadow at a given point of the day (Steele 2016: 52). Prior to Apollonius' advances, sundials were generally simpler and less accurate, usually only able to accurately account for the hours at certain times of year. Advances in geometry, however, allowed for a single face to accurately convey seasonal hours throughout the year.

The major types of Roman sundials that emerged following the geometrical advances described above are briefly summarized here:

Spherical Sundials – This class of sundial is defined by a shadow-receiving surface of concave spherical section or hemispherical design. Spherical sundials also, though rarely, include globe sundials which bear their markings on the convex face of a complete sphere. Roman spherical sundials generally had gnomons placed so that their tip would lie at the sphere's center, with hour lines radiating out from a central point day curves represented as (roughly) circular arcs running parallel to one another (Jones 2017). Hour lines, in order to accurately divide the day into equal seasonal hours throughout the year, would not be straight lines but rather trace out "undulating cones"

along the concave surface, however for most latitudes along the Mediterranean and further south a straight hour line was a reasonably accurate approximation (Gibbs 1976: 15-16). For globe sundials, a gnomon was not needed as the line of globe's own shadow fell onto inscribed hour lines over its face given a constant orientation (ibid: 29-30).

Conical Sundials – These sundials bear a face which is the concave surface of a cone with its axis oriented parallel to that of the earth's axis. This cone would then be bisected by a plane parallel to the horizon. The placement of day curves and hour lines varies within this class of sundial based on where the point of the cone would lie in relation to the surface depicted on the dial itself, though the most common arrangement was for equally spaced, straight hour lines originating from the point of the cone and intersecting with circular arcs marking day curves (Gibbs 1976: 31).

Planar Sundials – Sundials constructed on flat planes could be oriented a number of ways (parallel to the horizon, parallel to the plane of the meridian, etc.), but all dials of this type function by translating the geometry of conic sections onto a flat surface. In order to do this at the latitudes of the Roman Empire, planar sundials generally take the form of day curves for the solstices (which vary from hyperbolic arcs to straight lines to angular intersections according to the sundial's orientation), a straight line roughly bisecting the space between them for the equinoxes, and perpendicular or roughly perpendicular hour lines (usually approximated for the sake of simplicity) (Gibbs 1976: 39-56).

Cylindrical Sundials – Only 6 stationary cylindrical dials dating to the Roman period survive (Gibbs 1976; Graßhoff et al. 2016), representing two different types. Given the reliance on the geometry of conic sections to produce Roman sundials, cylinders can be considered “degenerate cones” (Gibbs 1976: 56) for the purposes of understanding the underlying mathematics of this sundial type. A single inclined cylinder survives, which was oriented so that its axis was parallel to that of the earth, and 5 examples of vertical are also known. Hour lines on this type of device equally divide day curves.

Portable Sundials

The Imperial period saw the development and spread of “the ancient equivalent of the modern pocket watch” (Hannah 2008: 751) in the form of the portable sundial. These devices are typically small enough to be held in one’s hand and made of light, strong materials like bronze or bone. A mobile version of the sundial is mentioned in Vitruvius’ discussion of timekeeping devices, where he gives credit to Theodosius and Andrias for its development, and the passingly described mobile sundial is likely similar or identical to the miniaturized portable variety that soon became more widely available (Talbert 2017: 9). Vitruvius also mentions, however, that the devices could only be built and used by those with some knowledge of astronomy (Vitruvius, *De Architectura* 9.7, quoted in Cupcea 2017: 599); portability allowed new types of timekeeping and in new contexts, but perhaps not for all in the Roman world. Similar to

stationary sundials, there is significant variation amongst the different surviving types of portable sundials; two cylindrical portable dials did not need to remain in one place in order to be used, but were not able to account for significant changes in latitude (as seen in the Este cylindrical sundial) (Talbert 2017: 11) while other forms were able to be adjusted for any latitude (Wright 2000; Talbert 2017). Talbert's recent book on portable sundials breaks the corpus of known examples dating to the Roman period into three classes: cylindrical, pillbox, and what he calls "geographical portable sundials."³⁴ As a general principle, portable dials function by leading the user to orient the device correctly in space, similar to the required accuracy in the initial installation of stationary sundials. Portable dials that have the capacity to function accurately at different latitudes also contain means of adjusting for one's location, usually with some sort of list to convey a numerical value for latitude at a given site or area.

Cylindrical portable sundials – The two extant examples of cylindrical portable sundials function of similar principles to the previously discussed stationary cylindrical dials. The portable examples bear hour lines and markings for the months on the exterior face of the cylinder with an adjustable plunger rising from the object's center that supports a gnomon. This class of portable dial appears to only function properly at

³⁴ Arnaldi & Schaldach 1997 propose six types for portable sundials, however Talbert's typology is more elegant in its combination of objects based on the principles of their function rather than more formal aspects.

a single latitude. One of the two examples of this type was recovered from a first century CE tomb in modern-day Este, Italy (Talbert 2017: 10).

Pillbox portable sundials – Pillbox portable sundials function by allowing light to pass through a pinhole or slot in the object's side before intersecting with an adjustable arm on its inside, similar in appearance to the hand of an analog mechanical clock. Some examples of this type are constructed to function at single latitudes, however there are also known examples that had interchangeable back plates with markings for different latitudes. Each disc would bear markings for the month of the year, while the hour lines fell on the arm itself.

Geographic portable sundials – This category of portable sundial has some variation in form, as Talbert includes known examples of the pillbox type that could accommodate use in a variety of geographic settings, but generally take the form of an inscribed disk with a suspension arm and a gnomon. The obverse of the disc is inscribed with a latitude ring along its outside, on which an indicator on the suspension arm would be placed to match one's location. An interior inscribed ring contained markings for the day, to which the gnomon would be oriented. After both of these alignments had been entered and the device suspended in appropriate relation to the sun, the gnomon would cast shadow onto an attached arm with hour lines. The reverse of the disc was inscribed with a list of locations and the numerical value of their latitude.

Clepsydrae

Water clocks were “the major timekeeping mechanism in the classical world” according to Hannah (2008: 752), though they functioned differently from sundials in that they measured elapsed time. Landes classifies this type of device as a chronograph (2000: 4), relatively simple time keeping devices³⁵ that need not correct for errors that would prove fatal to devices seeking to track time in predictable, long term ways. Simpler versions of measuring duration also existed, including the use of oil lamps that would burn for a given amount of time (Hannah 2008: 753). The roles and uses of *clepsydrae*, the Greek word for these devices, is more clearly identifiable in many ways than are those of sundials (hence the present study): *clepsydrae* were used to measure, and therefore regulate, durations of time in a variety of contexts. In the Roman world, these functions include political, legal, and military applications such as the regulation of speeches (as in the timing of legal arguments) and the maintenance of military watches at night when sundials were of no use (Cupcea 2017). Specialized *clepsydrae* were created to measure out standardized days, based on day lengths in winter, but the variations of day length throughout the seasons forced adjustments to be made to individual devices and introduced some inaccuracy, and a mid-4th century BCE *clepsydra* in Athens required a 1,000-liter capacity to operate without interruption over a whole summer day (Hannah 2008: 753). Techniques to adapt *clepsydrae* to the

³⁵ Hannah refers to early iterations as “simple egg-timer type of mechanism” (2008: 752).

seasonal hours most widely used in Greco-Roman antiquity were developed early in the history of Greek timekeeping, as Vitruvius credits Ctesibius with inventing a series of wedges to place in a water clock to adjust the length of its hours to match their change throughout the year (*Vit. De Arch.* 9.8.6-7).

There are two principle types of *clepsydrae*:

Outflow water clock – The initial technology of the water clock was the outflow type, which used the emptying of a water container to track a block of time. Outflow water clocks require constant pressure behind their draining in order to empty at a consistent rate (Glennie & Thrift 2009: 30), a feature initially absent in device that relied on a simple pipe to remove water from the outflow tank (Hannah 2009: 109). Time could be marked either by the complete emptying of the device to mark the passing of one whole unit of time to which it was set, or could be monitored by a float connected to some sort of time indicator (Hannah 2008: 753). The main technique for regulating pressure of device to keep consistent flow, developed by the Egyptians, was to slope the walls of the container inward toward the bottom, allowing the weight of water in the tank to be distributed across a smaller surface area as it depleted. This technique can be observed at the water clock at Oropos (#428), the earliest Greek hourly timekeeping device dating to the 4th Century BCE.

Inflow water clock – Inflow water clocks simply reversed the direction in which the passage of water was tracked by functioning based on the accumulation of water in

a tank rather than its passage out. In order to keep water pressure consistent, a second tank would be placed above the receiving tank, and this second tank would receive a constant flow of water that was regulated by an overflow pipe. Water would constantly fill the outflow tank to the level of the overflow pipe, allowing a second outlet at the bottom of the device to drain with consistent pressure into the measuring tank. The tank receiving water could either simply be marked to show the hour by the accumulation of water or could include a float that either itself told the time or was connected to a geared system to convey the time on a separate indicator. Inflow water clocks were developed in the Hellenistic period, credited to Ctesibius in the 3rd century BCE (*Vitr. De Arch* 9.8), and so the technology was available throughout the Roman Imperial period.

The differing underlying technology of clepsydrae as opposed to sundials had both advantages and disadvantages in tracking time. Clepsydrae measured elapsed time, and so could not be used to indicate the current time in the day without proper calibration and use versus the more passive sundial which, after its construction and installation, would mark time regardless of human action. Clepsydrae were, however, useful in a broader range of environmental conditions than sundials as they functioned independently of natural cycles and weather; a clepsydra could track the hours of night or a cloudy day. Since the devices did not operate passively, they required different and longer term investments in order to function; clepsydrae required constant maintenance and care to function including filling, draining, cleaning, and repair to ensure the

measured and even flow of water (Winter 2013: 22). While there is surviving evidence of repairs being made to sundials, the greater necessity of active involvement with clepsydrae has led Winter (2013) to interpret inscriptions that gift a *horologium* of unstated type with attendance or funds for continuing maintenance as water clocks.³⁶

Monuments

Perhaps the most spectacular iteration of urban timekeeping is found in the incorporation of monuments into systems of time, with the goal of creating “an unparalleled public spectacle” (Rehak 2006: 80) around the display of hourly time. Both water clocks and sundials were expanded to monumental proportions for the purposes of timekeeping as well as the exploitation of its grandeur for political projects.

Monumental timekeeping devices survive from the early stages of the Hellenistic period, with the earliest such examples being water clocks from the 3rd century BCE in Athens and Oropos, through to early 3rd century CE dial at Timgad. The majority of grand-scale timekeeping devices were likely permanently installed water clocks, like the two examples mentioned above or the similar device installed in the Basilica Aemilia in Rome in 159 BCE (#633), though the majority survive only as epigraphic

³⁶ While this work generally agrees with this assessment, some instances mentioning the repair of a *horologium* are less clearly associated with a particular type. For example, the 1st century CE inscription (#552) from Puteoli that mentions Tiberius’ foundation and a the city’s later repair of a *horologium* could apply to either a sundial or a clepsydra that was damaged in the earthquake that hit the region in 64 CE. The inscription reads: “[Ti(berius) Caes(ar) Aug(ustus) horolog(ium) po[suit ---] | [---] res public(a) refec(it) | ...”

records of gifts of devices themselves or the maintenance thereof.³⁷ While still monumental in size, these devices likely created less awe than the more unusual and even grander monuments that were constructed by the Romans (with the possible Greek exception of the Tower of the Winds, discussed below). Augustus' construction of his *Horologium Augusti* (#643) in the Campus Martius brought the grandeur of an imported Egyptian obelisk as its gnomon and the reported (though no longer extant) beyond life size Hercules holding aloft a sundial (#566) from 2nd century CE Ravenna. Whether utilitarian or grandiose, monumental timekeeping devices brought tracked hours to public space in ways that associated short time with the authorities that controlled and funded those spaces.

³⁷ The type of device is usually not recorded in these inscriptions, with devices simple referred to through a variation of the general term *horologium*. Winter (2013) explores epigraphic terminology in depth, often interpreting devices that are so named to be water clocks owing to the greater need for maintenance and repair those devices require.

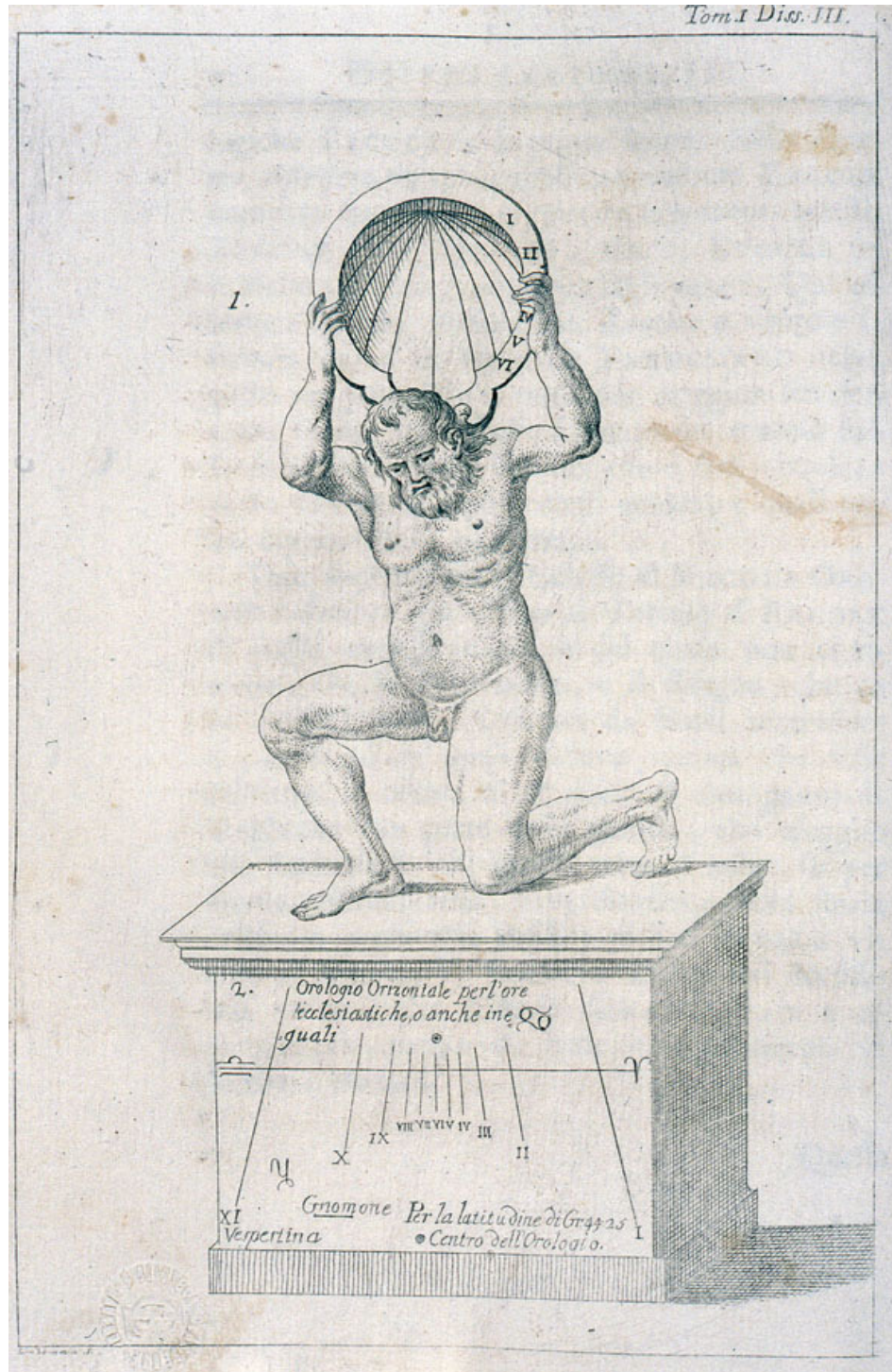


Figure 2.6 - Reconstruction of the monumental Ercole Orario of Ravenna (#887). From the 1768 *Della pittura degli Etruschi. Dissertazione del signore abate Giovanni Battista Passeri*.

The earliest known timekeeping devices from the Greek world are the monumental water clocks at the Temple of the Amphiareion in Oropos (#428) and the

Athenian Heliaia (#93). Not only do these objects show the prominent placement of timekeeping devices in the early Hellenistic period, but their great size (each estimated to hold 1,000 liters of water) make clear that the objects were used to track the hours of the day rather than only the iterable time used to regulate speeches. These devices are likely fairly typical of publicly installed water clocks, though few examples survive and only the Oropos clock retains its shape and attendant hardware. The device at Oropos appears to have functioned as an outflow water clock throughout its use history, though the upper part of its storage tank was sloped to maintain roughly equal water pressure. The device from Athens, on the other hand, at some point had the outflow opening at its base intentionally filled during repairs, suggesting that the device was adapted to function as an inflow clock at some point in its history (Hannah 2009: 108-109).



Figure 2.7 - Remnants of the water tank of the Athenian Heliiaia (#93). Retrieved from https://library.artstor.org/asset/ASITESPHOTOIG_10313819298.

The Tower of the Winds (#100), another public timepiece for the city of Athens (Robinson 1943), incorporates both a water clock on its interior and 8 sundials across its octagonal façade. The octagonal structure includes inscribed sundials on each of its 8 faces, a feat of considerable skill given the added difficulties of constructing planar sundials oriented to anything other than a cardinal direction (Evans 2015: 1593). The location of the monument also allowed it to enter into the view of a great number of people, as it lie just off the Roman Agora, a large public latrine, and the Hellenistic stoa (Webb 2017: 49). Spectacles, either in the sense of events or impactful objects, participate in what Smith calls an “aesthetics of awe” that comprise a significant component of the affective regimes of authority (2015: 68). In creating a monumental manifestation of timekeeping, the Tower of the Winds establishes a link between the Roman Empire’s ability to create things worthy of awe and its ability to exercise a sort of dominion over time (both in how time is conceived and how it is kept). Roman renovations to the structure under the Augustan program of rehabilitating monumental structures also made the tower more identifiably Roman, installing an aqueduct style water system to feed the internal water clock of the monument (Webb 2017: 49).

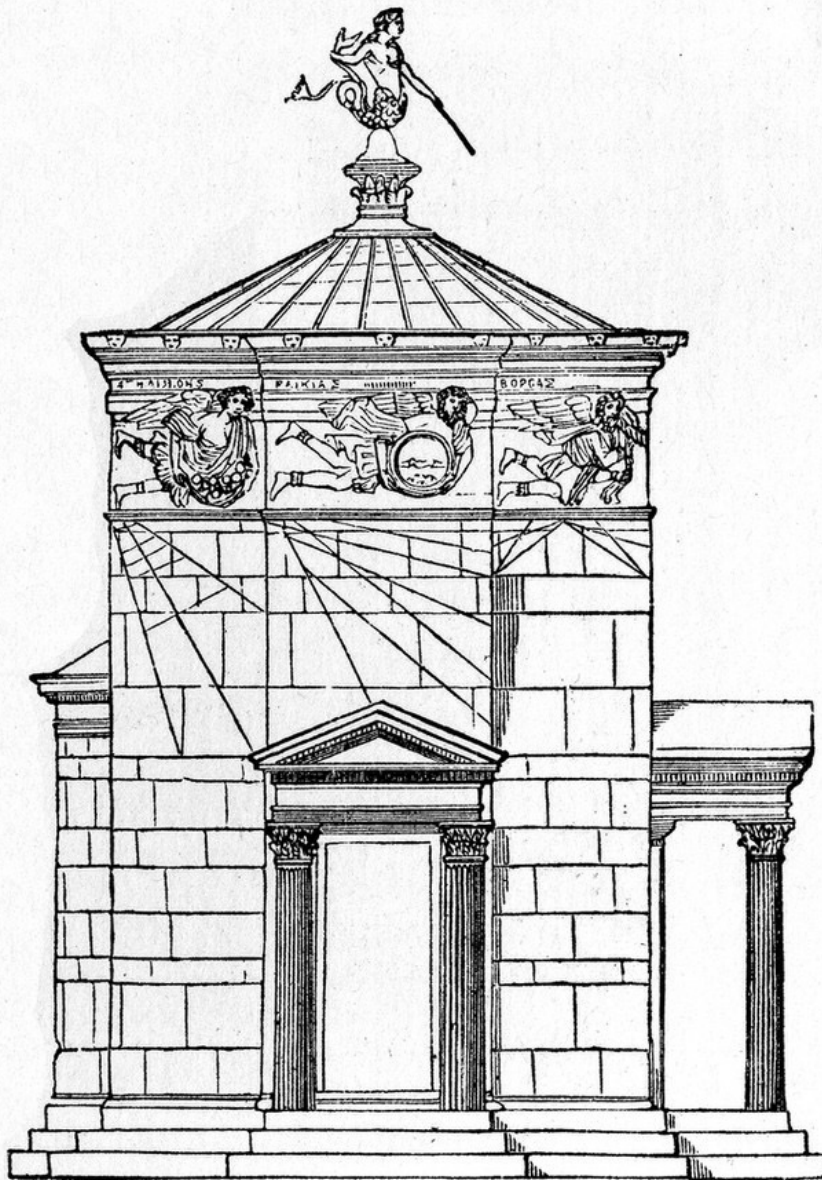


Fig. 91. The Lantern of Diogenes.

Figure 2.8 - Elevation drawing of the Tower of the Winds, with vertical planar sundials on exposed faces. Illustration from: Lübke, Wilhelm. *Outlines of the History of Art*. A new translation from the seventh German edition, edited by Clarence Cook. New York: Dodd, Mead, and Company, 1881. Volume I. fig. 91. Retrieved from https://library.artstor.org/asset/KOHL_HISTORY_1039765270

The Tower of the Winds is not the only spectacle of hourly time in the Roman world, with spectacular iterations ranging from the roofs of pleasure ships that

resembled sundials to the devices' inclusion in conspicuous places, as in the pediment of the Temple of the Muses (Rehak 2016: 68). Whether the *Horologium Augusti* is interpreted as a sundial or a meridian (a device that shows the day of year based on the sun's position at noon rather than hourly time) (see contributions in Haselberger 2014 for an overview of the debate), the monument is probably the clearest example of *imperium's* implication in timekeeping endeavors in the urban environment. Augustus' placement of an imported Egyptian obelisk to display time (be it throughout the year or the day) on a massive scale shows the power of the emperor to do as he pleases with the monuments of others, and the coordination of the shadow cast on his own birthday with the placement of the Ara Pacis suggests a mastery of time (Rehak 2016).

Inscriptions

In addition to the literal timekeeping devices that have survived to the present day, the catalog here also engages with inscriptions that identify devices that have been lost. The 55 examples included in this category do not include inscriptions present on extant timekeeping devices; those inscriptions are considered alongside the devices they adorn and are thus not separated in the catalog. The objects categorized as inscriptions here are epigraphic references to objects installed in the ancient world. These inscriptions are generally dedicatory in nature, marking the installation of a timekeeping device funded by individuals, civic authorities, or associations like Roman *collegia*. Other artifacts include honorary dedications to individuals that include such

gifts as accomplishments in the honoree's life or inventories of cities or temples that mention timekeeping devices.

An unfortunate reality of these devices is their general lack of specificity in naming device types. These inscriptions generally refer to the device they name only through a variation of the term *horologium*. Winter (2013: 111-142) offers an extensive exploration of the regional and temporal variations in terminology surrounding timekeeping devices, though even with this close reading it is often impossible to identify what form a given inscription represents. In some instances, an inscription may betray the nature of the object it references through mention of upkeep or attendants as part of the gift of a *horologium*, as water clocks more likely call for the sort of regular maintenance or presence of a specialized operator that such a specification implies. Even these clues, however, are not always enough to clarify the type of object in question, as there are both written and archaeological examples of repairs also being made to sundials.

While the epigraphic inscriptions separated from the timekeeping device do not often make the form of those devices explicit, they are a valuable tool for identifying the sites of timekeeping devices. Through either explicit naming of cities or their finds context, these inscriptions expand the number of known sites of timekeeping devices. This information greater reflects the true distribution of such devices across the Roman world, but also contributes to the typology of places known to hold those devices. An

inscription's recovery from a city forum or the ruins of a temple, for example, allow for the identification of contexts that contained hourly timekeeping devices even when the devices themselves are lost.

Representations of Short Time

The hour came to serve a social role in the Greek and Roman world not only through its use in regulating timing and schedules, but also for the symbolic resonance it gained via associations with authority, science, knowledge, and civic life. Such resonances are themselves deployed in representational art through depictions of timekeeping devices, an artistic practice which at once reinforces the status of those objects and further entrenches the ideological entanglements of the hour. The catalog here contains 142 representations of timekeeping devices, including some items that have not previously been interpreted as such devices. The corpus of representations relevant to the theme of time is significantly larger, owing both to the expansive list of concepts within that theme (years, seasons, the past, the present, etc.), and though the concepts and perceptions expressed by those works influences the temporal culture of both Greek and Roman antiquity writ large, the focus here remains on hours and, therefore, the devices that track them.

Among the 142 representations cataloged here, all depict sundials as opposed to water clocks. The more prominent position of sundials in the artistic repertoire reflects the predominance of those devices in the surviving archaeological record, though biases

in preservation likely exacerbate the relative counts of each type; the sundials that have been passed down to today are generally made of robust materials, carved stone, while examples in more perishable materials (especially metals) survive but in substantially fewer number. Sundials are also likely more immediately legible as short time devices, both in antiquity and among interpreters today. The larger water clocks of the ancient mediterranean are often close to monumental in scale and consist mostly of the water storage tanks that may be harder to convey as timekeeping devices. Similar problems may be encountered with smaller timekeeping devices, as well. The calendrical clepsydrae from Vindolanda, Hambleton, and the Frankfurt museum are roughly hand sized devices largely defined by interior markings which may be difficult to translate to artistic works, especially as secondary features. Sundials, on the other hand, fit better into the background of images and can easily be distinguished from most other features of the built environment; sundials were often placed above the ground on columns or mounted along roofs and bear distinctive markings, in the form of their gnomons, hour lines and date lines, that are openly visible wherever the object is installed.

The types of scenes on which timekeeping devices appear in art also likely influence which devices are depicted. Sundials most often appear as attributes of education, science, or knowledge. Examples of this usage include the “seven sages” mosaic of Pompeii (#496) (and the copy at Sarsina (#675)) or a mosaic portrait of Anaximander (#743) from Trier where the devices are associated with great thinkers of

the past. The devices also appear alongside Athena (#770) and Minerva (#606), again emphasizing their association with wisdom.

The greatest number of artistic representations of sundials come from sarcophagi with 65 instances reported here. This deployment of the objects is also temporally limited to the High and Late Roman Empire, with only a single datable object coming from the 1st century CE or earlier. Sarcophagi offer a wide variety of themes in which the notion of time is relevant, including the emphasis on wisdom (both human and divine) discussed above through depiction as an attribute of philosophers. The growing inclusion of sundials in funerary contexts also, though, highlights the growing association of hourly timekeeping with notions of time's passage more broadly. Virgil's reflection on time's passage, "it escapes, irretrievable time" (Verg. G. 3.284)³⁸ itself came to be frequently associated with sundials through the mottos regularly inscribed on the devices in the medieval period and beyond, but the connection between the devices and that sentiment appear to first gain cultural cachet in antiquity.

Intaglios make up the next largest group of representations, with 30 surviving examples. These objects temporally cluster around the 1st century BCE-1st century CE, and again represent a variety of motifs and themes. The smaller nature of intaglios leaves many of the objects depicting only a sundial atop a column, though learned figures leaning against such columns are also a common motif. These common

³⁸ *Fugit irreparabile tempus*

depictions are by no means the only option for scenes with sundials on intaglios, however, with more exotic examples including an anthropomorphic cicada playing a Phrygian flute with a sundial in the background (#804), among other examples.

Mosaics make up the next largest group of representations with 24 known examples. This class of representation is the most varied, with examples dating from the 1st century BCE to the 8th century CE. Sundials generally appear as either architectural features in the background of scenes or as features of the built environment of cities (the latter developing mostly in the Late Antique), though are also again associated with depictions of philosophers (as at Pompeii (#496) and Sarsina (#675)) or as the central motif of a panel (#996). Despite their limited number, mosaics offer some of the richest views into concepts of time and the hour's role in society, owing to the scenes they participate in and the explicit messages included alongside them in text. Later chapters discuss the role of these mosaics in both individual lives and the civic sphere of Roman life.

The remaining 23 artistic representations are split among wall paintings (5), terracotta figurines (3), funerary stelae (3), lamps (2), plaques (2), manuscript illuminations (2), silver vases (2), glass souvenir flasks (2), a funerary altar, and the frieze of a theater pulpitum.

Conclusions

The goal of this chapter is to lay out, in broad strokes, the ability of explicitly archaeological approaches to contribute to our understandings of short time in the ancient world, particularly in reference to that time's shaping of social relations. After introducing archaeology's ability to address the abstract concept of time through the material record, this chapter then identified three major lenses through which timekeeping devices must be read in order to understand their impacts on the social life of an ancient Roman. First among these is the timekeeping device's role as an individual artifact, a material object that is both the "largest part of the meagre physical evidence for the scientific activity [of antiquity]" (Gibbs 1976: 3) and an object of art situated among long histories of decoration, display, and meaning. The nature of most surviving devices from antiquity simultaneously places them among the features of the built environment, architectural fragments or even monuments situated among and constitutive of social spaces in the ancient world. Finally, the objects also create an infrastructure of short time through their participation in assemblages and networks throughout the ancient world.

With this framing in mind, this chapter then introduced the corpus of objects relevant to this study. The introduction here was broad, meant to situate this work's catalogs among the indispensable earlier examples while also serving to introduce the basics necessary to understand ancient timekeeping devices and their roles. There is

significantly more to be said about both the formal variation present in these devices and the finer details of their design and function. Each of these is addressed further throughout the work where relevant to understanding the role of said devices in the social relations of antiquity, though neither exhaustively so.

Finally, the chapter sought to introduce the symbolic and aesthetic value of sundials and clepsydrae through the catalog of their literal depiction in art. These depictions span the period from the 1st century BCE to the 8th century CE, appearing in a variety of media and conveying an even greater variety of meanings.

The next chapter of this work introduces greater details of the distribution and contextual placement of timekeeping devices across space and time. This aim is accomplished through grand scale analysis across the Mediterranean basin from the Hellenistic through the Late Antique, though finds the richest illustration of the landscape of Roman timekeeping in discussion of contextualized devices at the site and individual property level. Later chapters further explore the role of these contextualized devices in particular aspects of social life, political authority, and the makings and conception of time itself. The inscriptions, both on extant devices and announcing the installation of those that have been lost, and artistic representations of those objects are also incorporated as evidence of the growing influence of hourly time, particularly its implementations arising alongside the Roman Empire.

CHAPTER 3: ROMAN LANDSCAPE OF HOURS

VOICI VOTRE HEURE
(Geneva, Switzerland, Date Unknown)

When Vitruvius lays out the principles of constructing a sundial, he begins by calibrating the proposed dial in place: “Hence, wherever a sundial is to be constructed, we must take the equinoctial shadow of the place...” (Vitr. De Arch. 9.7.3).³⁹ Locating a sundial in place was essential to ensure its proper functioning, given the seasonal variations in the ancient hour created by one’s location on the sphere of the earth. Where a sundial was placed affected the underlying design of the object and its ability to function. Even portable sundials, invented sometime circa the 2nd century BCE (Talbert 2017: 9), were inherently tied to place through their need to be calibrated to their use location.⁴⁰ Beyond only their ability to tell time, however, place offers insight into the broader functions of hourly timekeeping devices⁴¹ in the ancient world. It is not only where the devices were found in the world, though, but also where they were

³⁹ Ita que in quibuscumque locis horologia erunt describenda, eo loci sumenda est aequinoctialis umbra...

⁴⁰ Usually done, from surviving examples, through an engraved set of places with known latitudes on one face of the object.

⁴¹ For the sake of brevity, this work uses the phrase “timekeeping device” to refer to the sundials and water clocks that tracked short time, and specifically the hour. While there are other types of timekeeping and a suite of technologies to accomplish it, the focus here is on the hour unless explicitly stated otherwise.

located within a city that informs their capabilities and uses. The specific locations of timekeeping devices open new avenues for understanding the complex role of sundials or water clocks and the hourly time they made possible. Like other features within the built environment,⁴² timekeeping devices were inherently tied to the builders, owners, and users of the spaces in which those objects were found. Sometimes the epigraphical or literary record convey this information directly, as in the number of dedicatory inscriptions for timekeeping devices preserved across the span and history of the ancient Mediterranean, though the archaeological record offers a broader, if less specific, toolset for understanding which members of society were commissioning the construction and installation of timekeeping devices. No matter how the identities of those affiliated with timekeeping are transmitted to us, the contextualized corpus of devices they left behind enables a further step in our understanding: what were the motivations behind pursuing or possessing a timekeeping device? Why were the devices commissioned, purchased, and displayed?

The short answer, of course, is to tell and display the time, but the motivations behind acquiring a timekeeping device are complex. The nuances of motivation for timekeeping are especially ripe for study in ancient contexts, wherein the relationship

⁴² Timekeeping devices occupy a liminal space between the archaeological categories of artifact or object and that of feature: the devices have been productively studied as discrete objects as works of science or art, but were also typically used as fixed in place and non-portable. With the exception of explicitly portable sundials, as studied by Talbert 2017, this chapter focuses on sundials as features, stationary components of the built environment.

between society and measured time are substantially different from in the contemporary industrial world. The construction and operation of timekeeping assemblages is deeply entangled with issues of socio-economic status, ideology, and power that can easily be obscured by too narrow a focus on the scientific design of the objects that make up the corpus. Among recent entries to the body of scholarship on classical sundials, Talbert (2017: 3) offers a sharp critique on the state of the field, stating that modern scholarship on timekeeping has suffered from a fixation on the technical aspects and precision of timekeeping devices at the expense of broader cultural questions. While this critique gives too little credit to recent scholarship on ancient timekeeping devices⁴³, I share Talbert's enthusiastic assurance that "mine is a cultural study" (ibid.), and thus one that is interested in the uses, outcomes, and impacts of timekeeping objects and practices in the early Roman Empire.

What, then, can the locations of sundials contribute to questions of social relations in the Roman world? As the vast majority of surviving timekeeping devices from antiquity were stationary objects that had to be installed in calibrated positions in order to properly function⁴⁴, existing studies on other features and spaces offer a model

⁴³ See, for example, Winter's (2013) chapter on the distribution of sundials in Rome and Athens, the collected contributions in Miller & Symons 2019 and Jones 2016, etc.

⁴⁴ This is not to say that timekeeping devices couldn't move, as seen in the example of the "sundial ship" of Delos, a device shaped like the prow of a boat with multiple sundial faces incorporated into it. The object was recovered from a gymnasium constructed in about 90 BCE, but bears an inscription dating to 200-166 BCE (Schaldach 2016: 73). This dial clearly moved over the course of its use-life, but in each phase of that life was installed in a manner that allowed its gnomon's shadow to accurately trace the hours.

for potential research questions. Ellis' study of Roman retail establishments, for example, argues that "*where* retail outlets were opened [can be] then readily imagined as a product of the basic social and economic agencies behind urban investment, preserving in their spatial patterns how the location of each shop or bar was either (and incongruously) purposefully planned or indiscriminately placed" (2018: 85). While this study differs from one on retail spaces in some dramatic ways, it nevertheless stands to benefit in similar fashion from the analysis of spatial distribution of its target features. Timekeeping devices evidence the social and economic agencies behind their creation, and further also represent investments in urban (and non-urban) contexts, both as objects of personal use as well as civic benefits. While the distribution of timekeeping devices is less directly tied to broader urban planning, this chapter shows that the placement sundials and clepsydrae nevertheless had impacts on social practice through their enabling of time discipline, the structured responses to a timekeeping system within a society (Landes 2000: 2). Laurence (1996) addressed the concept of the "temporal logic of space," arguing that the temporal aspects of elite routines impacted the spatial arrangement of Roman cities, as elites sought to maximize their ability to be (and to be seen as) on time in accordance with social expectations. Thus, for example, part of the reason for creating distance between the forum and the baths of a city was to allow for the conspicuous procession of elites between the two locales at the culturally appointed time each day (ibid.). Even beyond its implications for "urban planning,"

however, the distribution of timekeeping devices reveals the logics of their placement, be they determined by or deterministic of other surrounding features, structures, and activities. Even where the distribution of timekeeping devices appears indiscriminate in the broader context of the surrounding city, their locations within the spaces that hold the objects betrays the intentions of their installers and their usage by the broader communities that interacted with them.

This chapter addresses these core questions through two scales: the broader collection of timekeeping devices in the ancient Mediterranean and a more focused look at the site with the greatest preserved number of both devices and contextual information for those devices, Pompeii. These two scales offer answers to core questions about the practice of timekeeping in antiquity: where were timekeeping devices installed and used in the Roman Empire, who was responsible for those installations, and what were the individual and cultural motivations for construction a timekeeping feature? After establishing where timekeeping devices were found throughout the Roman world, or at least as many of them with surviving provenience information specific enough to assuredly or reasonably pinpoint their location, the case study of Pompeii shows the finer level of detail possible to identify among broad spatial and temporal patterns. The task of tying sundials or water clocks to individuals is not an entirely new approach, especially in reference to those such objects that retain inscriptions or mention in other records associating them with specific individuals, but

is here expanded to include the categories of identity that are less explicitly preserved; socio-economic status, for example, can be addressed through the degree of luxury (or, in exceptional cases, the lack thereof) found throughout a private residence containing a sundial. Known patterns of use, practice, and social convention about who had access to the types of spaces where timekeeping devices are found also opens avenues into how the objects functioned for those other than their owner; a property owner had a particular relationship with the hour and its keeping, but his or her clients and servants would have had substantially different experiences. Finally, the location and social network of timekeeping devices are used to explain motivations for the procurement and use of sundials and water clocks.

A key focus is on the urban environment of Pompeii, as the city both boasts the largest surviving corpus of timekeeping devices and is situated among other surviving locales with both those objects and relevant representations of hourly timekeeping. The richness of the remains of Pompeii also allows timekeeping devices to be considered within the broader functionings of a Roman city as a whole. This focus on Pompeii, however, is not the result of this or other urban contexts being somehow more infused with time than rural ones. Rural contexts have often been romanticized as existing outside the bounds of systematized timekeeping, instead relying only on natural

rhythms and seasonal cycles.⁴⁵ While the temporal structures and demands of rural and urban life are in many ways different, so too are those structures different across variations in class, gender, profession, and so on; the division between rural and urban as the only axis oversimplifies the multiple overlapping temporalities of a given setting. These temporalities “involve the interaction of multiple rhythms and include both cultural creations and physical phenomena” (Birth 2012: 64), of which urban or rural setting is a significant contributing factor rather than a wholly determining aspect. The extra-urban villas and small cities in the Bay of Naples provide points of comparison between urban and non-urban settings while also benefitting from the exceptional preservation conditions of the Vesuvian eruption of 79 CE.

Locating Timekeeping Devices

Mapping the locations of timekeeping devices provides a useful perspective on timekeeping’s function in the ancient world, though it does not provide the entire picture. De Certeau, for example, distinguishes between a city known from “above” through the god’s eye view of city planners and maps and that of those that “live ‘down below,’” the people that walk the city and experience it directly and idiosyncratically (1988: 92-93). Archaeologists have taken De Certeau’s framework to heart, leading to studies that varyingly rely on one sort of vision or the other, the combination of the two,

⁴⁵ Indeed, much of this bias toward rural settings has precedent among the authors of antiquity, and this bias has lead to the conception of the rural as other and often less than the urban (Van Oyen 2019).

or even creative re-imaginings of archaeological space (Joshel & Petersen 2014: 89).

Time, similarly, necessitates a variety of approaches and an understanding of experience in order to be holistically comprehended. De Certeau's view from above, perhaps the more common vantage among archaeological investigations, is useful in setting the scene of objects of time and the broader temporal infrastructure they create; the pervasiveness and interrelation of those objects used to tell time (or the other objects that influence perceptions of timekeeping, such as representations of sundials or clepsydrae) becomes apparent through a wider lens. This view, of course, can only be that of an empty container unless it is populated with the people that navigated, enacted, and re-enacted a given temporal culture.⁴⁶ For these reasons, not only literal time telling objects are considered here, but also representations of those objects that shape and influence the ancient mentality of time. The Romans themselves speak of the role of objects other than water clocks and sundials on ancient "time discipline," the way that time cues serve as cultural commands (Landes 2000: 2), as the formulation of core temporal practices emerged without the aid of the devices under study here. Pliny, for example, reports that prior to the installation of Rome's first sundial, the day was divided into four periods based on the passage of the sun behind the four main

⁴⁶ Wishnitzer (2017: 7) defines "temporal culture" as "a historically created system of time-related practices, conventions, values, and emotions that structures the temporal dimension of social life and fills it with meaning." While this definition does not explicitly exclude material culture, this study finds it important to supplement Wishnitzer's definition with a focus on the material culture of time that represents and communicates timekeeping systems.

buildings of the *Forum Romanum*. The built environment, the shadows it cast, and countless other parts of daily life are implicated in the founding and functioning of a temporal regime, but rather than creating a picture too large to comprehend these connections allow us to explore the meanings of time through its use, representation, and significance.

The spatial distribution of hourly timekeeping devices in the Roman world, the sundials and water clocks that tracked hours, is vast in reach while concentrated in its density. A number of ancient timekeeping devices do not possess sufficient provenance information to clearly determine where they were found within the borders of modern nations, with 121 devices sourced from completely unknown locations. As a means of conveying the geographic distribution of the objects, Figure 3.1 shows the number of functional devices by modern nation borders. Of devices of known contexts, the area comprising modern Italy has the most with 211, followed by Greece with 166, Turkey with 76, France with 30, and the remaining 30 current nations with associated ancient timekeeping devices all containing 25 or fewer devices each. There are 105 devices without location data at even the country level.

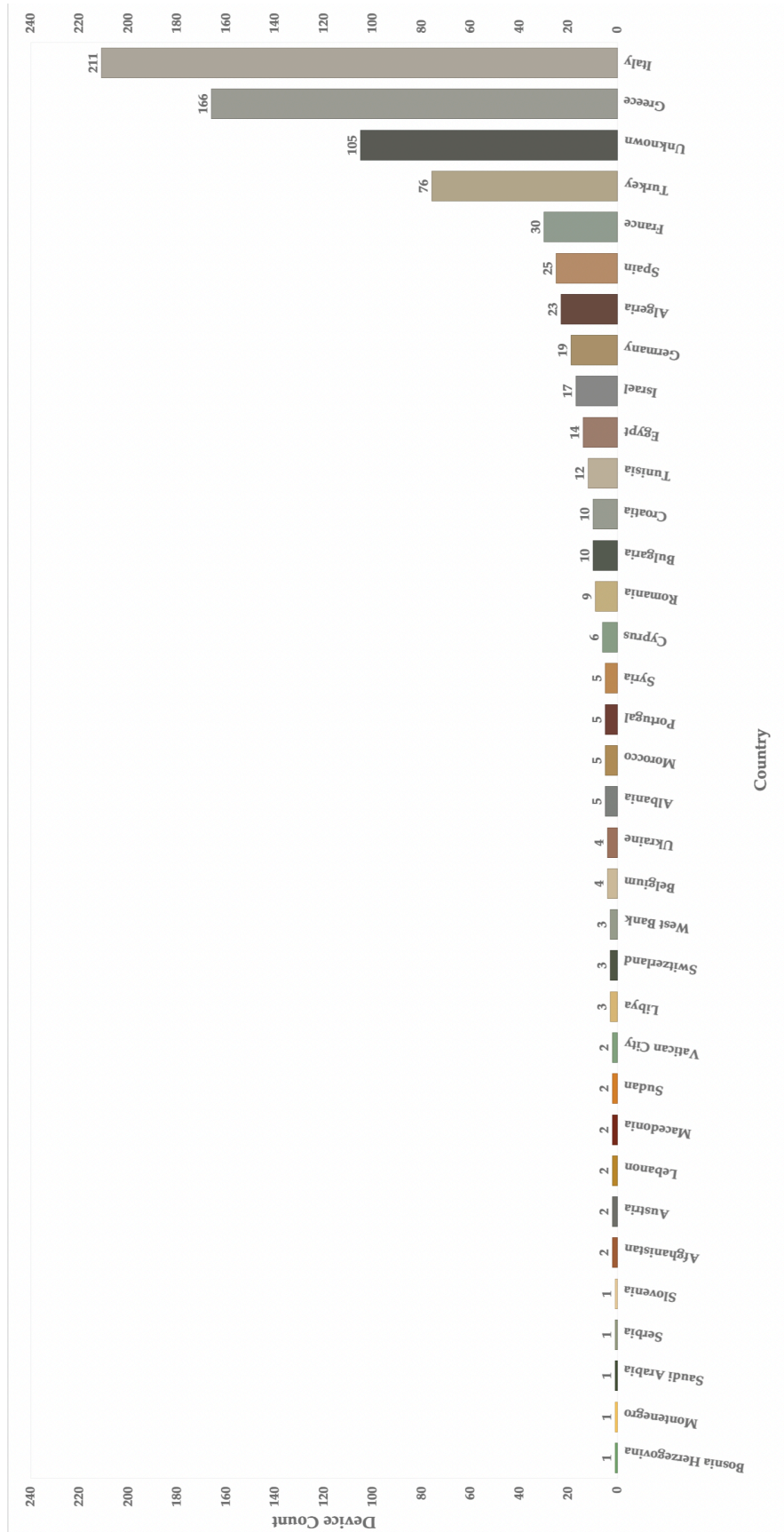
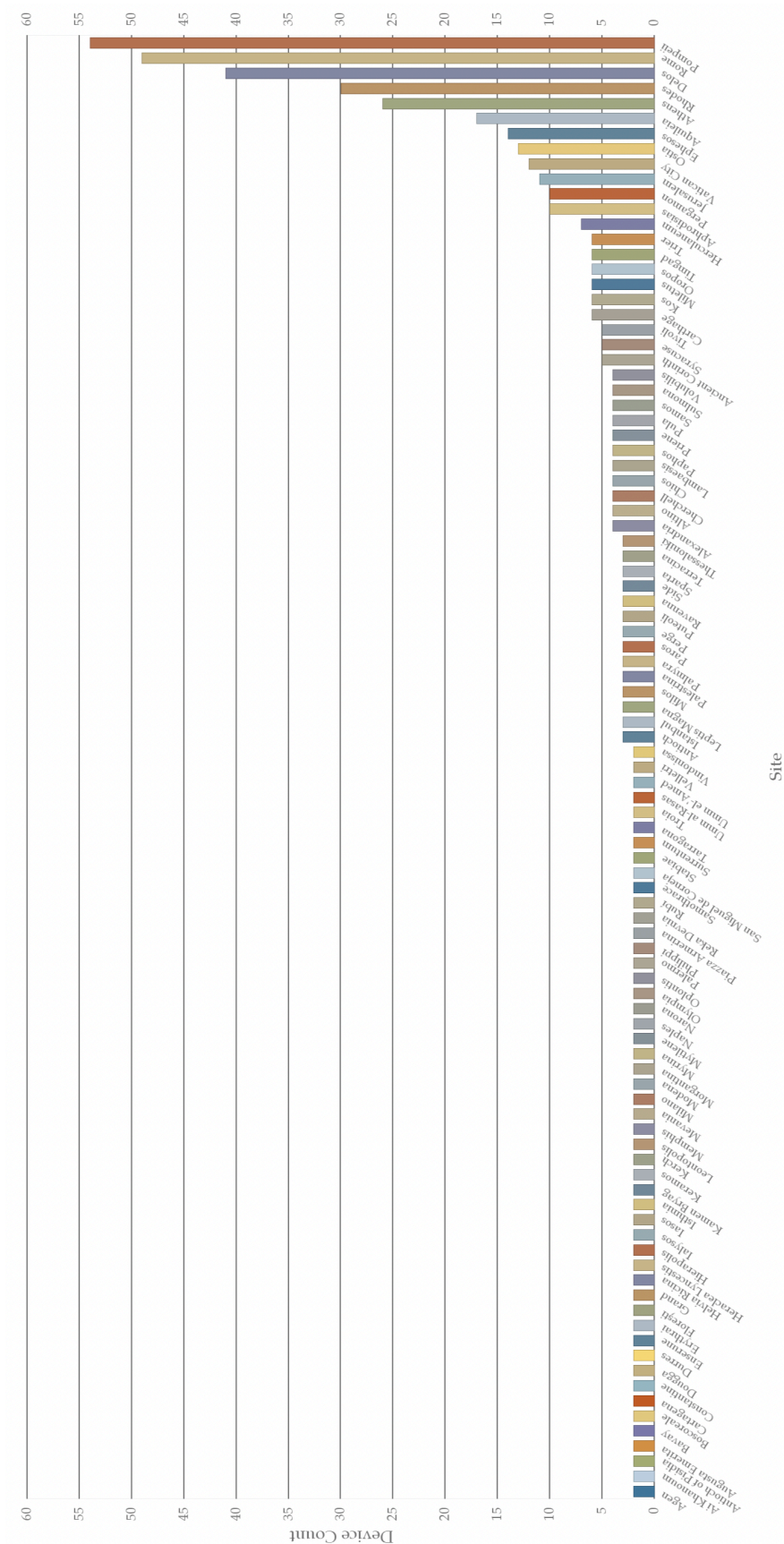


Figure 3.1 - Total count of devices recovered by modern country.

While modern nation state boundaries are not clearly representative of patterns in the distribution of Greek and Roman sundials and clepsydrae, they can be useful in showing the extremes of the spread of their particular temporal culture. Greek or Roman hourly timekeeping devices have been recovered from as far south as present-day Sudan, as north as Germany, as east Afghanistan, and as far west as the western extent of the Iberian peninsula and Morocco. Adding in Roman representations of these timekeeping devices pushes their extent north to the United Kingdom, where a Late Antique mosaic at the Brading Roman Villa on the Isle of Wight depicts a spherical sundial as a component of the built environment (Bonnin 2015: 414). Even where sundials or clepsydrae were not installed, portable dials show us even wider spread for the usage of Roman timekeeping (or, at least, the extent of the imagined utility of that system of timekeeping). Portable dials, which generally contained a list of known latitudes to allow for calibration of the device to one's location, include among their entries Sarmatia, Babylonia, Cappadocia, Arabia, Ethiopia, and India (Talbert 2017). While portable sundials were likely not actually transported to and used in all of the potential locations listed on their reverse faces, they nevertheless show that tracking the hour was seen as a worthwhile endeavor to a Roman traveller even in the most distant known lands.

Rather than the portable sundial in the pocket of an exceptionally well traveled individual, however, most Roman encounters with both timekeeping devices came closer to home. Studying timekeeping objects at the level of an individual site or city, then, allows for a more nuanced understanding of hourly time in the Roman Empire as it enables both the view from above and that of those that “live[d] down below” and experienced it firsthand. Figure 3.2, below, shows the distribution of timekeeping devices by site for sites that have more than one known device. Pompeii has by far the largest corpus of preserved timekeeping devices with 54, followed by Rome (49), Delos (41), Rhodes (30), Athens (26), Aquileia (17), Ephesus (14), Ostia (13), Jerusalem (11), Aphrodisias (10), and Pergamon (10). Beyond these leading sites, there are 10 additional sites with between 5-10 devices each, 11 sites with 4 each, 13 sites with 3 each, and 45 with 2 each. Counts of surviving timekeeping devices can be expanded by the written record in some cases, such as the reported locations of additional such objects from Rome (Winter 2013: 240), however most sites are not fortunate enough to have surviving detailed information on the location of sundials and clepsydrae.



The types of places in which timekeeping devices are found have been studied across the entirety (as known at the time) of the corpus of timekeeping devices, notably through Winter's classification of find context into 7 categories: fora/agorae (86 objects), residences (69), temples (67), tombs (39), theaters (including amphitheaters and circuses) (18), bath complexes (12), and gymnasia (8) (Winter 2013: 185).⁴⁷ While each of these categories provides unique, and vital, contextual information about the use and reception of hourly time, they can be meaningfully grouped into public (fora/agorae, temples, tombs, theaters, baths, and gymnasia) and private (residences). The former category allows insight into the role of hourly time at the level of civic and state authority, as well as its impact on individual action in the public sphere; it is in these spaces that we see attempts to make hours legible and accessible across social groups and the regulation of civic activities and their attendant temporal expectations. Private residences, on the other hand, allow exploration of the individual's role in keeping and abiding by time, as well as the hour's effects on personal relationships and practices. Some categories also straddle the border between these broader categories, as sundials

⁴⁷ It is worth noting Winter's inclusion of only objects of clearly known installation locations, i.e. only those objects whose actual in situ position can be determined, and exclusion of objects recovered from a known location but whose actual point of use is unclear. The following discussion uses findspot, rather than installation site, to discuss the distribution of timekeeping devices in Pompeii. This broader net is important in the Pompeian context, as the level of preservation allows certain contexts to clearly be associated with a sundial despite the object no longer being in situ. For example, a sundial in the House of the Menander was found amid rubble and construction materials from an ongoing renovation of the peristyle garden the object had likely been placed in prior to being replaced by the property's second sundial during those renovations. This context provides a clear link between the displaced sundial and the property, even if the device was not found installed in a peristyle garden.

on funerary monuments were funded privately and installed in association with an individual's tomb, but would usually be publicly accessible.

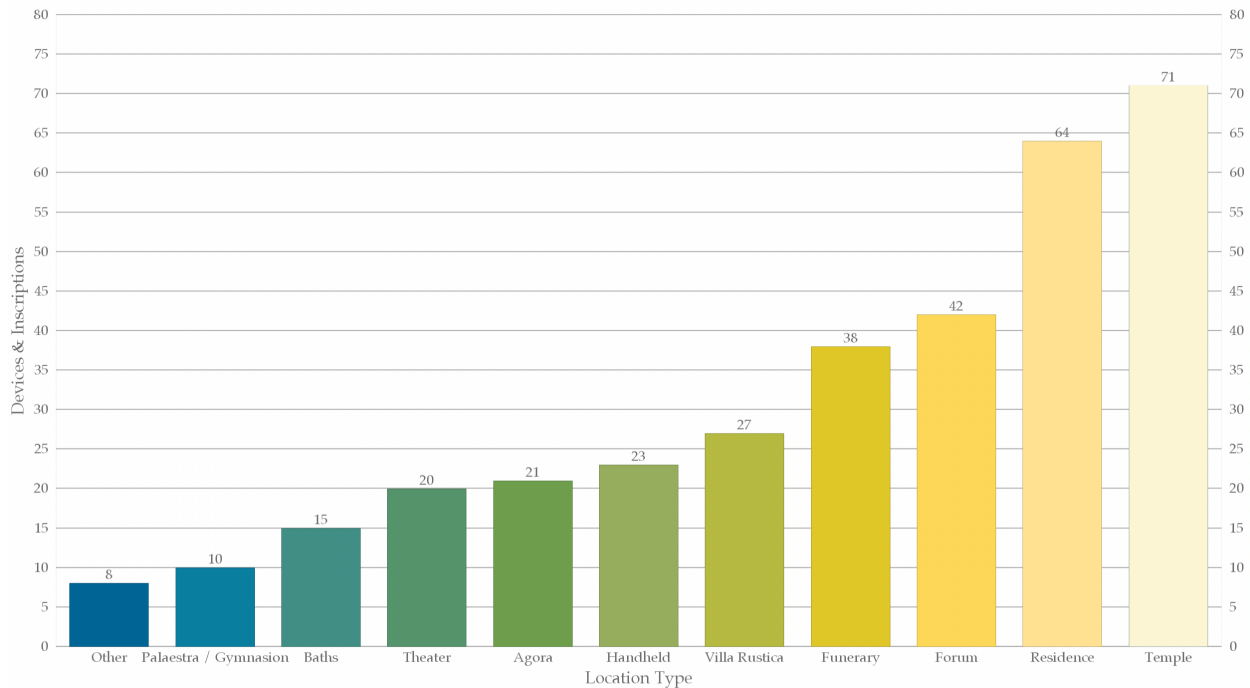


Figure 3.3 - Timekeeping devices & inscriptions naming no longer extant devices by find location type.

The number of known sundials has grown since Winter's publication, largely made possible through the Ancient Sundials Project of the BSDP,⁴⁸ the catalog of which is cited here as Graßhoff et al. 2016. This study has applied its own categorization to the finds locations of sundials, seeking to extract more specific information from known contexts. Figure 3.3, above, shows the total counts of timekeeping devices and inscriptions for objects with a known location type. The location categories used here

⁴⁸ Hosted by Freie Universität Berlin and the Humboldt-Universität zu Berlin with the Berlin-Brandenburg Academy of Sciences and Humanities, the German Archaeological Institute, the Max Planck Institute for the History of Science, and the Stiftung Preußischer Kulturbesitz (Prussian Cultural Heritage Foundation).

are Other (which includes single instances of Acropolis, Amphitheater, Bouleuterion, Campus Martius, Heroon, Praetorium, Quarry, & Roman Camp), Palaestra & Gymnasion, Baths, Theater, Agora, Forum,⁴⁹ Handheld, Villa Rustica, Funerary,⁵⁰ Residence, Temple, and Unknown (omitted from figure above). Temples are the most common known installation locations for timekeeping devices, at least partially as the result of our ability to attribute some inscribed objects to religious locations based on the content of their epigraphs. While separated in the chart above, private residences would make up the largest single category when combining “residences” with “villae rusticae” in order to flatten urban and rural counts, coming to a total of 91 objects. The majority of objects overall, however, come from public spaces. The categories here also refer to the primary use context of recovered timekeeping devices, which is most relevant in the case of handheld devices; many portable sundials, for example, were recovered from funerary contexts but were placed there as personal effects of the deceased and would have been used to tell time in other more varied contexts.

⁴⁹ The distinction between agorae and fora is made based on temporal differences, intended to separate objects produced under different regimes.

⁵⁰ This category generally refers to funerary contexts, and thus individual tombs are classified as Necropoles even if not located among other burials.

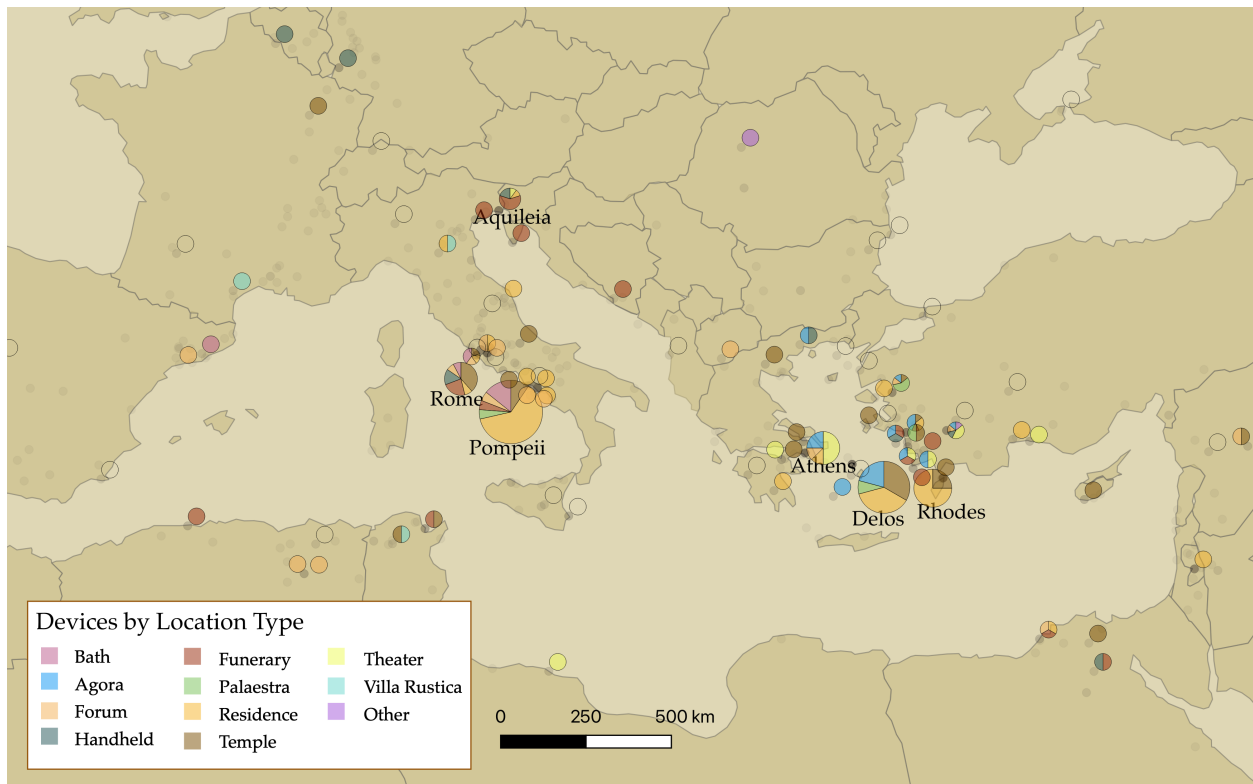


Figure 3.4 - Location type of timekeeping devices by site, excluding unknown locations. Graph size roughly correlates to device count. Sites with greater than 11 devices labeled for clarity.

The distribution of location types, the category of place in which a timekeeping device was utilized in antiquity, does not show strong regional patterning. The above map (Figure 3.4), depicting the location types of timekeeping devices by color and the overall number of devices at a specific site through chart size, shows the distribution of objects of time with known provenience across the Mediterranean. Single timekeeping devices are represented by light grey points. Devices with unknown location types were excluded for clarity. Rather than broad patterning, there appear to be regional clusters of predominating types: the Vesuvian cities, for example, all produced the majority of their objects with known contexts from private residences. Devices from funerary contexts or necropolises dominate the contextualized finds from the northern Adriatic,

and there appears to be a higher frequency of timekeeping devices from temples and religious contexts in the eastern Mediterranean. The differences and trends observed in this distribution cannot be taken separate from the histories of excavation at particular sites; cities like Pompeii and Herculaneum have a high proportion of their residential properties fully excavated, for example, while Aquileia is less fully uncovered but has had a large number of tombs exposed. The nature of location types is also an important consideration, as some locations are either more numerous in total or more likely to individually yield multiple devices. Many fora and agorae, for example, would have been the site of frequent interaction with a timekeeping device but only yield a single such object. The donation of a timekeeping device as an act of civic munificence was often centered on a forum/agora, where many people would see the object but there was not need for multiple separate devices. Residential properties and funerary sites, on the other hand, were numerous in a given city and thus offer more potential locations to hold objects of time. Certain locations also sometimes contained more than one sundial or water clock, such as villas holding multiple devices within different gardens or at different levels (see discussion of Pompeian households below) or bath complexes with timekeepers at different locations on their grounds.

The type of location for a timekeeping devices' installation shows more defined patterning temporally than spatially; there are shifts in the distribution of objects between the Hellenistic/Republican period (4th-1st Century BCE), the Early Imperial

period (1st Century CE), the Imperial period (2nd-3rd Century CE), and Late Antiquity (Late 3rd Century CE and onward). Assigning dates to a timekeeping device is not always possible, though context and stylistic developments are often sufficient for a broad categorization. Dates here are taken from Winter (2013), those included in the updated catalog by the BSDP (Graßhoff et al. 2016), or either object or secure context dates provided by the initial publication of a given device. Winter (2013:18-19) notes that assigning absolute dates is problematic, except for objects specifically inscribed with identifiable names or dates, and thus developed a methodology for discretely identifying dates. In her work, an object on the cusp of either two centuries or two periods was assigned to whichever of the two it was more likely to have come from (i.e., an object potentially created between 149 - 90 BCE was given a date of 2nd Century BCE as more of that range falls within that century). If such a determination was not possible, one object would be assigned to the first category and the next to the second (i.e., if two objects dated to 50 BCE - 50 CE, the first would be classified as 1st Century BCE and the second as 1st Century CE, etc.).

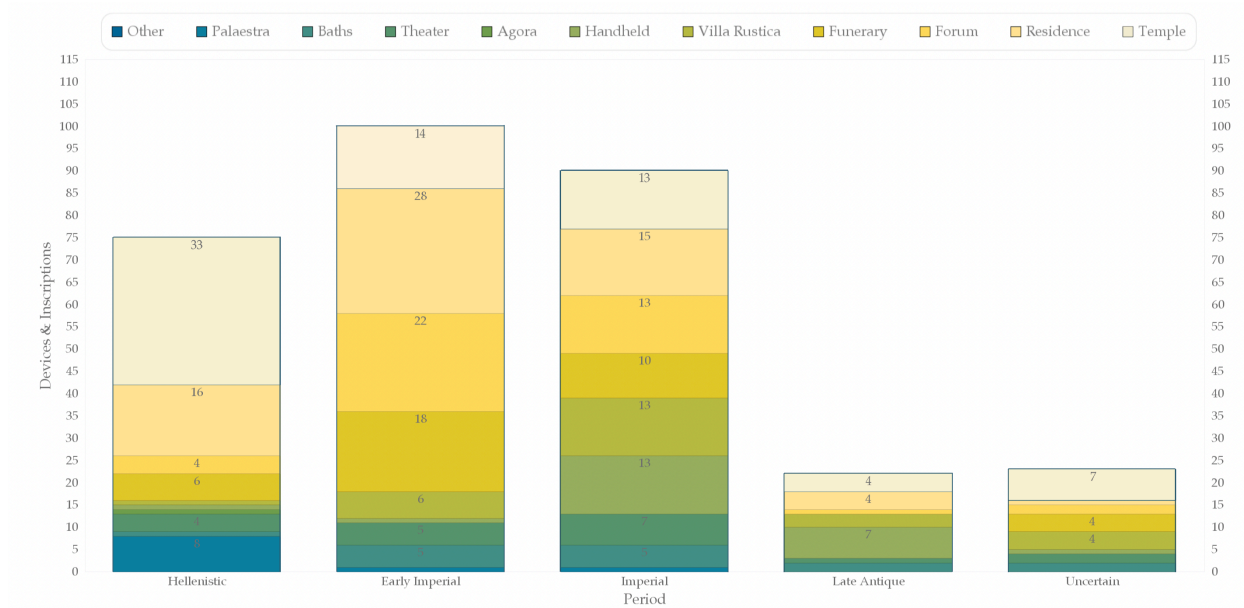


Figure 3.5 - Known location type of timekeeping devices by time period.

Among objects with known location types (Figure 3.5), the Hellenistic/Republican period produced 75, the Early Imperial period 100 devices, the Imperial period 90, and Late Antiquity 22 with an additional 23 objects of unclear date. Dates provided here generally refer to the construction of a device, arrived at either through contextual dating of surrounding installation point and/or stylistic dating, or in rare cases attested date on an associated inscription. The Hellenistic/Republican period has the highest number of objects associated with both religious contexts (labeled temples above), accounting for just shy of half of devices from the period. There is a notable shift in the Early Imperial period, where private spaces⁵¹ come to make up a majority of the known locations for new installations of timekeeping devices, with 52 of the 100 devices

⁵¹ Here including residences, villae rusticae, and funerary contexts. Handheld timekeeping devices are also here considered private, as many such objects have been recovered from funerary contexts for individuals.

dating to the period found in either urban residences, *villae rusticae*, or funerary monuments. The period also sees a marked increase in the prevalence of timekeeping devices in public plazas (*fora* or *agorae*), with 27 such objects (27% of finds dated to the period, as opposed to 8 devices or 10.6% from the preceding period).⁵² Private contexts in the Imperial period again make up the majority of contextualized finds with 51. The distribution of objects is generally more even in the Imperial period, with temples, residences, *fora*, funerary contexts, and *villae rusticae* all accounting for between 11-16% of the devices for the period each. The latest period has a notable percentage of handheld devices (31%), though this likely attributable to this dissertation's catalog ending with the 5th century in all but a few instances..

⁵² The eruption of Mt. Vesuvius in 79 CE certainly factors into this distribution, as the Vesuvian cities are particularly rich in timekeeping devices that retain known provenience n private spaces).

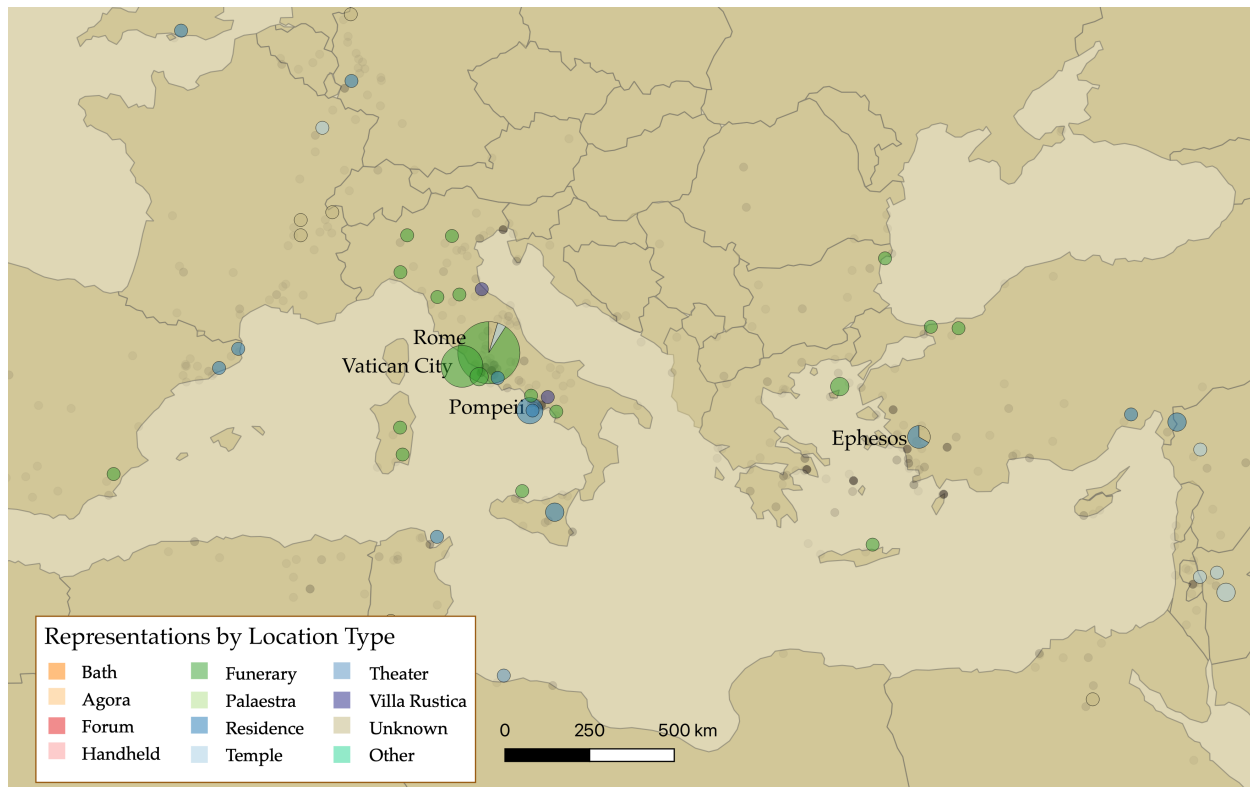


Figure 3.6 - Location type of representations of timekeeping devices by site.

The role of hourly timekeeping in the worldviews of antiquity is also an important aspect of the practice of the hour and its broader cultural significance. Representations of timekeeping devices comprise a smaller corpus than the devices themselves, with a total of 135 attested. For the sake of this work, “representations” refers to non-functional depictions of timekeeping devices themselves (i.e., sundials depicted in mosaics, small timekeeping objects depicted in reliefs, etc.). Given the desirable nature of works of representational art for early collectors and non-scientific excavations, many of the surviving examples of objects in this category lack specific provenience information where they do not survive *in situ*. In some instances the nature of a representation itself betrays its location type, as in the case of non-functional

sundials appearing within scenes on sarcophagi which can safely be attributed to funerary contexts. Depictions of timekeeping devices have been uncovered across the Mediterranean (Figure 3.6) , though are far more dense on the Italian peninsula than elsewhere. The density of objects in Italy is somewhat skewed by the objects currently found in the Vatican Museum, however many of those objects appear to have been sourced from Rome and its environs. The apparent spatial clustering of timekeeping representations recovered from religious contexts in the eastern Mediterranean is, in fact, a temporal phenomenon as each of the representations from Syria, Israel, and Jordan, come from Late Antique churches.

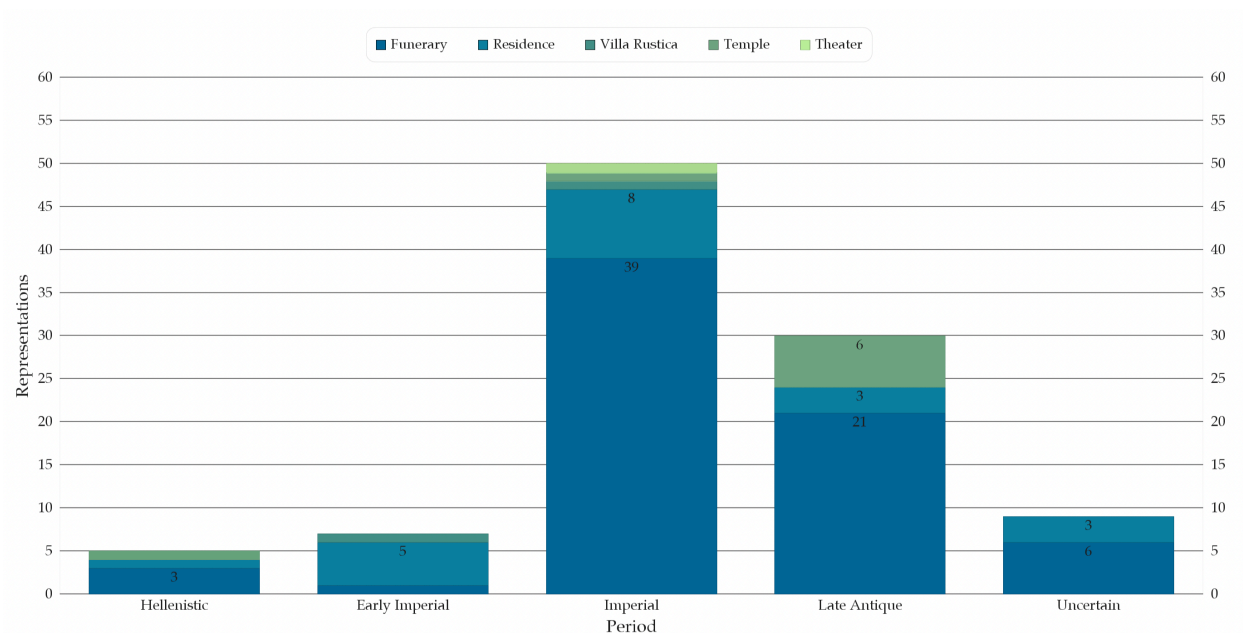


Figure 3.7 - Finds locations of representations of timekeeping devices by period.

The number of representations with both known dates and known locations (Figure 3.7) is somewhat limited, primarily due to longstanding interest in the

representational art of antiquity and its ability to be moved relatively easily. A total of 101 representations of timekeeping devices retain contextual information sufficient to assign them to a location type, and of those 92 can also be dated by period. Funerary contexts account for the largest portion of these representations, owing largely to the easy ability of sarcophagi and grave stelae to be associated with such contexts. These objects are also highly datable on stylistic grounds, allowing for even decontextualized objects to be classified as both funerary and broadly dated to a period. Funerary contexts account for 70 of the classifiable representations of sundials. Residences contain the next greatest number of these representations, with 20 across all periods and an additional 2 objects from *villae rusticae* in the Early Imperial & Imperial periods. Temples are the next most frequent site, with 8 representations (though it is notable that 6 of these come from Late Antique Christian churches). A lone representation comes from a Roman theater, a depiction of a sundial in the *pulpitum* of the theater at Sabratha.

While the overall count of objects with both known points of installation in their use period and with firm dating is small, 313 out of a total 846 timekeeping devices and/or dedicatory inscriptions thereof, the patterns of their distribution are borne out when viewing individual cities as case studies. Broad patterns in the distribution of such devices are the most extreme example of De Certeau's "view from above," showing only the objects themselves, divorced of all but the most general of functions and purposes. Zooming in on the intermediate scale, the distribution of hourly

timekeeping within an individual site, further reveals the patterning of where sundials and water clocks were placed while also granting insight into the resources, motivations, and practices of those that created or commissioned the devices. Establishing a more detailed “view from above” then enables a nuanced view of the view from down below, with greater ability to understand the entanglement of timekeeping devices, the broader social context of the city, and the individuals and identities that populated it. The next section of this chapter engages with the largest preserved site-wide collection of timekeeping devices, that of Pompeii, as a case study on the distribution of the devices in this intermediate scale.

Pompeii

Pompeii has been argued to be a major production center of timekeeping devices based both on the large number of devices present and a consistency of materials and overall quality among that corpus, which Miller refers to as “much cheaper and of shoddier workmanship” than preceding Hellenistic devices (2017: 10-11).⁵³ However, it appears that this interpretation is influenced by the sheer number of devices from the city. Pompeii’s prominence among sites in discourse on ancient timekeeping is at least in part the result of the site’s unique taphonomic and archaeological history. Any work on the site must come with a caveat cautioning against ascribing as special a role in

⁵³ Schaldach (2016: 73) points out the general decline in gnomonic quality between the large numbers of sundials from Delos and those from Pompeii, using the terminus ante quem of both cities as the basis for a temporal comparison of device quality.

antiquity as the site has in our understanding of antiquity; the city is unparalleled as an archaeological site, but of more mundane character when compared to other cities of its day. Nevertheless, Pompeii has a larger and more richly recorded dataset than perhaps any other site in the ancient Mediterranean (Ellis 2018: 19), including its unmatched number of known timekeeping devices. Further, this notable dataset survives in a more complete urban context than any other in the Roman world (ibid.: 20), an invaluable fact for the exploration of hourly time's influence on daily life.

In addition to the benefits of its remarkable preservation and the depth of study undertaken there, however, Pompeii was situated at a number of confluences important to the development of Roman time and timekeeping practices. Historically, for example, Pompeii allows a glimpse of timekeeping practice in an Italian city prior to and after incorporation into the burgeoning Roman empire. This historical span is most clearly represented by the city's sundial (#513) that bears an Oscan inscription, which at the very least shows an interest in maintaining local identity in the city around its full incorporation into the Roman sphere of influence. The city's strict *terminus ante quem* of 79CE also allows for a snapshot of a particular moment in timekeeping practice in the Roman empire; though not all evidence of the infrastructure of tracking short time survives, the material that does survive allows a more controlled historicity than an urban environment that had been more slowly abandoned. All of this allows Pompeii to inform us about a more specific moment in timekeeping practice than is possible at

most other sites. Through the city, we can learn about where objects of time were kept in a temporally controlled context, in a place subject to the growing influence of Rome at the same time as much of the Hellenistic world that this work has previously sought to distinguish culturally from Rome, and where issues of past conflict and non-Roman identity factor in the city's functioning.

The benefits of Pompeii's rich dataset also extend beyond only the preserved objects of time themselves, as the city also includes representations of those devices amongst its mosaics and wall paintings. Such depictions are essential in understanding the ways in which objects of time themselves contributed to the broader cultural significance of short time; timekeeping devices are not only cognitive artifacts that influence the systems and practice of tracking hours, but also works of art that bear particular associations and meanings. Sundials in Roman art, for example, symbolized mutability and time's fleeting nature, but also held associations with philosophy, even being inserted into established motifs as in the Pompeiian iteration of the seven sages (Jones 2016). Sundials became a means of associating individuals with scholarship, often being depicted in funerary contexts alongside representations of the deceased with classical Greek scholars (Schaldach 2016: 89).

Pompeii provides the largest corpus of sundials of any Roman site, with 56 unique entries between including devices & inscriptions, 2 further speculated devices from the reports of excavators at the site, and 4 representations of timekeeping devices

in art. Three of the four stationary sundial types outlined above are present at Pompeii, with 20 spherical, 13 conical, 10 planar, 11 unidentifiable fragments, and 2 inscriptions for dials of unknown type. The lack of cylindrical sundials at the city may not be exceptional, as that type is rare in the archaeological record, with Gibbs identifying only 6 objects (1976: 56) and 9 total in the catalog here. Dating of the sundials recorded at Pompeii has been largely based on the broader dating of their context, most obviously in relation to their *terminus ante quem*, by all catalogs consulted here (Gibbs 1976; Severino 2003; Winter 2013; Graßhoff et al. 2016). Therefore, the dating of individual objects has often not been tied to the objects themselves. Most examples have simply been dated to the period before the Vesuvian eruption that buried the city in 79 CE, though the technologies employed suggest that all extant examples suggest their creation after the 200 BCE development of the mathematics of conic sections discussed previously. The oldest datable object is that recovered from the Stabian baths (Schaldach 2016: 77), dated to the 1st century BCE, that bears an Oscan inscription (#513).

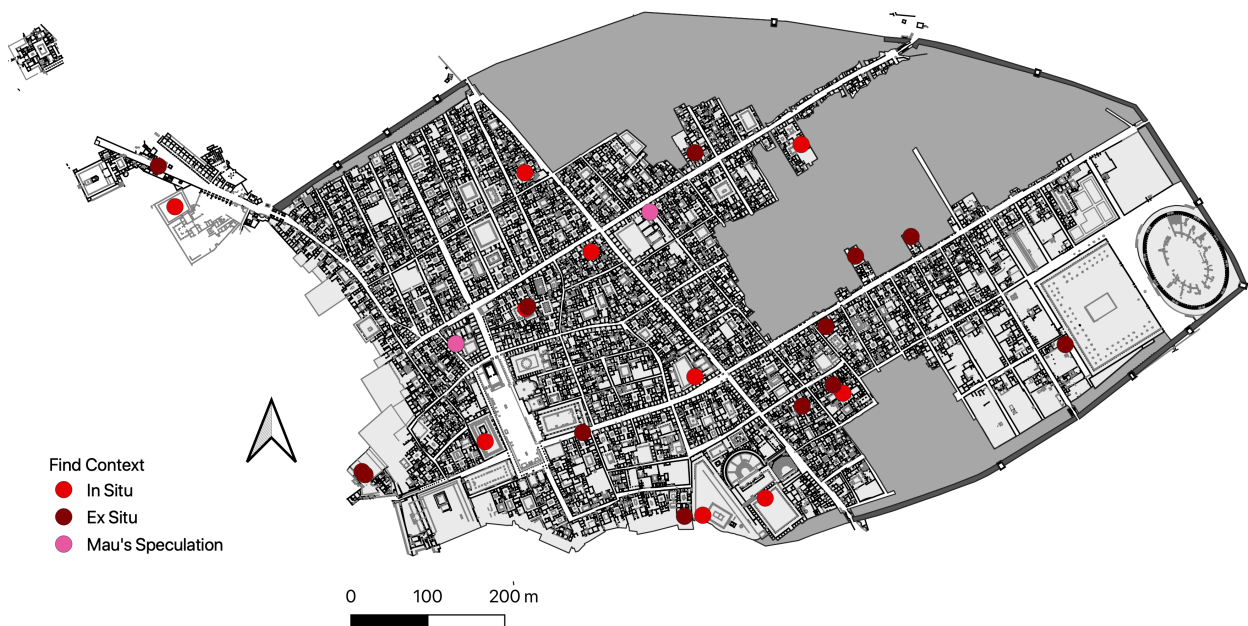


Figure 3.8 - Timekeeping devices of Pompeii by finds context.

Of the 54 known sundials in the city, 23 retain some sort of provenience information (Figure 3.8), including the two dedicatory inscriptions naming the patrons of installed dials. Figure 3.9 below shows those objects in place and categorizes the location type in which they were found. Sixteen of the sundials are associated either with particular residences or with insulae generally containing residential spaces (though two of these are potentially associated with other nearby public structures, see below), 1 with a temple (the Temple of Apollo), 3 with bath complexes (with two further potential examples as interpreted by 19th century excavators), 1 amongst extramural

tombs, 1 near the theater at the *Quadriporticus*,⁵⁴ and 1 installed in open public space at the Triangular Forum. While sundials did carry significant symbolic meaning in Roman contexts and sometimes function purely aesthetically in elite private gardens (Schaldach 2016: 89), it appears that all examples with provenience data were (or had been) located within sunlight (either on the exterior face of a building, in open public space, or in the garden of a residence) and therefore at least could have been functioning timekeeping devices. The lone exception is found at the House of the Menander, where a dial was recovered among construction materials related to the renovation of the adjacent peristyle garden (Allison 2003: 304-305). The timekeeping devices at Pompeii can be fruitfully separated into those from public spaces (fora, baths, theaters, temples, etc.) from those in private spaces (villas, shops, etc.). Six to eight⁵⁵ of the sundials appear to have been situated in areas that were broadly accessible, either in civic spaces or religious spaces. Fifteen to seventeen of the sundials were found in residential spaces, all in the peristyle or gardens of villas with two object potentially belonging to a small shop (discussed below). The remaining timekeeping devices recovered from the city do not have enough findspot data to determine neither their findspot nor the location of their installation while in use.

⁵⁴ The *Quadriporticus* has been traditionally regarded as either a “gladiator barracks” or as a component of the theater, however recent work there has revealed that the structure functioned largely independent of either of these uses (Poehler & Ellis 2010)

⁵⁵ There are two ambiguously placed sundials: #533 found in the road between a private villa and the building of Eumachia off of the forum, and #523 which was assigned a finds location at an address that was both renumbered and reinterpreted, obfuscating its exact provenience.

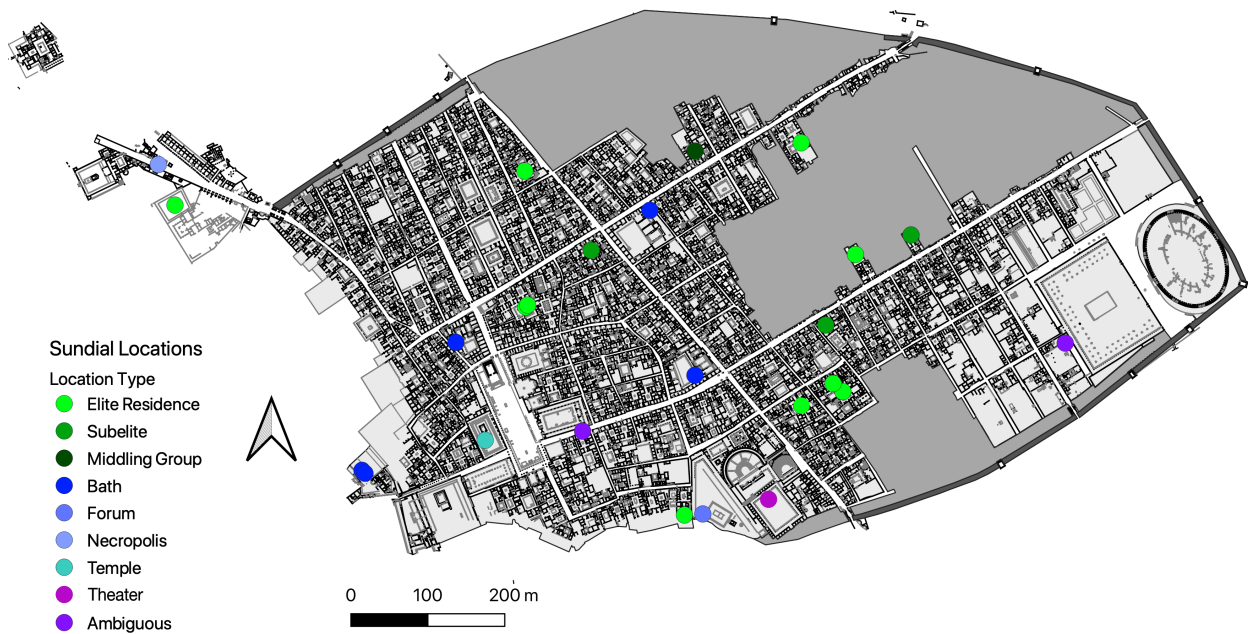


Figure 3.9 - Location types of Pompeiian sundials.

Public Spaces

The role of public spaces in the creation of timekeeping systems has been treated differently across different historical moments. Much of the literature on ancient timekeeping is particularly focused on practices and objects of time found in public spaces, mirroring the evidence that survives in the written record. Wolkenhauer's recent analysis of the history of Roman timekeeping in Pliny, for example, finds that all of the ancient author's milestones in Roman timekeeping practice revolve around public displays, from the initial observation of sunrise and sunset at the *rostra* of the forum in

about 450 BCE to the installation of a water clock in the Basilica Aemilia in 159 BCE (2019: 219). Winter's (2013) analysis, taking the same passage from Pliny as its jumping off point for the discussion of the placement of objects of time in Rome, similarly identifies nine devices mentioned in written sources but not archaeologically recovered, all in public settings. Horological literature on the late medieval and early modern period, however, has largely focused on clocks in private settings despite Glennie and Thrift's argument that, during those periods, "clock time was essentially, and explicitly, a public concept" (2009: 24). Recent literature on Roman timekeeping has also seen an increase in interest in private timekeeping practices, as well; the handheld portable sundials of Talbert's (2017) study were designed for single users, hours came to serve an essential function in the medical practice of figures like Galen (Miller 2017), and in the general approach to fevers (Miller 2019). Rather than advocate one aspect over another, however, it is the ways in which timekeeping across these spheres, or indeed any other divisions that could be applied to the ancient world, that allows an appropriately deep understanding of Roman temporal culture.

Pompeii serves as an excellent case study for the public display of hourly time in the Roman world because the city retains timekeeping devices associated with each location type used here, other than a theater. Some of these associations, unfortunately are unclear. Though regularly referred to as being placed within the main forum of Pompeii, the only dial in this area is actually within the walled confines of the abutting

Temple of Apollo. The dial and dedicatory inscription recovered from the triangular forum is also somewhat ambiguous, as the device is installed on a schola just outside the Doric temple there, however Hannah confidently attributes the installation to general civic munificence rather than any religious connection (2013: 94). The grand Palaestra in the east of the ancient city did not have a sundial recovered within its courtyard, however a dial was recovered from a side-room attached to the structure (though there is some uncertainty of the findspot due to reinterpretation of the extent of various structures in the area and a change in the numbering system for excavated rooms in the insula after Gibbs initial publication, discussed below). The bath complexes of Pompeii contain three sundials, which make up a substantial portion of the small number of such findspots for the objects, not to mention the potential for two further examples at the city's other bath complexes as interpreted by early excavators. Finally, a dial was recovered among the necropolis along the *Via Dei Sepolchri*, though unfortunately it was no longer *in situ*. As with private residences above, a consideration of the specifics of each public context allows for both more nuanced understanding of the roles of individual objects of time, as well as grounding to reconstruct the broader distribution of hourly timekeeping in the city.

Baths

Winter's catalog lists 13 timekeeping devices as having been recovered from bath complexes, of which a full 23% come from Pompeii (2013: 208). The connection between

baths and hours, however, appears much more broadly in both formal civic codes as well as writings on general social practice. The *Lex Metalli Vipascensis*, for example, outlines the opening hours of municipal baths and the specific time periods reserved by gender for the 2nd century CE Spanish mining town of Vipasca (*Eph. Epig.*, iii, 10, 165).

Hannah writes that the sixth through eighth hours are synonymous with the baths (2009: 137), citing Martial as an example:

Nuntiat octavam Phariae sua turba iuvencae, et pilata redit iamque subitque cohors. Temperat haec thermas, nimios prior hora vapores halat, et inmodico sexta Nerone calet.

The priesthood of the Pharian heifer announce to her the eighth hour, and the guard armed with javelins now return to their quarters. Now the warm baths have acquired a proper temperature; at the preceding hour they exhaled an intolerable excess of steam; at the sixth the heat of the baths of Nero is unsupportable. (Mart. 10.48.1–4, trans.W. Heraeus 1925)

The passage from Martial is telling, in that it not only refers to general social practices of bathing during certain portions of the day, but hints at the predictability of the schedule of the bath complex; for the baths to have reached the appropriate temperature at a specific hour each day they would have to run on a reliable schedule. The predictability of the timing at the baths can in some ways be contrasted to the social clock that Martial lays out elsewhere; Wolkenhauer (2020: 231) uses Epigram 4.8 to argue that there are prescribed times for particular events, but “this norm is not connected with punctuality according to the clock, but rather determines a chronological sequence of events.” The apparent disconnect here, between predictably “warmed up” baths on one hand and elite activities taking place in sequence, each over a range of hours rather than at a specific time, is not the result of a lack of coherent timekeeping system, but rather a

reflection of the complexity of temporal orders generally and the role of social positioning within them. Baths were to be open at specific times, determined either socially or explicitly through legal codes, but some members of society had flexibility in when they would make use of the space.

The bath complexes of Pompeii, and particularly the Stabian Baths, show both this apparently common hourly ordering within Roman temporal culture and introduce specific changes seen from Hellenistic timekeeping practice. Indeed, the Samnite residents of Pompeii, prior to the city's incorporation into the Roman Empire, already appear to embrace a more explicit role of civic munificence in timekeeping. This bath complex produced possibly the most famous sundial (#513) uncovered at the city, notable for the Oscan inscription it bears. The sundial, which Schaldach notes may be the oldest surviving Roman conical sundial (2016: 77), is a highly decorated travertine dial with low-relief vegetal and flower motif on the sides and lion's feet flanking the base, upon which the Oscan inscription lies. The inscription reads:



Figure 3.10 - Oscan inscription on sundial recovered from Pompeii's Stabian baths (#513). Photo by Carlo Raso.

Maras Atinius, son of Maras, Quaestor, has, by decision of the Council, commissioned the establishment [of the sundial] from the received fines (trans. Schaldach 2016: 77).

The inscription is remarkable for its Oscan script (Figure 3.10), but also in its implications for how sundials were presented to the public. This object evidences the creation of a sundial from public funds; prior to the end of the second century BCE sundial inscriptions generally did not credit the “communal authorities, private benefactors, or even emperors” that erected the objects in public spaces (ibid.). Further, Schaldach argues that this activity is a particularly Roman phenomenon, marking a departure from Hellenistic timekeeping practice.

The findspot of the sundial is somewhat unclear, but more information survives than the object is often attributed. Winter describes the dial as originating in the vicinity of the Stabian baths (2013: 483), however Overbeck and Mau go into greater detail; they claim the object was uncovered in the southeast corner of the *palaestra* of the bath complex (Overbeck & Mau 1884: 219). The findspot, though specific, does leave some ambiguity in the object’s original context. The southeast corner of a porticoed interior space is a difficult context in which to install a functioning sundial, given the need for a southerly exposure to the sky and sufficient surrounding space for the dial to be read by a passersby. The reference point given by Overbeck and Mau also places the dial near a preserved section of the architrave of the portico, limiting the vertical plane in which the dial could be imagined to have been originally placed. The same corner of the *palaestra* is also illustrated with a sketch that unfortunately does not betray the exact

location, either the findspot or place of installation, for the sundial. In a different publication, Mau (1899: 194) stated that the masonry foundation that presumably held the sundial remained in place “on the roof of the frigidarium and men’s caldarium,” roughly coinciding with the location given in Overbeck and Mau. What can be taken from the provided location, however, is that the sundial was very likely originally placed within the palaestra rather than the building exterior. Further, the lack of an associated column may indicate that the dial was originally mounted on the edge of a roof (Schaldach 2016:77), supporting Mau’s later assertion. The sundial inscription has proven vital in understanding the development of the structure over time, as the use of Oscan indicates that the original construction of the baths dated earlier than the 1st century BCE renovations by Sullan *duumviri* Gaius Uulius and Publius Aninius, with Overbeck and Mau placing the first palaestra’s initial construction (and thus the installation of the sundial) in the Samnite period (1884: 216) before 82 BCE. A finely carved conical sundial (#537) was uncovered within the *insula occidentals*, the area west of the House of Fabius Rufus beyond the city’s fortification walls, that was eventually identified as the Suburban baths of Pompeii. This sundial has several decorative features, including a half-cylinder scroll separating the device from its base and a crescent and rosette pattern below its shadow receiving face. The white marble sundial also exhibits a divot at the top center of its shadow receiving face with a small remnant of the lead gnomon. The dial contains eleven hour lines and three date lines, with the

former extending slightly beyond the winter solstice dateline into the otherwise uncharted space below the gnomon hole. In addition to the purely decorative crescent and rosettes, the dial also contains distinctive marks within its shadow receiving face; special marks to indicate the 3rd, 6th, and 9th hours. The 3rd and 9th hours are marked with X's along their hour lines between the equinoctial and summer solstice date lines, while the 6th hour, the indicator of midday, is marked with an enclosed circle at the same point. Severino passingly points out the similarity between special markings for the 3rd, 6th, and 9th and later Christian liturgical hours (2011: 19), however there is plentiful evidence that these hours were significant in pre-Christian Roman contexts. Indeed, these hours are marked in a similar fashion in a sundial from Pergamum (Gibbs 2023G) and through extending the hour lines in question past terminal date lines in examples from Ostia (Gibbs 1034) and an unknown provenience (Gibbs 1056G). Painted hour lines also sometimes mark these hours, likely making the practice much more common than survives in the archaeological record (for example, see the sundial in the House of the Wild Boar above). The identification of the context as a suburban bath complex also provides potential explanation for the markings, given that the literary and epigraphic records are rife with references to the particular timing of activities in the Roman bathhouse (Winter 2013: 209).

A second dial (#546) was also uncovered in what was deemed at the time the *insula occidentalis*, this a planar dial with breaks along its left edge and across its top-

right corner. This dial is the only planar sundial from Pompeii with a surviving gnomon (Winter 2013: 487), which takes the form of a slanted pyramidal bronze pointer held in place with lead. The shape of the gnomon is also interesting, as rather than being placed orthogonally to the face of the dial it is angled to align with the poles, a development otherwise not seen until the Middle Ages (Severino 2011: 16). While the exact findspot of both dials is lost, the reliance on time discipline in the operation and patronage of bath complexes allows for such contexts to reasonably contain more than one device. This may further be justified by strictures on movement within and access to bathing activities, as explicitly outlined with temporal dimensions in the gendered usage of baths in the *Lex Metalli Vipascensis*. The presence of a planar and spherical device in the same structure also finds precedent in the House of the Figured Capitals, discussed above, which had an *in situ* planar and *ex situ* conical dial.

In addition to the recovered sundials found within bath complexes, the excavators of both the Central and Forum baths of the city also uncovered evidence suggesting the placement of sundials within those complexes. Mau reports features in each complex that he believes to have served as pedestals/bases for sundials that were no longer extant at the time of his encounter. For the Central Baths (IX.4.18), Mau (1899: 205) interpreted an oblong open space in the northeast corner of the structure as a garden under construction/renovation at the time of the city's destruction, wherein he argues that a large square masonry foundation was intended to receive a sundial. The

space in which Mau projects the sundial has a rear entrance to the complex opening onto the small Vicolo di Tesmo, a narrow passageway flanked by walls only broken for this and one other entrance to a southern court or service area in the baths. In its unfinished state, the area seems an unusual choice for the installation of a sundial, though if the space was in the process of having a peristyle garden installed as Mau suggests, a timekeeping device would be less out of place. The second proposed sundial by Mau (1899: 201) would have been placed atop a column surviving within a court at the rear of the women's bathing area, near the southwest corner of the structure. Mau states "a sundial doubtless stood on the larger of the two pillars in the court, which is about sixteen feet high and near five feet at the base" (ibid.), going on to say that the other shorter column in the space is of unclear use. The height of this column is similar to that of the column holding a sundial in front of the Temple of Apollo, but Mau does not provide any further justification for the presence of a sundial here. The low overall number of sundials assigned to bath complexes in antiquity (12) makes the phenomenon seem somewhat rare, however the presence of three known timekeeping devices between two of the other bath complexes in Pompeii and the known references to the use of hours at baths means that the presence of timekeeping devices in these two additional spaces is in line with both local and general Roman practices. The impact of the known associations between timekeeping and baths on Mau's interpretations will

unfortunately never be clear, but these interpretations may have been influenced by those ideas.

Temples

Temples and sanctuaries are a common findspot for sundials that retain provenience across the Greek and Roman worlds. Winter's catalog includes 67 objects of time associated with temples, the third largest grouping behind private residences (69) and civic spaces (fora and agorae), comprising roughly 20% of identifiable contexts (2013: 185-186). Additional finds since her publication take the total number to 71 devices at temples, remaining behind only private residences (85).⁵⁶ Further, there is a peak in the installation of sundials at temples in the 2nd and 1st centuries BCE before gradual decline in the number of such objects through the 3rd century CE, followed by an increase with the shift to Christianity in the Late Antique (ibid.). The shift away from sundials at temples overlaps with a sharp rise in devices placed within private residences, of which there were none datable to the 4th or 3rd centuries BCE, only 5 in the 2nd Century BCE, and then a large spike in the 1st century BCE and peak in the 1st century CE (ibid.: 219).

Perhaps the most iconic sundial from Pompeii, or at least installation of a sundial, is that recovered from the Temple of Apollo (#529), which was recovered in two

⁵⁶ Do to differences in classification from Winter, fora/agorae here make up the location of only 60 devices.

fragments along with the column that originally supported the device. The dial is well known given its prominent placement to the west of the stairs leading into the temple atop a tall, inscribed column. Ironically, however, the dial on currently installed atop the reconstructed column is not the one actually recovered from the area, but is rather a cast of a different and more complete example from the city (#526) (Hannah 2009: 177). The reconstructed dial is also incorrectly installed, aligning with facade of the temple rather than the meridian and thus with an error of up to 3 hours (Hannah 2009: 175), despite Severino's reported observation that the dial functioned within about 15 minutes of accuracy at midday (2011: 27) in the spring months. The actual dial, likely not replaced due to its fragmentary nature, is decorated with lion's feet flanking its base.

In addition to the sundial itself, the installation at the Temple of Apollo bears an inscription describing the source of the sundial. Two *duumviri*, L. Sepunius Sandilianus & Marcus Herennius Epidianus, funded both the sundial here and that outside the so-called Temple of Hercules in the city's triangular forum (discussed below). The inscription here reads:

L. Sepunius Sandilianus son of Lucius, Marcus Herennius Epidianus son of Aulus, duoviri for administering the law, saw to it being done at their own expense. (trans. Hannah 2013: 94)⁵⁷

Presentation of the sundial in front of the Temple of Apollo in scholarship has often given a misleading sense of its location and symbolic role. The device is often referred

⁵⁷ L. Sepunius L.f. Sandilianus, M. Herennius A. f. Epidianus duo vir(i) i(ure) d(icundo) d(e) s(ua) p(ecunia) f(aciundum) c(urarunt)

to as in situ (Severino 2011: 27), which glosses the initial condition of the sundial recovered from the area and reconstructed nature of the current installation. Further, the sundial's location is also sometimes referred to as within (ibid.) the forum without specifying the relationship between the device and the Temple of Apollo. Such an identification gives the impression that the timekeeping device is publicly installed in a way that emphasizes its function within the time discipline of the city, a sort of central clock easily accessed during the course of one's daily activity in the forum. The association with the Temple of Apollo, which is itself separated from the main body of the forum by a bounding wall thus blocking the sundial from view for those outside of the temple, is actually one of the more conservative installations in the city; sundials in such temples "actual[ized] the identification of Apollo with Helios the Sun god, an identification which developed from the late fifth century BC onwards" (Hannah 2009: 133). Similar installations at temples of Apollo in Claros (#160) and Delphi (through a dedicatory inscription for a sundial, though the object itself is lost) (ibid.).

While the sundial within the Temple of Apollo could have easily been consulted by those doing business in the forum, using the object would have been either an offshoot of other activity at the temple or was an intentional act of seeking out the time; the sundial could not be passively consulted from the center of the forum. A more nuanced appreciation for the location of the "forum" sundial also gives a greater appreciation for the publicly accessible dials elsewhere, particularly that recovered from

the outside of the House of the Wild Boar, the nearest visible timekeeping device from the forum itself if it was in fact installed on the building of Eumachia rather than the residence to the south of the Via dell'Abbondanza.

Fora

The same pair that donated the sundial at the Temple of Apollo appear again in the Triangular Forum of Pompeii, where they leave another dedicatory inscription at a *schola* and attached *horologium*.

L. Sepunius Sandilianus son of Lucius, Marcus Herennius Epidianus son of Aulus, duoviri for administering the law, saw to the schola and sundial being made at their own expense. (trans. Hannah 2013: 95)⁵⁸

Public spaces like agorae or fora make up the plurality of known installation points for timekeeping devices across the ancient Mediterranean. While the earliest examples date to the 4th century BCE, the 2nd century BCE to 2nd century CE saw a notable rise in datable objects of time installed in open civic spaces (Winter 2013: 200). Interestingly, the peak of datable timekeeping devices found in public spaces during the 1st century CE actually saw a drop in the number of sundials from the previous two centuries, but a correspondent increase in the number of water clocks (at least among devices with determinable dates) (ibid.). Not all devices found at fora or agorae are permanent installations, either, as some small water clocks likely associated with measuring the

⁵⁸ L. Sepunius L.f. Sandilianus, M. Herennius A. f. Epidianus duovir(i) i(ure) d(icundo) scol(am) et horol(ogium) d(e) s(ua) p(ecunia) f(aciundum) c(urarunt)

duration of speeches at courts or other civic functions are included in Winter's *platzenlage* category.

Hannah argues that while the sundial at the Temple of Apollo makes sense as a dedication to Apollo and his equation with Helios/Sol, the example in the triangular forum is "simply municipal beneficence," often expressed in the Roman world through the installation of public objects of time as "an amenity" (Hannah 2013: 95). The *schola* and sundial in the triangular forum both face away from the city, instead overlooking the bluff at the edge of the city and out over surrounding fields and the Bay of Naples, then at a significantly different location relative today than it is today. The motivations behind the two donations by L. Sepunius Sandilianus and Marcus Herennius Epidianus may not, however, be quite so distinctive. The sundial in the Triangular Forum is also closely associated with the city's Doric Temple to an unknown deity, as the *schola* and sundial are located at the southwest corner of the temple. The placement of both sundials, then, may have some religious affiliation. While the connection between a sundial and Apollo is clear, the lack of such a clear connection does not necessarily preclude a religious nature for a timekeeping device at another temple.

Further, the distinction drawn between a gift to the Temple of Apollo and "simple municipal beneficence" is also worth interrogating. While both sundials donated by the pair of *duumviri* are found in association with temples, they are also conspicuously placed at temples near the city's *fora*. Sundials are, further, functional

objects akin to infrastructural elements that nevertheless also function as prestige goods. Both sundials could give accurate (or accurate enough to local standards) time with little or no extra effort in seeking the objects out. A focus on the similarities between these two dials, their location within temple complexes in proximity to open public areas, their nature as timekeeping devices, etc., it becomes apparent that they heavily overlap in both the motivation of their gifting and their utility after installation.

The act of euergetism is also somewhat constrained, in that many gifts would only be worthwhile in filling some kind of need in public life; Laurence gives the example of it being highly unlikely to donate an amphitheater to a city that already had one (1996 :32). The majority of civic benefaction, however, occurred at smaller scale and thus avoided such difficulties; while a second amphitheater would not usually be called for, repairs to a public building or decorative elements for public consumption offered more numerous and overlapping possibilities. In Zuiderhoek's study of Roman euergetism in Asia Minor, he found that the majority of gifts focused on "prestige projects or public events with strong political and ideological-symbolic overtones" (2009: 36), which ultimately served to both provide necessary amenities but also led to the reinforcement of participation within the structures organizing civic life (ibid.: 74). Sundials, though their contribution to time discipline and their association with prestige more broadly, played a role within the "prestige projects" of many urban developments. The connections between Augustan renovation and ideas of time and cosmos, for

example, show a vested interest by those in positions of authority in the Roman world in developing associations between themselves and time.

Palaestrae

Winter (2013: 206) identifies a temporally and spatially specific phenomenon of timekeeping devices in gymnasia/palaestrae, a grouping including 2 objects each from Pergamon, Delos, and Ai Khanoum (Afghanistan) and one object from Priene. All of these examples belong to Hellenistic poleis and date to the first half of the second century BCE, making this spatial category the most strictly limited of any Winter presents. The overall count of hourly timekeeping objects with this class of building is slightly higher, with an additional later object from both Pergamon and Delos and a potential example from Pompeii. While Pompeii does not have a certain example of a sundial in a gymnasium/palaestra, there is sufficient ambiguity in the location of one sundial that it is worth considering the possibility that it had been installed at the grand palaestra in the southeast of the city. The Augustan construction of the city's grand palaestra would make the sundial found here both the latest and the furthest west of any such object.

Gibbs records the findspot of a sundial (#523) as II.11.7, but the insulae of Regio II have since been renumbered. The insula previously identified as II.11 has since been renumbered II.8. In addition to ambiguity introduced by the renumbering of rooms here, maps of the region at the time of Gibbs' writing also misinterpreted some

components of this and surrounding insulae. Gibbs appears to have relied on a map by Eschebach that assigned some door numbers (the addresses of individual entryways into properties) in the area to what was later deemed to be an interior door within the neighboring insula, currently numbered II.7, the entirety of which is assigned to the city's large *palaestra* (Van der Poel 1986: 56). A small series of rooms extends west from the otherwise straight wall that defines the insula of the palaestra, at one point remaining separated from the next insula to the west by only a small *vicolo*. Winter also recognizes the uncertainty of the true findspot of the object, and simultaneously further complicates the issue by listing its source as II.9.5-6 or the grand Palaestra (2013: 491) (rather than II.8.5-6, the current number for the original space identified by Gibbs). A location in II.8.5-6 makes the likelihood of a provenience within the palaestra even greater, as the northern end of the peristyle of properties in that insula, where the south-facing sundials of the city are most often located, abuts against the narrow *vicolo* that separates the properties from the palaestra to the east, thus placing the dial physically closer to the boundary of the public structure than Winters location in the insula to the north.

The sundial excavated here is a large, spherical marble dial with traces of red paint surviving in all 11 hour lines and 3 datelines. The gnomon hole contains remnants of lead, and the base of the dial also retains fragments of both lead and bronze. The only decorative feature of the dial, other than red painted lines, is a torus moulding below

the shadow-receiving surface at the transition into the object base. Platonic references to time as a regulating factor in the daily schedule of education may be an explaining factor for the placement of timekeeping devices within palaestrae, as could the use of timekeeping devices in astronomical instruction (though sundials would carry obvious limitations in that regard) (Winter 2013: 207). The objects of time from gymnasia in Delos show the desire to maintain the connection between that space and timekeeping, as one of the devices was clearly initially constructed before 166 BCE but was reinstalled in the city's new gymnasium constructed in 90 BCE (Schaldach 2016: 73).

Funerary Contexts

Connecting oneself to the notion of time did not only take place at city-wide scales, however. A no longer extant sundial (*Pompeii 4*) was reportedly uncovered along the Via Dei Sepolcri in January of 1762. Though the object is lost, the dial was described and illustrated in *Abhandlung von den Sonnenuhren der Alten* (Martini 1777: 57), showing that the dial was a Parian marble conical sundial without decoration. While the findspot along the Via dei Sepolcri is not specific, it nevertheless enters a new type of context into the corpus for Pompeii; sundials placed among or incorporated as a part of graves.⁵⁹

The connection between sundials and funerary contexts is certainly a known

⁵⁹ Funerary contexts like the tombs along Pompeii's Via dei Sepolchri offer some challenge for categorization into public vs. private space as the tombs were at once privately funded yet publicly accessible. For the sake of this section, the sundial uncovered within Pompeii's necropolis is treated as a publicly placed object, as it was openly available to any passerby, despite having been privately commissioned.

phenomenon, both in antiquity and through the Renaissance, though the connotations in the Roman world are often different from those more commonly encountered in contemporary thought. Representations of time, for example, became more sinister, depicting the phenomenon as “an inescapable force causing ruin and decay” in the Renaissance (Schechner 2001: 207). Sundials themselves also began to reflect this different conception of time, often bearing inscriptions reflecting on the fleeting nature of time and its association with death such as “HORUS FUGIT MORS VENIT” (“time [or perhaps more appropriately here, the hour] flies; death comes”) on 16th century sundials from Nuremberg (ibid.). While the formulation “time flies” is first attested in Virgil as “fugit inreparabile tempus” (*Verg. G. III*, 284), “Irretrievable time flies,” however the association isn’t typically as sinister in ancient contexts.

The practice of associating a sundial with a tomb is also attested in Roman literature, as Petronius’ Trimalchio is said to describe a sundial that is to be placed on his own tomb, stating “in the middle a sundial, so that whoever reads the hour will read my name whether he wishes to or not” (Petron. *Sat. 71*, trans. Lowe 1905)⁶⁰. While Trimalchio’s insistence on a sundial as a tool to force passersby to reflect on his own name is clearly meant to show the vainglorious nature of the character, it nevertheless reflects real practice and likely references Augustus’ monumental timekeeping devices

⁶⁰ ...Horologium in medio, ut quisquis horas inspiciet, velit nolit, nomen meum legat

in the Campus Martius in Rome (Rehak 2006: 68). Indeed, the character is also tied to timekeeping with another reference to death:

Trimalchio, the very paragon of elegance, has got a clock⁶¹ and trumpeter all complete in his dining room so that he can always know exactly how much longer he has to live (Petron. *Sat.* 26.9, trans. Lowe 1905).⁶²

The associations between Trimalchio and timekeeping are best understood as satirical, a commentary on the character's gauche freedman status, but are still instructive of timekeeping's role. Trimalchio explicitly includes a sundial in his tomb not for the device's ability to cause reflection on time's passage or the brevity of life, but because of his recognition that a functioning sundial is a useful device that would attract eyes otherwise indifferent to his remembrance. Magnusson interprets the tomb timekeeping devices as an attempt to "accentuate the most important part of the tombstone, namely his own name" (2000: 122), and while this accentuation is achieved through the association of that name with a device conveying some sort of elevated status, it is rather the efficacy of the timekeeping device as a functioning component of an important infrastructural system that is operative.

Though lost, the dial reported from the Via dei Sepolcri is clearly a typical, functional device rather than merely a decorative component of tombstone. Martini depicts a full-sized and typically formed, undecorated sundial (1777: Plate 1 Figs. 3 & 4)

⁶¹ Magnusson (2000) argues that *horologium* here must refer to a water clock rather than a sundial given the interior placement of the device.

⁶² Trimalchio, latissimus homo horologium in triclinic et bucinatorem habit subornatum, ut subinde sciat quantum de vita perdiderit

and goes into greater detail of its geometry than other provided examples. Further, his commentary on the remaining portion of the devices gnomon further illustrates its functional nature. This dial, like all associated with tombs, functions in multiple ways; it brings prestige to the deceased, provides a service to the community, and may give pause for reflection on the nature of time in an early iteration of social practice to that more commonly seen in later periods.

Evidence from elsewhere on the Italian mainland shows that the connection between sundials and individual tombs was already a nascent idea before Pompeii's destruction. Cities to the north include both greater numbers of dials associated with funerary contexts and have the devices in greater proportion of their overall counts timekeeping devices. Aquileia, for example, has 6 sundials associated with individual graves out of a total of 17 timekeeping devices. Given that two of the sundials from that city are portable devices and 7 of the stationary devices are without provenience information, dials from necropolises make up 6 of 8 known contexts (75%). The city of Altino has produced 4 timekeeping devices, all of which have been recovered from necropolises. In both instances, the dating of the timekeeping devices in question falls between the mid-1st century CE and the early 3rd century CE, thus opening the possibility of a broad regional trend of increasing association between sundials and individual graves on the Italian peninsula.

Public Spaces Conclusions

In his contextualized study of temporality in the Ottoman Empire, Wishnitzer writes that some social institutions “‘radiated’ hegemonic temporal order and structured everyday life in line with it” (2015: 24). While the Roman Empire did not have a cultural practice equivalent to the temporally specific Islamic prayer cycle in either scope or temporal specificity, the public display of hours nevertheless functioned both to “radiate” a temporal order and to structure everyday life. In the case of the early Roman empire, a series of social institutions laid claims to their respective portion of the day, radiating not only temporal demands at specific times but also weaving together to create an entire day’s ideal routine. Timekeeping devices, rather than simply coming to serve the temporal order of other social institutions, created temporal specificity that was then pressed into service by the social demands of life. Bathing after the sun reached its peak in the sky for the day had always been possible, but bathing between the 6th and 8th hours of the day only becomes possible with the measurement and, essentially, communication of those points in time. Through publicly displaying time, civic institutions both enabled their own adherence to strict temporal structures (the baths being warm by the start of the 6th hour, rituals taking place at the appointed time in temples, etc.) but also made those structures legible and enforceable to the wider community. This ability leads to growing entanglement of hours and local civic authority in the late Republic and early Imperial period, illustrated in this case by the

dedicatory sundial inscriptions in the city, imbued hours with a sense of political authority while at the same time building the claims of cosmic influence by the possessors of Roman *imperium*.

Beyond merely the “task-based” time so often associated with preindustrial societies by modern scholarship, largely following the influential work of Thompson (1967), public display generally illustrates the operation of time discipline in Pompeii. Glennie and Thrift’s (2009) tripartite division of time discipline, which includes *standardization*, *regularity*, and *coordination*, pierces the veil of time discipline’s supposed industrial and/or mechanical footings. Allowing public access to timekeeping devices allowed for the *standardization* of daily temporal structures, or the ability for temporal structures to be the same as one another. The enforcement of temporal orders over activities like bathing created a somewhat standardized structure for the day, at least among the elites whose temporal habits survive in the literary record. Those same temporal habits clearly show *regularity*, or the ability to develop repetitive routines along temporal lines. As is the case today, these temporal structures should not be expected to be perfectly repeated nor forever unchanging; the differences of daily routines in Pliny’s urban and rural residences is just one piece of evidence showing that the Roman temporal order was contingent on location, class, occupation, and another of other factors, though was still sufficiently ordered to be described as regularly adhering to specific hours. *Coordination*, the ability to connect one’s temporal structure with those

of others, is a central function of the hour in antiquity despite the differences between contemporary understandings and practices of coordination. The ability to not only use the same reference points in structuring a day, the seasonal hours told by sundials, public installations allowed for those reference points to read from the same devices by large groups of people. While Pompeiian dials have been characterized as cheaper or shoddier than Hellenistic versions of the devices, Jones (2020) has shown that many measurements used to argue for latitudinal inaccuracy are flawed. Further, the error present in sundials is often less pronounced than imagined, particularly given that the hour was the smallest regularly used unit of time⁶³; one could not be a few seconds, or even a few minutes, late to a meeting as these units did not exist in lay usage.

Public timekeeping allowed for time discipline both in general and in regard to particular cultural practices; communally accessible objects of time would allow for general awareness of the time, and thus created an ability to adhere to social mores on the timing of some events or practices. While, similar to Wishnitzer's Ottoman examples (2015: 38), social authority likely allowed elite individuals to shape social time in the Roman empire (as discussed above), the efforts of the state to control temporality produced time outside of the direct relationship between a patron and the client he forced to wait; the beginnings of Roman timekeeping were centered on the public

⁶³ Smaller divisions of the seasonal hour were possible (Jones 2019) and indeed utilized in some scientific and astronomical applications, but very few objects of time from the ancient mediterranean convey anything more precise than a seasonal hour.

announcing of key points in the day (Wolkenhauer 2020) which either continued in conjunction with the spread of sundials or became redundant through their installation as the devices themselves, through their public placement, visually announced the time.

Private Spaces

Due largely to the exceptional excavation history of Pompeii and its thorough exposure, various scholars have sought to classify residences and their owner's socio-economic status through calculations of property size. Wallace-Hadrill pioneered this approach (1990; 1994), taking the overall size of individual plots as indicative of socio-economic status. Though Wallace-Hadrill initially presented households in 13 different groupings based on ground floor surface area, he ultimately analyzed houses in the city by quartile (1994). Recently, Flohr (2019) revised this model by factoring in the number of rooms, a proxy for architectural complexity, of a property with its overall plot size and recategorizing the groupings that emerge. Breaking residential properties down by decile, Flohr classifies the 10th decile as "elite," 5th-9th deciles as "subelite," and the bottom 50% of properties as "middling groups"⁶⁴ (ibid.). This classification scheme allows "a rudimentary estimate of the social distribution of living space and of the basic structure of wealth inequality at Pompeii" (ibid.: 106), that is a context specific look at

⁶⁴ This terminology springs from another revision on Wallace-Hadrill's approach, as Flohr counts smaller apartments or shops rented within a larger property as the holdings of the property owner, given that the owner would still benefit from rents paid. Flohr applies the model to luxury domestic decorations which, like the sundials discussed here, occur within the types of spaces confidently assigned to overall property owners.

broad-strokes patterns of socio-economic distributions. The more fitting nature of Flohr's categorization can be seen in the disparities within Wallace-Hadrill's quartiles, the largest grouping of which ranged in property area between 350-3000 m² while all other quartiles cover significantly reduced variations in size (10-45, 50-170, and 175-345m², respectively) (1994: 81). Table 3.I lists the residential properties with timekeeping devices or representations thereof by their architectural complexity score.

ID	Type	Location	Addresses	Complexity Percentile
1018	Sphere	Oecus of the House of the Citarist	I.4.25	100
1029	Unknown	House of the Colored Capitals	VII.4.32	99.3
544	Sphere	House of the Menander	I.10.4	99.1
505	Cone	House of the Menander	I.10.4	99.1
516	Sphere	House of M. Obelius Firmus	IX.14.2	99
541	Cone	House of Gaius Polybius	IX.XIII.1-3	98.8
508	Plane	House of the Emperor Joseph II	VIII.2.39	96.8
527	Cone	House of the Golden Cupids	VI.16.7	94.1
497	Representation	House of the Small Fountain	VI.8.23	93.4
535	Sphere	House of the Figured Capitals	VII.4.57	91.9
514	Plane	House of the Figured Capitals	VII.4.57	91.9
1030	Unknown	Reportedly in the House of Pomponius	VI.10.6	87.9
1036	Unknown	In the peristyle of IX.5.6	IX.5.6	86.4
510	Unknown	Casa di Ercole Fanciullo	VII.3.11	80.9
523	Sphere	House of the Triclinium	II.9.5-6	70
495	Representation	House of Pinarius Cerialis	III.4.b	68.1

538	Sphere	House of Narcisus	V.3.6	49.5
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Table 3.I - Private contexts in Pompeii with timekeeping devices or representations thereof, ranked by architectural complexity percentile following Flohr 2018.

Roughly 20% of all sundials with finds data cataloged by Winter (2013) originate in household contexts, though the 70 such objects she presents make up closer to 10% of the broader corpus (which includes objects with no provenance information at all and those discovered since Winter's writing) collected by Graßhoff et al.. By combining the timekeeping devices found in urban residences and villas with those of villae rusticae, a total of 86 such devices have so far been identified. Given that either 15 or 16 of the 23 sundials with secure provenience from Pompeii (65% or 69.5%) were uncovered in residential space, the city already appears to have a much greater prevalence of domestic timekeeping devices than attested elsewhere. Further, the overwhelmingly residential character of most built space in Pompeii, particularly those places where a functioning sundial could be installed, suggests that a significant portion of the remaining objects of time from the city without secure provenience must also have come from domestic contexts. Severino cites historic photos from the site that contain further timekeeping devices that are since lost (2011:31), which are surely joined by other objects destroyed or not recognized as objects of time from the site.

Sundials in Elite Residences

Among the residential properties containing sundials, it is the most elite households that predominate. The top 10% of Pompeiiian houses by size and complexity

(following Flohr 2018)⁶⁵ contain 10 of the 23 sundials with known provenience and comprise 8 of the 21 known findspots (the House of the Menander and the House of the Figured Capitals both containing multiple objects of time, as does the Suburban bath among public spaces). In addition, the houses in this category contain one of the two known representations of a timekeeping device within the walls of the city. They also make up 71% of the domestic contexts containing sundials. The residences in this category account for 45 of the city's 124 (36.29%) excavated peristyles, suggesting that the presence of an appropriate space for the functional use of a sundial is not the only motivating factor for their clustering within this socioeconomic category.⁶⁶

The House of the Menander (I.10.4) is an excellent example of the practice of personal timekeeping devices within elite households, both for its preservation of two such objects and for the history of their discovery. One of the sundials recovered within the elite residence was discovered within a peristyle garden, still installed in its original context during the use phase of the structure. The second, however, was recovered out of any context in which it could be used (i.e., away from direct sunlight), and instead

⁶⁵ Flohr's database, it should be noted, includes all independent structures that contain a house or "another possibly inhabitable unity" (2018). Thus, the decile ranking through which he classifies domestic structures slightly underemphasizes the disparity between elite and non-elite residences as the data is diluted by structures typically not considered private residences.

⁶⁶ The size of a peristyle is also likely a consideration for the installation of a functional sundial, but the presence of only 6.45% of peristyles among the entire bottom half of the residential size and complexity distribution (Flohr 2018) also suggests that there are few peristyles too small to reasonably hold a sundial. Indeed, Jashemski refers to one peristyle that did contain a sundial as a "light-well" (1993: 37) rather than a peristyle because it was notably small.

amongst building materials in storage, discussed further below. The excavation history of the House of the Menander gives among the clearest picture of how a timekeeping assemblage would function within an elite residence thanks in large part to its having been excavated after the advent of photography (which cannot always be assumed for Pompeian contexts, given the site's excavation since the 17th century) and to the incredibly detailed, multivolume work on the Insula of the Menander published in the 1990s and 2000s (Ling 1997; Ling & Ling 2005; Allison 2006; Painter 2001). Allison's (2006) work on the finds of excavations at the insula during the 1920s and 1930s is particularly invaluable, both as this volume contains the sundials (recorded here as artifacts, rather than as installed features or architectural components as they sometimes are) and especially for its attention to contextualizing the finds of the grand property.

A spherical dial was recovered in peristyle garden C of the House of the Menander, located *in situ* at the northern edge of the pool within that space. The sundial (#544), along with its rectangular base, was cut from a single block of stone and was recovered with its bronze gnomon intact. The hour lines of the dial are preserved, as are two date lines. The dial can be dated to the period between 80 BCE and 14 CE, thanks to dates assigned to the surrounding structure (Winter 2013: 486). Allison also notes that traces of plaster survive both on the base of the dial as well as the dial itself (2006: 88), which appears to have covered over the incised hour lines of the object. The only decoration present on the object are a pair of feet carved into the bottom of its base,

common both among sundials and other carved stone objects in Roman art. The surface of the surviving plaster was insufficiently preserved to be sure of its decoration, but Allison suggests hour lines may have been repainted over the incised lines after the application of plaster.

This dial offers several interesting insights into the practices of sundial usage at the House of the Menander, as well as into their significance. The application of plaster atop the shadow catching surface of the dial suggests a strong interest in the decorative function of the object; adding any material to this part of the dial introduces that possibility for introducing error into its function, through changing the geometry of its surface, as does the notion of repainting hour lines atop the obscured or erased lines below. These later mortifications to the sundial could also be evidence of some sort of repair to the object, potentially correcting misalignment (real or perceived) in the incised portion of the stone itself. This latter explanation, however, seems less likely as Jones (2019) has convincingly argued that this type of dial, when installed properly, could reliably tell time at much smaller intervals than seem to have been regularly used in Roman temporal practice.

Severino (2011) reports a second sundial (#543) within a few meters of the above object inside garden C. While this sundial is currently on display within the same peristyle as the above object, its location is the result of a recent relocation to a speculated installation point. The actual find location, however, is of significant interest;

the tufa sundial appears to have been held in storage at the property rather than being on display in a functional context during the Vesuvian eruption. Mairui's reporting of the associated finds argues that they had been collected during the abandonment of the property during the Vesuvian eruption of 79 CE as a sort of desperate accumulation of valuable objects by fleeing members of the household. Allison differs in her interpretation, however, noting the seemingly undisturbed nature of an installed chest filled with the notable silver hoard of the house within the same room. Instead, Allison suggests that the accumulation of objects containing this sundial, those objects clustered together in the western ambulatory of the peristyle were remnants of (likely temporary) storage during a significant reconstruction of the peristyle as a whole (Allison 2006: 304).

The second location in Pompeii to house more than one timekeeping device is another elite residence, the House of the Figured Capitals (VII.4.57). This house contains one of the few *in situ* planar sundials (#514) in the city, which is etched into the flat top surface of a small column in the structure's peristyle garden. The planar dial has eleven hour lines and day curves for the solstices and equinoxes, though was calculated to be designed for a latitude significantly to the north, somewhere in the Italian Alps (Winter 2013: 488). Despite serving as the frontispiece in an 1837 publication on the House of the Figured Capitals, the sundial was unknown to the site superintendency when Severino visited its current location (Severino 2011: 28). While both the column supporting the

sundial and the device itself are unadorned, the intersections of hour and day lines are each marked with a drill hole and the meridian line extends beyond the outermost hour lines.

The House of the Figured Capitals has been subject to a long history of excavation and publication, providing even further contextual information for understanding this object of time. The peristyle of the house was redone in the Augustan period, providing a reasonable point to assume the installation of the sundial (Winter 2013: 488). Further, the reorganization of the peristyle was not purely aesthetic, as surviving graffiti reference three looms installed in the portico of the structure as well as the names of the individuals that operated them (*CIL* IV 1569, 1570, 1571, 1572). Jashemski (1993: 181) uses this graffiti to argue that the peristyle had been converted into an *officina textrinum*, or weaver's workshop. The connection between the renovation of the peristyle of this elite home into a productive area and the installation of a timekeeping device has implications for our reading of the role of short time in the space. The device itself bears several possible indications that it was less important as a status symbol, as many sundials in the city seem to be, and that it instead was a more practical installation. Carving a planar dial into a short column takes less expert knowledge and craftsmanship to accomplish, especially in the likely event that plans for sundial manufacture traveled; while correctly laying out a horizontal dial does not inherently take less scientific know-how, transposing a two-dimensional plan directly

onto a surface to carve is less expertise-intensive. This could also serve as an explanation for the incorrect latitude of the device; an existing plan was distributed and made its way to Pompeii, where the inaccuracies were either unknown or unimportant to a purchaser. As was discussed in the previous chapter, however, today's notions of accuracy and its necessity in timekeeping simply may not have held similar sway in antiquity and thus the inaccuracy of the device was not a primary concern of the purchaser.

In addition to the planar dial, a second dial (#535) was also recovered from the peristyle of the property, though was no longer *in situ*. This dial, a spherical marble device, is believed to have fallen to the ground level of the peristyle from an upper floor at the time of the house's destruction (Jashemski 1993b: 182). The dial, undecorated but for a taurus scroll between the shadow receiving face and the object base, was uncovered during excavations on July 14, 1832, and featured in both Avellino's (1837) notes and Bilfigner's (1886) early discussions of ancient timekeeping. This second dial of the House of the Figured Capitals is notably also designed for a latitude near 46°, well north of Pompeii like the other sundial in the peristyle below, despite Pompeii's location at near 41° latitude. The two dials do not exactly match, though internal inconsistencies would have caused any difference between the two to vary.⁶⁷ For

⁶⁷ Jones (2019) provides the most accessible discussion of these issues, both in terms of inconsistencies in the objects of time themselves and in the calculations of their intended latitude by modern scholars. For the latter, he explains "each determination of ϕ could be affected by inaccuracies in the execution of the

example, Gibbs notes that along the summer solstice line the latter dial would work properly at 50°(1976: 293), the same calculated latitude of the first dial (Severino 2011: 28).⁶⁸ Any variations in the calculated intended latitude of the two dials in within the House of the Figured Capitals would likely have gone unnoticed by the devices' users in antiquity. It would have been entirely possible to install the devices in such a way as to minimize differences in time caused by their differing latitudes, as the installation angle impacts the manner in which a gnomon's shadow travels across the device's face. The modern world's concepts of sub-hour accuracy and precision are also significantly different from the workings of short time in antiquity, and thus any difference in time between the two objects was likely small enough to escape the concern of its users.

Given that the sundials sharing the peristyle, though at different levels, of the House of the Figured Capitals told what would likely be conceived of as the same time, why would the house have two dials in one space? Both dials have in some cases been argued to date to the construction of the house in the Samnite period, thus dating them to between 200-80 BCE (Gibbs 1976; Winter 2013; Graßhoff et al. 2016), but renovations to the property in the Augustan period may have introduced one or the other of the dials later. The House of the Menander, the other home with multiple sundials, had one

spherical surface, the solstitial day curves, and the hour curves, as well as some uncertainty about the assumed value for the obliquity of the ecliptic" (2019: 144).

⁶⁸ Further, though calculations of intended latitude have been the basis of many claims about sundials in the ancient world, Jones (2019) recently pointed out that more accurate measurements of sundials made possible by 3D modeling software often produce different (and more accurate) location estimates and that installation would play an important part in variations between devices.

device found in storage related to renovation of the property, which presents the possibility that during the known renovations to this property, the ex situ conical dial had been replaced by the planar dial rather than both being installed at the same time.

The instances of multiple timekeeping device in a single property show that tracking hours was an ongoing concern, one that was considered during the renovations of the peristyle of the House of the Menander, and that access to time was worthwhile to have in different parts of the same home. The predominance of elite homes among the findspots of sundials in Pompeii well reflects the trend seen in ancient literature on the role of the hour; timeliness down to the hour was an important consideration among elites. Some of this spatial patterning is certainly economic, as the most elite households were the best able to afford commissioning or purchasing sundials, though their presence in smaller homes suggests that their cost was not prohibitive to individuals or families that had sufficient resources to also own an enclosed space in which the dial could work. Beyond simple cost, the utility of tracking hours accurately within one's own home appears to be most valuable to the most elite of Pompeian society. This in part reflects the activity of the heads of household themselves, as the surviving written sources show the most specific time conventions imposed on the elite themselves. The temporally defined duties of a senator or *eques*, though, may keep them out of the home from the completion of the morning *salutatio* (beginning around the 2nd hour) to the completion of public business and social

engagements in the 10th or 11th hour (Laurence 1993: 107-108). During this absence, other members of the household also made use of the ability to keep time within the home. The need for hourly time, both for heads of household and those around them, reached beyond only the upper 10% of houses in Pompeii; there are instances of smaller homes maintaining their own timekeeping devices. While the difference between the elite structures and Flohr's "subelite," those in the 50-90% by size and complexity, were likely not always stark, the categorization nevertheless helps illustrate interest in personal timekeeping outside of the very upper echelon of Pompeians.

Subelite Spaces

"A sundial seems to have been a part of the standard furnishings in the more elegant gardens [of Pompeii]," Jashemski tells us, "but they were also found in more modest ones" (1993: 112). While making up a substantially greater percentage of the residential structures in the city, there is a notable drop off in the number of recovered sundials in subelite structures. The properties falling into Flohr's "Subelite" category make up 40% of the total residential structures of Pompeii and account for over half (56.25%) of all peristyles within the city. Despite holding the majority of privately held areas suitable for functioning sundial installations, only four examples retain any findspot data within properties of this classification with one additional representation of a dial. While there is likely a bias in the archaeological record regarding both which houses survive in Pompeii (i.e., extramural houses or those made of organic materials

are much less well known (Beard 2008: 163)) and which spaces have received the most archaeological attention, the houses of the subelite category have received significant interest in both the early excavations of Pompeii and in contemporary, more methodologically robust investigations. The pursuit of luxury goods, either for the collections of early excavation sponsors or for academic research through the present day (as in the impetus for Wallace-Hadrill's seminal *Houses and Society in Pompeii and Herculaneum*),⁶⁹ includes the structures in this category as they possessed sufficient wealth to accumulate such goods. The fact that the three dials identified within this category of residence were excavated between 1880-1912 also suggests that there is not a specific exclusion of sundials from the records of late 19th and early 20th century excavations. Indeed, the attention paid to sundials in early excavations and publications (as in Martini's 1777 *Abhandlung von den Sonnenuhren der Alten*) makes the objects as likely to retain contextual information as any other class of artifacts at the time.

Despite being outside of the grandest properties of the city in terms of size and complexity, subelite residences contain some of the finer examples of timekeeping devices in Pompeii. While the structure was only partially excavated, what now serves as the entryway to the Casina dell'Aquila (IX.7.12) was a separate structure in antiquity and contained perhaps the most impressive decorative scheme on a Pompeian sundial

⁶⁹ Indeed, Wallace-Hadrill's study includes the House of Fabius Amandus, the findspot for one of the sundials in this category discussed below.

(#507), as the fragment found in the property's garden consists of a kneeling "Hercules" holding the bottom portion of a sundial on his shoulders. The property was only partially excavated to reveal its front rooms (a corridor, *fauces*, single *cubiculum*, and *triclinium*) and a portion of the peristyle garden in the 1880s. The entirety of Hercules' body survives in relief along the base, with the bottom fragment of the shadow-receiving face of a spherical sundial with 5 partial hour lines above. The sundial only appears in the recent BSDP database, and is there presented with little information other than supposed findspot and current location in the Naples Archaeological Museum.

A similar sundial was uncovered at Tor Paterno near Ostia around 1790, with a kneeling figure holding a spherical dial on his shoulders. This figure, identified as Atlas, differs slightly by having only one knee placed down whereas the Pompeiian example has both knees directly on ground. The Tor Paterno dial, however, must be treated with caution; the hour lines etched into the object are spaced to represent equinoctial hours, rather than the seasonal hours used in antiquity. There are several possible explanations for the unusual device, which should also be kept in mind for the Pompeiian example, discussed by Evans 2016. First, while it is rare in the archaeological record, the system of equinoctial hours was conceived of and sometimes used in antiquity by technical astronomers. Second, the object might simply appear similar to a sundial but actually have another purpose; the equally spaced "hour lines" centered on the meridian line may simply be meant to evoke a sphere. Depictions of Atlas (or Hercules, depending on

context and interpreter) holding the celestial sphere on his shoulders are a more common occurrence than similar figures holding sundials. The dial may also have received an “eighteenth century ‘improvement’” (Evans 2016: 153) to make it more desirable to collectors. While Evans does not explicitly mention the possibility of an outright forgery, it should certainly be considered.

If, in fact, the Pompeiian example is authentic and properly attributed it represents an unusual contribution to the corpus of timekeeping devices found in the city. Sundials supported by a kneeling figure have been uncovered at Pergamon (#476), the imperial villa at Tor Paterno (#444, now held in a private museum in the United Kingdom), and Pompeii, with a further example (#507) with a base depicting Atlas holding the sundial on one side while the reverse shows Hercules, identified by the pelt of the Nemean lion over his shoulder, and either Antaeus or Iphicles (Popović 2012: 95-96) from Sirmium in modern-day Serbia. The Pompeiian and Sirmian objects have been roughly dated to the 1st century CE, the Tor Paterno object coming from a 1st-2nd century imperial villa, and no date assigned to the object from Pergamon. The finds context of each varies widely, as the Pompeiian example was recovered from a subelite residence (Graßhoff et al. 2016), the dial from Sirmium from the city’s necropolis (Popovic 2012: 95), the Pergamon dial from a temple, and the Tor Paterno example at the site of an Antonine imperial villa. Perhaps the most famous example of a kneeling figure supporting a sundial comes from Ravenna, where an above life-sized figure

supported a sundial in the Piazzetta dell'Aquila prior to the statues destruction in 1591 (Winter 2013: 512). Atlas is more frequently associated with the celestial sphere, the imagined concentric sphere to the earth on which all celestial objects are projected, which in itself is a core concept in the operation of ancient sundials; the surface of a spherical sundial is essentially an inverted model of the celestial sphere onto which a shadow is cast to map the position of the sun (Jones 2016: 25). The early Imperial Farnese Globe, now at the Naples Archaeological Museum, is an excellent example, of the association as it depicts Atlas holding up the celestial sphere complete with constellations carved onto the globe's face.

Among the smallest properties associated with a sundial (58.6th percentile in Flohr 2019) is the house at VII.3.11, the House of Ercole Fanciullo. The property has a small peristyle which is cut by a triclinium on its western edge, but continues to wrap around the room containing the triclinium on its eastern side, eventually leading back to an aedicula shrine with statues of a Lar, Minerva, and Harpocrates (Jashemski 1993: 177). The House of Ercole Fanciullo is not only noteworthy for its relatively small size among properties containing sundials, but also for its commercial nature; the structure served as a shop as well as a residence. No existing catalog of timekeeping devices includes examples explicitly found in a commercial or shop setting, though both the House of Ercole Fanciullo and the House of Narcissus (the lone sundial in the "middling group" category composed of the bottom 50% of Pompeiian households by

size and complexity) served as a shopfront or restaurant as well as a residence. In both cases, the remnant of staircases proves the prior presence of upper stories, likely the residential quarters of the shop proprietors. Both properties contain a triclinium that opens on to the peristyle holding a sundial, suggesting the device was important for conveying messages to the patrons of the establishment. That the two smallest structures holding objects of time both have a commercial nature is revealing of the potential uses of sundials outside of elite homes; small properties appear to have used the devices to communicate particular ideas and create ambience.

Middling Groups

The lone sundial with provenience information connecting it to a structure in the entire bottom 50% of size and complexity ranking, the grouping Flohr refers to as “middling groups” (2019) is a spherical travertine dial from the House of Narcissus. The structures in this category do not easily lend themselves to the functional use of sundials largely due to their size; only 10 structures⁷⁰ in the bottom half of the distribution contain peristyles, necessary components for the inclusion of a functional sundial on the interior of a domestic structure. Even among the structures that do contain a peristyle in this category, there are minimum parameters that must be met for the functioning of a sundial mounted anywhere below the roofline, as there must be

⁷⁰ IX.8.C, VII.2.H, VIII.6.C, the Samnite Palaestra, I.13.A, VI.2.N, IX.9.G, VII.7.D, I.13.I, & V.3.I.

sufficient space to allow the dial to remain outside the shadow of the surrounding structure for all hours in which it would operate. Further, installing a dial high enough to avoid such concerns also requires sufficient space to visually access the object from below.

The paucity of privately held objects of time in the bottom 50% of residences is also, it must be noted, not evidence of the lack of hourly time outside of elite life. It was not only the owners of elite spaces that interacted with those spaces and their accoutrement, nor were privately held spaces the only points of access for objects of time. Even if a particular aspect of time discipline was only practiced by a small group of elites, the activity surrounding such actions would inherently impact people across socioeconomic rank; dinner in the ninth hour, for example, would not only set the temporal requirement for host and guests to arrive at the appropriate time, but would require synchronous activity by the slaves and servants preparing a meal, would impact the time clients could interact with patrons in elite households, and so on. Activities would also be impacted by adherence to another's schedule; Joshel and Petersen call the view out of a dining room during the 9th or 10th hour "a patrolling gaze" (2014: 60), wherein the activity of slaves would become a backdrop that put slaves on view for both hosts and guests, with heightened expectations of position, activity, and decorum.

While Gibbs records the location of a spherical sundial (#538) as simply "along the Via di Nola," the *Notizie Degli Scavi* in which the object was first published contains

a much more vivid description: “A travertine sundial of the usual concave design was found in the garden [of the House of Narcissus (V.III.6)] on 16th May 1902, but devoid of its gnomon and abandoned on the ground, therefore of no use as a timepiece” (Paribeni 1902: 374). Unfortunately, the excavators do not explain this claim in any further detail, and the fact that the object remained in the garden of the small 5 room property suggests that it likely was functional prior to the eruption of Mount Vesuvius, perhaps mounted on the northern wall of the garden, which is also the northernmost wall of the property. The spherical dial is undecorated, but all 11 hour lines and 3 datelines survive.

The property is emblematic of the differences between “elite” and “subelite” properties and those of the “middling groups” in the Pompeiian context. While the households in the elite classifications often had shop spaces incorporated into them, either connected or walled off from the main residence and presumably rented out, the House of Narcissus devotes a substantial portion of its ground floor to a retail space. The front room of the property contains a small stove immediately to the left of the entryway, a dolium used as a puteal near the rear center of the room, and another smaller room to the rear left. The rear right side of the structure opened to a staircase leading to no a longer extant upper floor and a narrow hallway that ends at the rear garden of the property. Along the length of the hallway there is another room housing a triclinium, which opened onto the garden in which the sundial was recovered. It is from

the third-style decoration of the triclinium that the house received its name from excavators, as the central scene depicts a reclining Narcissus. Jashemski classified the property as “a large shop front on the street [that] had a small back room and passageway alongside it that lead to the living quarters and garden at the rear” (1993a: 184), however it appears these observations were made before the recognition of both the triclinium and stairway at the rear of the house. The presence of stairs, as are found in 40% of Pompeian retail properties (Wallace-Hadrill 1994: 80), suggests rather that the living quarters were above the retail space which may have included the triclinium and garden as dining space.⁷¹ Ellis classifies spaces with facilities for both street side food or beverage service and accessible formal dining spaces as “multi-room bars” (2018: 76), and though this property does not have a typical masonry bar along its street frontage it remains possible that the entire ground floor served an economic function.

At just 115 m², V.III.6 is by far the smallest property with an associated object of time. The structure falls into the 11th percentile of Flohr’s index (Flohr 2018), a significant gap in size from the structures in either the subelite or elite groupings (50th percentile and over or 90th percentile and over, respectively). The garden itself measures slightly larger than 5x5m, thus the sundial would likely have been visible from any point within the garden itself. Visibility from the triclinium in an adjacent room is

⁷¹ Even an upper floor does not guarantee a living space within the property, as Varro notes that dining on the upper floors had become a growing trend by the first century BCE (*Ling.* 5.162).

uncertain given the dial's recovery out of its original installation point, but the large doorway linking the two spaces suggests the dial may well have been in view to diners. The complicating issue here is elevation, as the dial would have to be installed high enough to avoid shadows of the surrounding structures and upper floors.

While the exterior face of the property does not resemble a typical retail space in the city in its final phase, a previously extant bar counter was seen archaeologically to have been removed and the usual wide doorway of a street side bar or restaurant was narrowed to its smaller size at the time of the eruption of Mt. Vesuvius (Jashemski 1993b: 114). The potential for the property to have mostly or entirely functioned commercially, as a *taberna* or restaurant, further places it in a unique position among contexts with sundials. Winter's catalog does not classify any structure containing a sundial as sourced from a *taberna*, applying the term only to the location of a presumed water clock in the Basilica Aemilia at the Roman forum (2013: 520).⁷² The spatial arrangement of the House of Narcissus, be it a retail / dining space, residence, or both, reflects that seen in elite households. Ellis argues that the elite spatial language presented by Vitruvius, the particular set of common features and arrangements of the homes of the Roman elite, "was understood, if not always spoken" by members of society outside of that socioeconomic category (2018: 238). In the case of the House of

⁷² It should be noted that this count does include sundial #538 discussed here, however Winter's catalog lists the findspot as a residential property. She does note that the well-preserved dial appears to have been mounted on pedestal given the characteristics of its base (2013: 500).

Narcissus, this “speaking” of elite spatial language can be seen in a number of ways; the presence of a richly decorated triclinium, the presence of a dining space and garden at the furthest (and thus most privileged to access) part of the structure, and so on. The presence of a sundial in this space can be seen as further evidence of the speaking of elite spatial language. The mere presence of a garden sufficient to allow the functioning of a sundial is a rarity in structures of this size, and the installation of a sundial was clearly seen as a worthwhile investment to the owner / proprietor. The connection with hours and dining culture shows how the presence of a sundial could add to the ambience of a dining space. The 3rd century CE mosaic from Antioch is perhaps the best illustration of the connection between the two phenomena wherein the depicted sundial has a reader proclaiming “ENATHIAPHΛΑΣEN,” “the ninth hour has passed” (Olszewski 2015: 454). This mosaic, recovered from a triclinium, shows that the very reference to the traditional hour of dining set the ambience for a dining space; a sundial becomes a sign that tells the observer that in this space, it is always dinner time. The ability to convey these messages, and to serve these functions, to either private guests or paying customers allows access to social customs more typically experienced by those of higher position.

Representations of Time

In addition to sundials themselves and references to hours, depictions of timekeeping devices also serve to create and reinforce the social role of hourly time in

Pompeii. While not exceedingly common in the corpus of Roman art, sundials nevertheless are occasionally depicted.

Depictions of Time

In the case of Pompeii, a sundial appears in the background of a mosaic depiction of “Plato’s Academy” recovered from the extra-mural villa of T. Simnius Stephanus. The *opus vermiculatum* mosaic has been dated to the beginning of the 1st century BCE, though is thought to be based on a Hellenistic painting dating to roughly the 3rd century BCE (Gaiser 1980: 8-12). Part of the justification for this belief is the existence of a similar, but more crudely executed, mosaic depiction of the same scene uncovered at Sarsina in north Umbria (Olszewski 2014: 450). The exact identification of the grouping depicted in the mosaic has been somewhat contested, with the traditional interpretation being Plato’s academy and more recent reinterpretations suggesting the seven sages: Cleobulus of Lindos, Solon of Athens, Chilon of Sparta, Bias of Priene, Pittacus of Mytilene, Periander of Corinth, and Thales of Miletus (Evans 2016: 143). In either instance, the subject of the mosaic is clearly meant to evoke a sense of the prestige of science or knowledge.

The ambiguity of the identification of the mosaic retains the relevant portion of its message here no matter which of the two interpretations best reflects the artist’s intent; the mosaic depicts an archaizing Greekness associated with knowledge. Sundials were “linked to wisdom and an intellectual life” in antiquity, serving a similar role of

reifying the intangible concept of time as does the clock face in the modern world (Jones 2016: 34). Winter argues that the use of philosophical themes is meant as a sort of trigger for guests, demonstrating the mindset and values of the property owner (2013: 219). Alternate interpretations of the sundials role in this particular mosaic see the object as “a symbol of passing time” given that the depicted sages were all long dead by the time of mosaic’s creation (Evans 2016: 151), however this symbolic use of a sundial would be exceedingly rare given the number of artworks in antiquity that depict times passed without specific reference to timekeeping.

The villa of T. Simnius Stephanus is an interesting context for the recovery of an intact mosaic, given the identification of a portion of the property as a mosaic workshop. However, the presence of an *opus vermiculatum* mosaic in an elite suburban villa is not out of character for the distribution of such objects in Pompeii and its environs; the top 10% of houses by size contain over half of such mosaics in the city, and the plurality of the remaining mosaics come from houses that lie in the 9th decile (Flohr 2019: 109). Following the distribution of mosaics of this type, then, there would likely be a shrinkingly small market for the piece outside of T. Simnius Stephanus’ villa. The size of the mosaic, 94 x 96 cm, places it in a category that was produced both *in situ* and in trays for transportation (ibid.: 111), though Westgate has argued that only one *opus vermiculatum* from Pompeii, the Alexander Mosaic from the House of the Faun, was too large to preclude its construction elsewhere than its ultimate installation (2000: 272).

Artistic depictions of time were not always so literal as to depict hours directly, and indeed abstractions (often through personification) were the most common method of representing or expressing time in Roman art (Kondoleon 1999: 323-325). Hellenistic art often relied on depictions of Aion (with the Roman female variation Aeternitas) and Kronos (latin Saturnus) as vessels for the indication of time, though at scales beyond the hour. Pompeii preserves two wall paintings depicting Saturn, at the elite House of the Dioscuri⁷³ (VI.9.6) and subelite House of the Tragic Poet⁷⁴ (VI.8.3-8). The former was among 12 deities painted over a red background surrounding the atrium immediately inside the entrance of the large property (Trimble 2002: 228-229) and the latter, which Mau (1899: 311) interpreted as Zeus and Hera at Mt. Ida, is also among a number of deity scenes in the atrium of the structure. The elite House of the Vetii⁷⁵ (VI.15.1) also contained a statuette depicting a season carrying a goose and wine, an example of the representation of time through *kairos*.

Graffiti

Most of the socially meaningful representations of seasonal hours are likely lost to us archaeologically; stories, literature, art that doesn't preserve well, and direct associations between objects of time and their surrounding ideologically charged

⁷³ 96.6th percentile for size and complexity according to Flohr 2018.

⁷⁴ 68.8th percentile according to Flohr 2018. The painting in question has alternately been interpreted as Zeus and Hera, rather than Kronos and Rhea (Digital LIMC 2018)

⁷⁵ 91.4th percentile according to Flohr 2018.

settings are likely to have existed in significantly greater number than is available to scholars today. While there are a number of ways in which written sources convey time and temporality, those sources don't always explicitly engage with the seasonal hour. The only reference to hours literally transcribed on the walls of Pompeii, for example, comes from an erotic epigram written as a graffito three times throughout the city:

I wish I was a jewel, for not more than a single hour, so that I might give kisses, pressed onto it, to you as you sign. (*CIL* IV.10241, trans. Milnor 2014: 181)⁷⁶

The metaphor of the epigram expresses the writer's desire to be the central stone of a signet ring so that they could experience the wearer's "kiss" when moistening the stone to seal a letter (Varone 2002: 21). The use of the term *hora* itself here shows that the concept of an hour was well established as a cultural indicator of a short period of time. The erotic drive to experience only a single kiss likely also factors into the use of a small increment of time in the epigram, as the transformation need only take place for what current Western approaches to time might describe as a moment, but here the terminology centers on the hour as the nearest linguistic fit to a sort of minimum time span. The source of this epigram, unfortunately, is not known and Milnor even suggests that may have been passed orally as there is slight variation in phrasing across the three examples (2014: 181-182). The three iterations, found in the elite House of Maius Castricius, on a tomb along the Via Nocera, and outside a *taberna* northeast of the forum respectively, show wide variety in their context.

⁷⁶ Vellem essem gemma hora non amplius una / Ut tibi signanti oscula pressa darem

Explicit inclusion of hours is not the only way in which the graffiti of the city convey a sense of time. Much of the temporality of Pompeian graffiti is tied in with particular events across past, present, and future. In some cases, graffiti were used to coordinate social action around future events, as with announcements for upcoming events at specific times. Numerous examples can be found amongst the announcement of gladiatorial games, which often tell the dates of upcoming games both within the city and in the surrounding area. There are 36 surviving examples that name a specific date for gladiatorial games, often also conveying the cause for the games, the nature of activities to be held, and the names of dedicators, dedicatees, or participants (Cooley & Cooley 2004: 218-219). These inscriptions do not, however, state hours for the games they announce. Houston (2015: 305) argues that viewers of such events “presumably just showed up and waited for things to start,” though there are some surviving records of other public events being staged at specific times. One gladiatorial announcement from Pompeii, however, gives a sense of specific timing:

For the well-being of the [emperor Vespasian] Caesar Augustus and of his children, [and on account of the] dedication of the altar, [the gladiatorial troupe] of Gnaeus [All]eius Nigidius Maius, priest of Caesar Augustus, will fight at Pompeii, *without delay*, on the 4 July. There will be a hunt and awnings. (CIL IV 1180) (trans. Cooley & Cooley 2004, emphasis added)

The specification that the games being announced were to be held “without delay” could refer either to the date of the event or an understood starting point on the appointed day. There were clearly some bounds to what part of the day, if not specific time, gladiatorial events took place, as a midday break for lunch was instituted around

61 BCE and certain events were typically held during particular parts of the day (Dunkle 2008: 90). Surviving graffiti do not include reference to the year of any of the advertised games, however viewers would likely understand from context (i.e., reference to sponsors or dedicatees) and experience of the city to know which were upcoming and which were past. Pompeiian gladiatorial announcements have been dated to a range from Augustan to Flavian times, and shown to have a “consistent pattern of activity” (Tuck 2008: 127) in scheduling. Such consistency can also be expected with regard to the hours during which games took place, even if they are not included in advertisements.

Similar to gladiatorial announcements, election graffiti in the city is also tied to specific points in time that are not fully spelled out in the inscription itself. Election notices provide the best glimpse of local politics during the Roman Empire (Milnor 2014: 98), but do so through a period of distinct moments rather than any overarching description of political realities. While the timescale of election graffiti does not appear to have reflected a need for hours (there are no graffiti instructing the reader to vote before the closing of polls at a particular hour as in modern election practices, for example), there is one surviving reference to the temporal structure of the day. Graffito *CIL* IV 581 ironically casts support for a candidate from “the late drinkers”⁷⁷ in an

⁷⁷ “The late drinkers all ask you to elect Marcus Cerrinius Vatia aedile. Florus and Fructus wrote this.”

attempt to capitalize on Flavian era moralizing on improper uses of the hours of the day and night.

Writing messages in support of a candidate after the election in question, or even after the death of that person, would not be a worthwhile endeavor for graffitists seeking to influence the community; such advertisements are targeted toward the particular event of an upcoming election. The fact that such writings survive well after those moments, as do the announcements of games above, does manifest the past into the daily environment of the ancient city. The implication of short time for many of the cases addressed in graffiti in Pompeii is unclear, however this does not preclude the events in question from having associations with specific hours of the day known through either other forms of disseminating information or simply social convention.

Absence

In addition to noting where objects of time and their representations are present, the absence of timekeeping devices must also factor into analysis of those object's role in Roman society. The near lack of sundials from all areas that are not either publicly controlled or elite residences meshes well with the trends of munificence and elite ownership seen throughout the Roman Empire, but does not show that hourly time was inaccessible to those outside of the elite. While the city adheres to general trends in the elite ownership of sundials, it also provides key exceptions through the residences with shopfronts that contain dials. The prestige offered by owning or funding sundials may

have been inaccessible to most of Pompeii's residents, but it was not impossible for businesses and those with less sizable and complex homes to have a sundial in their space. Further, the lack of a sundial in one's personal assemblage does not suggest the lack of access to them in general, and Jones has argued that the objects of time did indeed play a distinct role in individual lives (Jones 2016). Even if one were to somehow remain ignorant of the hour in a city such as Pompeii, the adherence of the surrounding population to the hourly would surely impact how they navigated the city and its practices.

The types of available evidence, and particularly the recognition of *unavailable* evidence, should also be considered when conceiving of the temporal culture of an entire Roman city. The most glaring example of unavailable evidence is the provenience of the majority of archaeologically recovered timekeeping devices from Pompeii, as the objects with surviving context make up less than half of those known from the city. The frequent occurrence of sundials within the same sort of contexts that excavators targeted by early non-scientific excavators has likely led to the departure of a further number of timekeeping devices from the archaeological record and into private collections. The scope of this problem can be seen among ancient timekeeping devices generally, as 541 devices or inscriptions naming devices do not have specific enough contextual information to classify their location type. In the case of 95 of the objects,

even the country of origin is unclear and some entries in the Topoi project database are known only from private auction catalogs (Graßhoff et al. 2016).

Some categories of timekeeping devices are generally less robust in the archaeological record, opening the possibility of their presence in ancient Pompeii but absence from our trenches and surveys today. Portable sundials, for example, were often made of less durable materials than their stationary counterparts. Talbert, rightfully, assumes that his catalog of geographic portable sundials is incomplete even of the objects recovered from their archaeological contexts and that further devices exist in unpublished private collections or have yet to be identified within museum collections (2017: x). The presence of a portable sundial from neighboring Herculaneum, the delightfully odd “*prosciutto*” dial in the shape of a ham hock (Winter 2013: 372-373), shows that the technology was developed and available within the region prior to Pompeii’s destruction by the eruption of Vesuvius. Even the categories into which ancient objects of time can be placed is likely not yet a complete reflection of available technologies in the ancient world; ongoing efforts to interpret a fragmentary timekeeping device uncovered in Vindolanda have argued that the object is part of a previously unrecognized clepsydra type (Meyer 2019).

Water clocks present a further challenge to creating a complete picture of hourly time in the ancient world. No water clocks survive at Pompeii or its environs, though the technology for various types of water clocks long predates any of the sundial types

found at the site. Allen provides a potential explanation for the lack of clepsydrae in this Roman region, provocatively arguing that Roman timekeeping is defined by the sundial and Athenian timekeeping by the water clock (1996: 165). This argument, though, is based largely on ideological grounds rather than technological or archaeological ones and does not take the known examples of water clocks from Roman contexts into consideration. While the types of time measured by water clocks can be different from the seasonal hour of Pompeii's sundials, the former *can* be designed to tell the same time as the latter. Indeed, Rome itself has yielded at least six water clocks (Winter 2013), some designed in the city and others imported as booty from territorial expansion. Larger water clock installations are sometimes only preserved as a tank or tanks even in so prominent a device as the Tower of the Winds, the complete workings of which remain unknown (Hannah 2009: 63).

Conclusions

While this study has argued that objects of time participate in broad cultural assemblages, a focus on individual objects in their context does allow a more thorough articulation of timekeeping concepts and practice at a localized scale. The sundials with dedicatory inscriptions from Pompeii, for example, show civic interest in displaying the time and enabling broad use of timekeeping devices. The Stabian Bath example (#513) shows that the most longstanding sundial known at the city functioned in public space (Schaldach 2016: 77). As early as 1943, Robinson argued for a preference in the ancient

world the use of central, accessible places to make time reckoning available to everyone, citing the example of the Tower of the Winds in Athens (Robinson 1943). Not only did the sundial from the Stabian Baths (#513) participate in time as public spectacle, but it was also entangled in the state utilization of time as its erection was funded by money collected from fines by a city *quaestor* (Houston 2015: 309). While Jones notes that records of civil administration in the Roman world only rarely make reference to hours within the day (2016: 29), the inclusion of objects of time in civic spaces suggests a degree of concern with keeping (and making available) time at this scale. Associating civic authority with timekeeping is a means of establishing that authority as an important component of the proper functioning of the world; a regularized order (in this instance, regular systems of reckoning time) both enable and reproduce authority (Smith 2015). The distribution of timekeeping devices across space and time show the patterns of how the association of power and timekeeping play out, here in the sense of broad patterns across the Mediterranean and in the administration of the city of Pompeii. Nowhere is such an investment in telling the time in order to reinforce the power of a civic authority than in Augustan Rome, where Augustus' monumental timekeeping devices (working across several timescales) were an important component of "deliberately elevating himself above and beyond the conventional arena of competition among the great senatorial families" (Rehak 2009: 91). The regulation of timekeeping practice by figures of authority was certainly not a new phenomenon in

itself, as the politically driven calendrical reforms of preceding figures from Numa Julius Caesar (Rüpke 2011; Stern 2012; Stern 2017) provide ample evidence. The early part of the Imperial period, however, saw a more concerted effort to incorporate hours into the temporal influence of political leaders, particularly at the local level through increasing association through prominent individuals and hourly timekeeping devices. As discussed above, Pompeii contains three such surviving examples, one of which is the earliest instance of such an association in the Roman world (Schaldach 2016: 77).

The Stabian bath sundial further contributes to the political order of the city by manifesting a non-Roman past into and beyond the Augustan period when indigenous languages appear to have all but disappeared in the city (Henderson 2015: 113). While the Oscan inscription on this sundial makes its multi-temporality apparent to us, the persistence of sundials is a widely shared property that allows the objects to transmit what Smith calls “perduring anachronism derived from a distinctively nonhuman temporality” (2015: 48). The Stabian Baths sundial can be seen to be participating in the efficacy of timekeeping systems through its material presence and implications in relations of timekeeping, the symbolism of Roman authority in its layered association with both civic authority and cosmos, and the ability to influence the imagined capacities of objects through its multitemporality, its ability to bear an Oscan past into the Latin present of the city’s final phase pre-eruption. Indeed, the entire corpus of sundials in Pompeii contributed to these swaths of Roman practice and ideology in

their own ways; the sundial of an elite peristyle lent authority over time within their own domain to its owner, the symbol of time and its passage drew attention to tombs along the Via dei Sepolcri, the association between the objects and Greek thinkers gave them each a sense of aged wisdom, and on and on. Mapping the sundials and water clocks of the ancient world shows the patterning within these applications of hourly time. For example, the Augustan period ushers in an increased interest in hourly timekeeping in the private sphere, and Pompeii serves as a case study to show the concentration of that drive among the most elite members of society. The exceptions that are present are also telling, though, as seen in the inclusion of sundials in the triclinia facing gardens of the two most humble properties that contained sundials; modest spaces could access the elite “language” formulated by elites’ conspicuous display of timekeeping.

The following chapter focuses on how objects of time functioned socially in the Roman world. Pompeii and its environs have here stood as an example of the “where” of such objects in an Imperial Roman city; both a reflection of trends within the empire and of the culturally and historically contingent variations presented by individual contexts. Discussing the specific contexts of sundials, artistic representations of hourly time, and written references to the hour also begins to reveal the “why” of the hour, the motivations for and conditions of the installation of hours or their proxies. The next stage in understanding the particulars of the hour in the Roman Empire revolves

around the “how,” the implications of hourly time and its role in influencing, structuring, and in some ways controlling social life.

CHAPTER 4: THE SOCIAL ROLE OF HOURLY TIMEKEEPING IN THE ROMAN WORLD

LUDUS LABORQUE COMPOSITA REPETANTUR HORA
(College du Marché, Paris, France, 16th Century)

In the previous chapter, the goal was to establish a view “from above” of the distribution of timekeeping devices across the Roman world, with particular interest in the early Imperial period. The first goal of that chapter was to establish the location of devices used to track hourly time, especially where those objects retain provenience information, in order to understand the breadth of such objects’ use across the ancient Mediterranean. Once the known locations of the sundials and water clocks that made up the infrastructure of hourly timekeeping had been established, the chapter sought to identify patterns within the temporal and spatial contexts wherein those objects were found. I focused specifically on those objects with known points of installation and use, as those provide the most contextual information for understanding where hourly time was used and, to a certain degree, by whom. Finally, the city of Pompeii was explored as a key case study in the history of ancient short time. Pompeii, still explored through the “view from above” of cartesian maps, shows the distribution of timekeeping devices between the public and private spaces of a Roman city in the Early Imperial period. The

case study of an individual site allowed for a more specific exploration of the motivations behind the installation and upkeep of devices of hourly time, and Pompeii in particular preserves the largest corpus of surviving contextualized devices of any location in antiquity. Pompeii shows sundial distribution at a time when the state had an increased interest in hourly time as a means of exerting real and cosmological control, which also saw an intensifying interest in private ownership of timekeeping devices by members of the local elite. In this chapter, I build upon those maps and the trends they show to explore the impacts of hourly time in the social life of the Early Empire. These social impacts include both what timekeeping devices themselves *did* through making possible a particular system of time and how the objects were used.

I argue that sundials and water clocks that told hours in the ancient world made new understandings of time possible, that these understandings led to changes in both the temporal practices and the broader ways that Roman culture organized around those practices, and created new symbolic meaning that impacted ideology and behavior beyond only literal adherence to an hourly framework. These impacts of hourly timekeeping can be seen through the view of those “down below” situated in the actual practice of living in and navigating space (De Certeau: 1984: 92-94); whereas the view from above shows broader patterns of interest and investment in short time, peopling that view with actors that experienced and were influenced by timekeeping devices unearths the practices that the objects influenced. The broadest question, then,

is how did short time impact social life in the Roman Empire? The question can be approached through more targeted takes on the categories of placement and the identified trends of timekeeping distribution discussed in the previous chapter: How did timekeeping devices influence practice and ideology across class and status? How did the growing prevalence of timekeeping devices in private contexts of the early empire shape social experience?

I first briefly review core concepts from Chapter 2 about the work that timekeeping devices do, especially in regard to those capabilities beyond their defining task of telling the time. The many ingenious solutions to keeping time found in the devices of the ancient Mediterranean often distract from how exactly those objects had impact and influence. Recent scholarship has shown a shift toward these types of social concerns, with work on religious significance (von Lieven & Schomberg 2020), philosophy (Sattler 2020), cultural frameworks (Ker 2020; Wolkenhauer 2020), medicine (Miller 2020), and astrology (Heilen 2020) among others. Despite this growing concern with the impacts of short time, and indeed the recognition of its impacts across so many disparate aspects of life, there are lingering doubts about the utility of short time prior to the invention of the mechanical clock. This view is strongest among scholars focused on the timekeeping of later periods, as in Rossum's (1996: 20) speculation that only the well educated would need exact times and seldom had need for them besides or Landes' (1983: 6-11) location of time discipline as arising entirely after the invention of

mechanical clocks. Leading figures in the study of timekeeping in the ancient world have also expressed doubts on the actual use of hours in the ancient world, notably with Alexander Jones speculating that hours were “seldom invoked” in private life and noting only few branches of the state that made use of seasonal hours (Jones 2016: 28-29). Timekeeping devices can even be denied their symbolic functions in scholarship specifically discussing their broad utility, as in Houston’s comments that sundials were “practical objects” that never acquired a widely understood symbolic value (2015: 307). Appreciating the breadth of efficacy carried by timekeeping devices reveals, however, that the impacts of short time are wider than often argued.

Following the discussion of the capacities of hourly timekeeping devices, this chapter next explores the various impacts of short time across class lines, specifically focusing on the sorts of “everyday lives” that are rarely represented in the surviving literary record. While the written sources of ancient Rome do not reflect the voices of non-elites and the enslaved, those sources do nevertheless provide important insight into the temporal lives of such individuals. In many cases, the role of hours in the daily life of the non-elite was tied to the schedules of elites, who could outright compel or more subtly influence adherence to temporal regimes through economic opportunity, cultural cachet and influence, threat of punishment, and other means. The shaping of time discipline by elites is most clearly seen in the enslaved, as this group was directly beholden to elite desires. While the schedules of slaveholders offers much insight into

how hours structured the day of the enslaved, those same schedules also opened opportunity for the enslaved to exercise agency and resistance. The chapter discusses how short time was both a limiting and enabling force in the lives of enslaved Romans.

Free non-elites, similarly, can have aspects of their temporal regimes made clear through the expectations and behaviors of elites, but also offer a wider variety of evidence to show their own temporal culture than do the enslaved. The chapter next discusses the role of hourly time in the social lives of non-elites, both in reference to interactions with elites and where there is evidence to show their independent temporal regimes.

Finally, the chapter explores the impacts of the rise of hours in legal frameworks and on social relations, specifically in regard to temporally restricted water rights. The use of hours as a means of both measuring and distributing water resources both shows the utility of short time as an organizing principle and extends our view of hours in the ancient world to include rural contexts. Often viewed as outside the influence of *chronos*, or measured time, rural life actually provides some of the most temporally specific and strongly enforced engagements with short time to be found in the ancient world. This chapter discusses water servitudes, rights of access to another's property similar to modern easements, and cooperatively arranged water sharing agreements from across the empire as mechanisms enabled by hours and with impacts on social interactions in rural contexts. Further, this section introduces new evidence of the

enforcement of hourly restrictions on water access through a reinterpretation of recently a published timekeeping device, a calendrical clepsydra (Meyer 2019).

What Hours Do

The spread of hourly timekeeping devices across the ancient Mediterranean well illustrates an interest in making time broadly legible across society; each day was broken into predictable units that were displayed or communicated in a variety of settings. Sundials and clepsydrae, though each the result of long processes of discovery and innovation, were designed to carry out the deceptively simple task of keeping time. This task was often accomplished in more than one way, for example through the calendrical function of sundial date lines, or through complex calculations to ensure accuracy despite changing conditions as in the seasonal adaptations of anaphoric water clocks or the spatial flexibility of portable sundials. The role of timekeeping in shaping social practice cannot be understood, though, when these devices are considered only as individual scientific devices. Lehoux argues that ancient science is best understood *in media res*, situated among the interrelationships of social, cultural, and experiential factors (Lehoux 2012: 1). Timekeeping is a scientific pursuit at its core, even though the readers of sundial faces in antiquity or digital clock faces today are insulated from the calculations that make tracking time possible. The science of timekeeping is then doubly involved *in media res*. Firstly, timekeeping is quite literally *in res*, as most time telling is done through timekeeping devices rather than through the application of the models

and measurements upon which those objects are based (Birth 2012: 9). In the contemporary world, this relationship to time through objects is apparent as clocks are so ubiquitous that they are often features of other devices rather than objects in their own right (i.e., digital clocks on smartphones, computer screens, automobile dashboards, and so on). This reliance on objects for timekeeping holds in the ancient world, where objects translated the sun's position (or the in- or outflow of water) into legible and predictable units just as atomic clocks do the same to the movements of cesium atoms.⁷⁸ Secondly, the things that tell time, and the users that read them, are *in media res* in the broader sense of being situated and entangled in the world. Interactions with timekeeping are experiences that take place in the real world, each with its own set of settings, characters, surroundings, preconceived notions, and so on. Focus on specific trends and individual contexts allows the experiences of those that "lived down below," to return to De Certeau's (1988) levels of knowing a place and time, had with timekeeping to come into clearer view.

To complete this last step in De Certeau's model of understanding, establishing a baseline of how timekeeping devices work allows for an application of these capabilities to their situated experience. The telling of time is here less thoroughly explored, as it is both addressed in earlier chapters and the richest topic existing scholarship on the

⁷⁸ These units, it is worth noting, are predictable in different ways; the ancient seasonal hour as 1/12th of a given day or night and the contemporary hour as an unchanging span of time.

history of timekeeping as explored elsewhere. Timekeeping devices in antiquity had the ability to make things happen, a characteristic of objects that Bennett calls “efficacy” (2010: 31). Bennett defines this ability as “the capacity to make something new appear or occur” (Bennett 2010: 31), an ability that doesn’t necessarily require agency as we expect if in human actors. Bennett clarifies that objects do not need lifelike agency to enact this capacity, but rather that they “modify the developmental paths taken by human flesh, affections, thoughts, identities, and relations” (Bennett 2020: ix). Adam T. Smith extends Bennett’s efficacy yet further by removing the “new” from her original formulation (2015: 50), emphasizing that things continuously act and react and their efficacy can still be seen in the maintenance of existing as well as in the formation of novel relationships. Timekeeping devices, then, can be seen as making new concepts of time and new time discipline in their transmission of temporal frameworks, but also as actively reinforcing those frameworks and spreading them across the Greek and Roman periods. All of this action, further, occurs nestled in networks of interactions and wider assemblages of objects; the sundial can only make something occur given actors that are socially bound to act on its readings, the specific actions it enables are likely dependent on wider infrastructures and tools (i.e. to make someone arrive to the baths on time, there must be baths, flowing water, laboring people, roads to travel, and so on).

Through the creation of a timekeeping system and an efficacy of imposing that time system on Roman culture, timekeeping devices further make social relations

appear and occur in novel ways. The objects do this both by telling the time while also creating tools for the imposition of that time on social life. Measuring time created new time discipline, with impacts on standardization, regularity, and coordination (Glennie & Thrift 2009: 43) of telling time itself and the activities organized on a temporal basis.

Hourly Time and Social Relations

In their effort to extend Appadurai's notion of the "social life" of things to time, Bastian et al. (2020) argue that time is inherently social in two fundamental ways: time is *of* the social and, simultaneously, time *produces* the social. The latter of these, they point out, is readily accepted broadly, as time is a key phenomenon in organizing and enacting social relations in the world today; we are all quite familiar with using temporal markers to engage in coordinated action, to quantify our labor, and on and on. That time is itself a product of social relations, however, is perhaps less intuitive in the contemporary world, as our system of time is held to be universal and defined in relation to immutable natural phenomena (a year is the measure of one of Earth's revolutions around the sun, an hour is one 24th of a calendar day, a second is "the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom" (Bureau International des Poids et Mesures 2006)). All of these immutables, however, are to a degree arbitrarily decided; the exact time one revolution around the sun takes varies based on where one takes their measurement, the use of 24 hours is culturally derived,

the atomic formula for a second was chosen to match an existing unit derived from base-60 counting systems, and so on. Latour (2005) goes so far as to suggest that it is the relations which enable a time system (i.e., the human actors and nonhuman objects that make and track time) that are the primary factor, with time itself being only epiphenomenal to those relations.

The entanglement of time with social relations is not only a conceptual relationship, however, as time is made possible through material objects that calculate, communicate, and in other ways “make” time. The first domain in which objects and assemblages act on social relations is what Smith (2015) calls “sensibility.” For Smith, sensibility refers to the materiality of objects and their situation within both assemblages and social life, the interplay of which allows things to “create the conditions of possibility” (2015: 109) for broader political orders. For hourly timekeeping devices in the Roman Empire, the conditions of possibility for the ordered structure of daily life include a specific time consciousness (and its associated ability to coordinate and influence practice), a regime of accessing and expressing that consciousness, and the solidification of communities of practice invested in that system. These possibilities for ordering are perhaps most readily visible in the dense networks of urban contexts, where the daily sequence has long been held to be more strongly defined by social conventions (Schechner 2001: 191). This is not to say that objects of time are only efficacious in cities, as the types of temporal practice they develop reach

into other areas in a variety of ways (i.e., military or postal organization around hourly scales of time (Cupcea 2017) or the transmission of objects of time and those versed in their use as seen with portable sundials (Talbert 2017), among others). Indeed, while urban contexts are fruitful for the exploration of time's social impact due to their density, over-representation in the written record, and larger history of exploration within archaeology, some of the most precise and most strictly enforced employments of hours in antiquity come from rural contexts. The growing spread of sundials beginning around the dawning of the Roman Empire, along with the less archaeologically visible utilization of water clocks (as discussed below in relation to water regulations) saw the co-constitution of a temporal regime and social mores and actions based around it.

Timekeeping devices were able influence life broadly, beyond only the scientific specialists that provide the most detailed records of their engagements with the hour (see Miller 2017 for doctors, Steele 2016 for astronomers, etc.), by being physically manifest in the Roman built environment and engaging both intentional users and casual passersby. As long as an individual knows the general principles of timekeeping device, as has been argued to be widespread knowledge among the bulk of the Roman urban population (Houston 2015), the object had potential to impact social engagements relied upon a set schedule, either explicitly or through cultural convention. The physicality of the objects also produced particular modes of engagement and, therefore, sensorial experiences. Sundials, like many of the timekeeping devices relied upon in the

modern world, function as a predominantly visual tool (Glennie & Thrift 2009: 82). Water clocks likely functioned mostly through visual access, though it was possible to construct pneumatic alarm devices beginning in the Hellenistic period. This visual 'reading' of time is by no means inevitable in either nature nor in cultural practices that seek to provide synchronicity. Premodern timekeeping indeed often found recourse to other senses to indicate time and to instill time discipline; Chinese drum towers marked time with sound, translating the visual tracking of time by specialists into aural experience for non-specialists (Hung 2003), as did European bell chimes before the spread of mechanical clocks (Landes 2002: 75). The communication of time through sound was a common feature of Roman timekeeping as well, as in the case of military *horologiarii*, soldiers specialized in tracking time with *clepsydrae* (often overnight, when sundials wouldn't be of utility) that notified their fellow soldiers of the end of night watches by instructing horn-blowers when to indicate the hours (Cupcea 2017). Relying on the reading of a timekeeping device rather than only the communication of time was considered to be an evolutionary step in early work on modern timekeeping, as in Nilsson's (1920) account of *aoristic* time that was irregular and discontinuous prior to the invention of uniform and universal divisions of time. Examples may include the tolling of bells to mark an event independent of calculated time, as in ringing a dinner bell only when the meal is done cooking rather than at the set dinner time of 6pm.

The reliance on visuality in sundials produces particular sensibilities of time; their physical form creates a need to “read” time. Glennie and Thrift argue that aural methods of time indication require “fewer and less abstract skills” than do visual, dial-based systems (2009: 42). Visually accessed objects of time, then, require greater literacy and participation by the people that read them. These skills, however, appear to have been widely enough available that sundials created a larger Roman literacy in timekeeping practice rather than only sequestering knowledge to specialists. Further, the practice of reading time without the aid of interlocutors between finished device and passerby allowed an increase in engagements with time reckoning, the ability think systematically about time rather than only be aware of it. Rather than aural cues which indicated time, sundials enable “the employment of ‘regular and continuous’ divisions of time into structures” (Lucas 2005: 68) that could be used to extrapolate future and past times. The variations in seasonal hours from day to day and from place to place certainly differ from time as experienced today, however that does not mean that they could not be used in planning and time reckoning; even today not all years are the same length, as the cycle of leap years is employed to match our reckoning of time with the movement of our planet. While the cycle of changes in a seasonal hour is more complex (variation between the longest daylight hour on the summer solstice and the shortest on the winter solstice), it is nevertheless a cycle that impacted all hours in a given place. A Roman seeking to draw water during a prescribed period of hours, as seen in

cooperative water agreements like those at Tusculum (Frontin. *Aq.* 9.4-5) or Lamasba (Shaw 1982), their allotted time remained equally proportional to their neighbors on each day. Sundials and many clepsydrae function continuously (under the conditions in which they work at all, i.e., during daylight hours on sunny days, when filled and begun operation at the start of the day, etc.). Even though the actual length of a Roman seasonal hour varied throughout the year, sundials created a proportional division of each day; they emphasized epoch, a moment in time that could be compared to other moments, rather than universal duration, the passage of a segment of time (Birth 2014: 396). Even given these key differences from contemporary hours, the timekeeping devices available to ancient Romans could measure duration, they would just do so in relation to the date and place. This functionality would be difficult to apply to timing actions at different points in the year and at different places (a task taking one hour to complete in winter in Londinium and one hour in summer at Petra, say, would take extensive calculation to directly compare), however could be applied at the more local level, which account for much more of the recorded use of hours in antiquity, relatively easily.

The widespread availability of hourly time seen in the distribution of devices to track it and references to its use in written sources show that, despite its differences to modern hours, hourly time could be and in fact was used to organize human action in the Roman world. While popular conception of infrastructure often focuses on large

scale features of the built environment (roads, sewer systems, etc.) or, more recently, on the tools that enable digital communications (satellites, server networks, etc.), the technologies of short time and the objects that embody them clearly fall within the framework of things that facilitate movement and action. This connection is most easily seen in the contemporary world, where sub-second synchronicity is essentially to the complex calculations that undergird so much of daily life, but contemporary standards cannot be fairly applied to antiquity. Nevertheless, hours were used to coordinate and track action in myriad ways.

The mechanisms through which objects come to influence thought and practice are a central issue in understanding the function of timekeeping devices. Perhaps the most explicit engagement with the role of material manifestations of time is Birth's *Objects of Time*, in which it is argued that timekeeping devices "mediate networks of distributed cognition consisting of great historical depth, transcultural efforts, and many different institutions" (2012: 35). Further, Birth classifies objects of time as "artifacts used to think" (ibid.: 11), that is tools that create, shape, or change cognitive processes. Rather than following Marxist logics of reification wherein processes and relations (such as time) are made into things (Martineau 2015: 16), objects of time actively constitute time systems through their entanglements with ideas, culture, materiality, actors, etc. The impact of timekeeping and its material manifestations can be more fully understood through a consideration of those objects as things with efficacy

as proposed by Jane Bennett, the “capacity to make something new appear or occur” (2010: 31). Bennett’s notion of agency suggests that it is not only the creators of an object that seek to bring something to be, but rather that such a capacity is inherently an aspect of the objects themselves. Bennett holds that “there was never a time when human agency was anything other than an interfolding network of humanity and nonhumanity” (ibid.). In considering objects as things with efficacy that function within broader entanglements (with both other objects and humans), their capacity to mediate and transform thought and action emerges. A.T. Smith argues that these assemblages (which he calls machines) do not express efficacy in isolation, but rather in relation to human forms and action (2015). Objects of time, then, were efficacious through their participation in assemblages with both other objects and human actors. In the Roman world, sundials and water clocks inculcated the concept of seasonal hours and influenced how those hours functioned within broader assemblages to become a significant component of society.

The great variety of material aspects of Roman timekeeping, from monumental iterations to devices that could fit in a modern pants pocket, contributed to life on an equally broad variety of scales. Material manifestations of time were “indeed everywhere — in public squares, temples, townhouses, and country villas” within the Roman Empire, and participated from the public sphere down to the private realm of individual life. As Birth argues, humans think “with their world” (2012: 6), relying on

the mediation of environment and material to conceive of, convey, and use ideas. By mediating thought on and understandings of time, timekeeping devices impose particular logics and enable particular practices. These practices do not only consist of reckoning time, but also include broader thematic engagements with time. When Schechner argues, then, that “[sundials] reflected time consciousness” (2001: 189) she actually reverses the relationship for popular Roman engagements with timekeeping under study here; time consciousness rather reflected the sundial, with understandings conveyed by the objects themselves. These devices not only inculcated particular conceptions of time (Hannah 2008: 749) but also shaped the structures of Roman life and agency (Gardner 2012).

Hours in “Everyday” Lives

In their groundbreaking work on early modern timekeeping practices in England and Wales, Glennie and Thrift devote a substantial portion of their book to the “‘everyday’ temporal community,” loosely defined as “non-elite people carrying out tasks that do not inherently, or out of necessity, possess a high degree of temporal specialization” (Glennie & Thrift 2009: 181). While the differences in timekeeping technologies, surviving evidence, social relations, and a host of other factors make direct comparison between the Roman Empire and modern England difficult, this approach to understanding temporal culture has potential to address significant lacunae in our understanding of time in antiquity. Those areas of Roman life that aren’t

explicitly tied to timekeeping in the literary record are often assumed to have either existed in a natural temporal mode, one governed by natural rhythms without technological interventions, or to simply have been unaffected by time and timing in a meaningful way (at least short time).

The task of recovering the daily activities of people in the past, and especially of those who make up the “everyday temporal community” poses a real challenge, but is not an entirely novel undertaking. A notable example, and one that serves to outline some of the discussion here, is Joshel and Petersen’s (2012) *The Material Life of Roman Slaves*, which argues that many details of the lives of slaves in antiquity can be recovered despite their seeming invisibility in the archaeological, architectural, and literary records. Other groups that are often underrepresented in the historical record can be observed archaeologically, especially given the rise of interest in non-elite spaces among archaeologists in recent decades; much of the lack of non-elites can be described by both greater scholarly interest in and interpretive models that are biased toward elite men (Joshel & Petersen 2012: 5). While those outside of a society’s upper echelons can be lumped together under umbrella terms like “non-elite” or “everyday,” it is important to keep in mind the great diversity that such a broad category contains. Ellis compares the use of such terms to the more common shorthand of referring to a person or people as “Roman,” “Italian,” “Gallic,” and so on; these terms are accepted despite their lack of specificity, but come with important caveats about the many identities they represent

(Ellis 2018: 12). Rather than elucidating *the* temporal experience of non-elites, the discussion that follows seeks to simply argue that non-elite experience had a temporal aspect that was shaped by the growing use of the hour throughout the Roman Empire. The enslaved domestic servants of the House of Menander in Pompeii and the date farmer in Judea, to pull out examples of the discussion to come, would have drastically different life histories, identities, and even experiences of time and the hour. Nevertheless, both lived in contexts influenced by the Roman state and empire, including the particular ways it engaged with short time.

An opening example of how archaeological approaches can address gaps in our understanding of non-elites, I first discuss enslaved domestic servants in urban contexts. While the Roman archaeological record best preserves the objects and spaces of elites, those very same things and places create the “contexts of servitude” in which the enslaved were forced to live and work.⁷⁹ The ability of these contexts to reveal the activities that the enslaved were commanded to do is clear; slaves working in a kitchen would use the implements in those spaces in ways both identifiable and intuitive, those in dining contexts would use the serving tools of their day to present meals to masters and their guests, and so on. The particular actions of slaves are sometimes transmitted in the literary record, giving color and nuance to the duties and interactions of daily

⁷⁹ Joshel and Petersen borrow this term from Vlach’s (1993) work on slavery in the American south, though the framework remains useful despite the myriad difference between the two temporal contexts.

service. These accounts can be further bolstered through the reading of slaves' tactics of resistance into those contexts, the ways in which a slave would seize time for themselves, flee, steal, and so on.

Similarly, the lives between the extremes of elite and enslaved have been more difficult to tease out of the archaeological record for a variety of reasons. Factors including, but not limited to, differences in the preservation of the goods and spaces of non-elites (i.e., an extramural, wooden house is much less likely to survive archaeologically), the potentially smaller personal assemblages of non-elites, and most of all a strong focus in the discipline on elites and grand public spaces at the expense of those of more modest means. The latter of these, fortunately, is an issue that can be corrected and a still-growing body of scholarship on the ancient mediterranean has shed light on the previously overlooked majority of ancient Romans.

By exploring the entanglements of different populations in the Roman world with the hours of the day, this section seeks to address the current tension in temporal studies of the ancient world; a recognition that timekeeping was possible and desirable, with a wide variety of technologies and contexts for their deployment, but a pronounced difficulty in recovering the actual use of those devices and the temporal concepts they enable. Where ancient sources, both written and archaeological, do provide specifics about the employment of short time, it is usually in reference to the idealized schedules of the elite; moralist writing on the ideal use of one's time, the use

of short time in the courts, the presence of timekeeping devices primarily within elite or civic (and elite controlled) space, and so on. Elite schedules can, however, also shed light on the temporal culture of the non-elites around them; getting to the baths at precisely the sixth hour would be meaningless if the slaves tending them had not yet lit their fires, as a dinner at the ninth hour can also only happen with the coordinated effort of kitchen workers at the appropriate time. This impact of elite temporal patterns also impacts others not directly in their service or employ; a client would be beholden to the temporal strictures of a patron doing business, for example. Investigating the written sources' discussion of keeping time, especially when comparing those sources to the archaeological realities of timekeeping in the material record, here allows texts written by and about elites to clarify the broader impacts of elite schedule on non-elite temporal culture.

While the temporal demands of the elite offer a useful inroads to understanding hourly time across the Roman world, the daily schedules of everyone else did not solely rely on the whims and business dealings of the wealthy. The use of hours appears scattered throughout the literary record in reference to ordinary lives; doctor's diagnoses and treatments based on hours, the use of hours to equitably distribute resources and access, using hours to track efficiency, and many others. Populating the written the off-hand references to hours in the ancient mediterranean with the material culture of keeping time fills in much of the lacuna surrounding time and the non-elite.

Slaves and the Hour

The relationship of a domestic slave to time is complex, as is so often the case with so broadly encompassing a concept. Among Roman conceptions of time and temporality, *kairos* is likely the most important aspect of time for the life of a Roman slave; the notion of proper timing derived from Greek rhetoric, what Miller calls “the uniquely timely” (Miller 2002: XIII). Slaves were beholden to the whims and desires of masters, and strict adherence to the hours of the day could mean nothing if the slaveholder had other criteria for the appropriate timing of a given action or task. The more explicitly regulated concept of time found in *chronos*, the “fundamental conception of time as measure” (Smith 1969: 1) created by devices like sundials and water clocks, nevertheless would influence the temporal expectations of an enslaved person’s schedule. So, while the primary temporal concern of a slave would have been adherence to the proper time in a slaveholder’s eyes (completing an task by the desired time, performing an action at the correct moment, etc.), hours may have impacted when a desired moment fell within the day and when oversight and demand would be most substantial.

Joshel and Petersen (2012: 70) argue that the timing of “non-performative” tasks, those that didn’t need to be witnessed but simply completed, was likely unimportant to slaveholders. A task such as sweeping the floors can be reasonably assumed to not have strict temporal guidelines other than being completed before the space in question was

needed, especially so in cases where a slaveholder was away from the house on business or leisure. As discussed in the previous chapter, though, there would have been some social pressure to have tasks completed in time for the idealized elite schedule laid out in the literary record (i.e., baths had to be warmed and readied by the 6th hour, the scene for dinners prepared by the 9th hour, etc.). As slaves were responsible for facilitating much of the elite day, tracking the hour may have contributed to their overall management of domestic affairs.

There are, however, domestic tasks or assigned jobs that would be more likely to rely on measured time. These tasks, again, would ultimately defer to the temporal demands of the slaveowner, but are more explicitly related to the prescribed elite day that survives in the written record. Given, for example, temporal conventions on the hour at which a patron should begin receiving clients, it stands to reason that an *ostiarius*, a gatekeeper or doorman for an elite property, would benefit from being aware of the hour to ensure that their master was receiving clients at appropriate hours and, perhaps more importantly, not receiving those that arrived outside of the approved span. This is not to say that the *ostiarius* would dictate the paterfamilias' schedule, but rather that they could regulate the timing of appointments by specific hours as instructed. The literary record does not specifically include the hours as a standard by which visitors were granted or denied entry, but Seneca mentions those that held to strict schedules, as Asinius Pollio who would not engage in any work after the 10th hour

(Sen. *Tranq.* 17.7), many of which would call on their slaves to enforce and enable their temporal boundaries.

The offensive nouveau-riche freedman character Trimalchio was said to have maintained a slave entirely devoted to the hours in the form of a trumpeter that announced each hour of the day for the entire household. Petronius has a slave of Agamemnon report that his master and company are due at the dinner party of Trimalchio, who “keeps a horologium and a liveried bugler in his dining room, so that he can tell, instantly, how much of his life has run out!”⁸⁰ (Petron. *Sat.* 26).⁸¹ While Trimalchio is presented as overly zealous about time, both here and elsewhere in the text, the notion of slaves entirely devoted to the maintenance of a timekeeping device and/or the communication of its reading would not be unheard of in the Roman world. The initial implementation of short time in Rome, according to Pliny, came in the form of crier announcing the sun’s passage past 4 buildings in the *Forum Romanum*, a role that appears to have continued with the introduction of sundials and water clocks to the city (and the empire more broadly). Dedicatory inscriptions for *horologia* sometimes note the inclusion of a slave (or provisions for a slave) to tend the object, as seen in the 1st

⁸⁰ ...Trimalchio, lautissimus homo, horologium in triclinio et bucinatorem habet subornatum, ut subinde sciat, quantum de vita perdiderit.

⁸¹ Magnusson (2000) argues that the bugler attending to Trimalchio’s clock was likely an automaton, a feature of the device similar to Ctesibius’ pneumatic water clock discussed in Vitruvius. While the inclusion of technologically complex device fits with Trimalchio’s sense of grandeur, the garish use of a human bugler to mark the time (otherwise only attested in military contexts) fits well with the theme of Trimalchio’s unsuccessful attempts at integration into the elite.

Century CE inscription honoring Caius Blaesus Gratus' donation of horologium and attendant slave.⁸²

Slaves could also be assigned discrete tasks centered on knowing and communicating the time, rather than being entirely devoted to it (Laurence 1996: 104). Sending a slave or other attendant out to consult a timekeeping device appears to have been common practice (Hannah 2009: 137). The most frequently occurring example of this comes from writings on legal proceedings, where it appears to have been common to send out one's attendant slave to check the time and report back. Cicero includes the act as evidence of an unskilled orator that bored his audience (Cic. *Brut.* 200), implying the familiar act of watching the clock while wishing to done with a tiresome task. Martial hints at the very common nature of slaves being responsible for informing masters of the time while chastising an overly eager dinner guest, opening his epigram to Caecilianus "Your slave, Caecilianus, has not yet announced to you the fifth hour, and yet you are already come to dine with me" (Mart. 8.67.1). Here the implied method for keeping time is to have a slave announce the hour. The limitations of Roman timekeeping technology make it easiest for elites to pass on the responsibility of tracking the hour to others; regularly going to the garden (in a home with its own sundial) or to a timekeeping device in public space (in those without any personal dials

⁸² *Horologium cum suo aedificio et signis omnibus et clatris C(alus) Blaesus C(al) fil(lus) Voltinia Gratus ex HS n(ummum) X(milibus) et eo amplius ad id horologium adminislrandum serv(u) m HS n(ummum) IIII(milium) d(e) s(ua) p(ecunia) d(edil)*

or water clocks) would be an annoyance and hindrance to elites engaged in their daily commercial or leisure activities. Further references to slaves tasked with announcing the time appear in Juvenal (Juv. 10.215f) and Pliny (Plin. *Ep.* 3.1.8), both wherein an enslaved person announces particular hours that the master uses as cues for discrete activities in their day.

While the responsibility to check the time at a master's whim or to regularly announce specific times regardless of explicit instruction was one of countless responsibilities forced onto slaves, the organizational power of time also introduced opportunities for slaves. Time offered a means of recognizing and seizing the opportunities for slaves' tactics of resistance, those expedient instances of action counter to the instructions or interests of a slaveholder. Joshel and Petersen (2012: 14) note that these opportunities occurred at "openings in the regimes that ordered the lives of slaves," the loosening or existence outside of spatial and temporal bounds imposed by slaveholders. Knowing the time was likely an essential component of these tactics, as scheduled commands and behaviors would carry with them moments of potential escape from watchful eyes; a slaveholder that regularly went to the baths at exactly the 6th hour would leave behind a house without his watchful eye, for example. That slaves were also responsible for communicating the hour to others that had not directly observed timekeeping devices surely introduced opportunity to manipulate the slaveholders' time. Announcing the hour slightly early to end unpleasant assignments

(provided they were organized along short time) or slightly late to push a slaveholder behind schedule would both in themselves be tactics of resistance while also potentially creating opportunity for further unsupervised action. Those slaves that had to consult timekeeping device outside of their slaveholders' homes would also find opportunities in their trips beyond the property; there would be fewer watchful eyes specifically interested in their movements and a broader array of potential interactions (a chance to chat with friends or duck into a shop or bar, for example).

Slaves appear to have, in many cases, been in better position to know or check the time than their slaveholders. In addition to being tasked with acquiring and sharing a knowledge of the time, the prescriptions on slave movement and action often left them in situation where they could access timekeeping devices. The areas of slave occupation and labor tended to be toward the rear of Roman households, which often also housed the open air spaces like gardens that in turn would hold timekeeping devices. This is not to say that slaves found themselves confined to rear areas, as Wallace-Hadrill (1994) vitally emphasizes that slaves were both a constant presence throughout the domestic landscape and that the sharp delineation of slave/master spaces is most pronounced in the most elite of houses (which had the space to make such stark divisions possible), but rather suggests that rear areas were more frequently visited or passed-through by slaves.



Figure 4.1 - Plan of the House of the Menander (I.10.4, 14–16) marked with arrows depicting possible slave routes with sundial position in red, adapted from Joshel & Petersen 2012: 61.

Joshel and Petersen (2012: 61) map the most likely pathways for slave movement at Pompeii's House of the Menander to illustrate this phenomenon. Slave movement, shown with grey arrows, shows that regular movement across the southern face of the garden (room c) would have allowed a casual glance at the sundial installed at the north end of the garden. Jashemski (1993: 47) reported the location of the dial in the northeast corner of the garden, visible in photos of the garden from the 1960s. In order to directly face the sun, the device was oriented toward the South, and thus the back of the garden.

Walking along the waist-height wall that bounded the garden would leave a viewer no more than 15m from the device in this location, which should have allowed a viewer to read the face of the 42.3 x 33.7 x 21.5cm device. The location of water clocks throughout Roman domestic contexts is less clear from the archaeological record, but literary references to slaves' tending of such devices suggests they would also be more frequently in contact with those devices.



Figure 4.2 - House of the Menander Peristyle looking north with sundial in northeast corner. Photo by Stanley Jashemski (*The Wilhelmina and Stanley A. Jashemski archive in the University of Maryland Library, Special Collections, made available under the Creative Commons Attribution-Non-Commercial License v.4*)

Perhaps the most strict imposition of time on enslaved Romans, at least in domestic contexts, came in the form of the regulated timing of activity. Slaves' lives were choreographed along several axes, notably including the scripting of gesture and

motion and the slaveholder's timing of each (Joshel & Petersen 2012: 10). Trimalchio again presents an image of these practices taken to the extreme, with every motion and sound coordinated to the master's desire (though his orders again appearing gauche to more refined dinner guests). This choreography occurred at a highly local scale and sought synchronicity over adherence to specific time markers, thus occurred largely outside of the *chronos* made possible by short time devices as discussed here; a more useful tool would be the use of music with which to keep time or key gestures by the slaveholder, both of which employed by Trimalchio. While this sort of timing was highly determinative of slave actions and experience, timing based on *chronos* was also impactful on their lives.

The level of interest in choreographed action by slaves among moralistic writers of the Late Republic and Early Imperial periods (Joshel and Petersen 201: 11) shows, rather than a preference for *kairotic* time, a broader cultural concern for timeliness in general. As the elites about and for whom such authors wrote played such a large role in dictating the lives of enslaved Romans, this interest spilled into slaves' lives in a variety of ways. Despite being a central aspect of controlling slaves and taking their autonomy, though, time and timekeeping were also essential components of slave resistance. Knowing the time enabled rebellious acts, either intentionally carried out to harm or embarrass masters or simply to claim one's own time back from them.

Free Non-Elites

In some ways, the particular interest of elites in the regulation of those they enslaved has made the temporal lives of slaves better represented than those of other non-elites in the written record. Discussing how to best exploit slave labor, complaining about slaves' inefficiency or outright resistance, and keeping careful account of their own time created a sort of shadow account of enslaved temporality. The impacts of Roman temporal culture, and particular that of elites, on free but non-elite populations is less clearly articulated in the written record. Indeed, it is a common refrain among works interested in the ancient use of hours that their impact on daily life was minimal (e.g., Remijsen 2007; Jones 2016). There are some exceptions to this, particularly where non-elites interact directly with elites, but a sense of the role of hours in everyday lives outside of the elite domestic sphere is more fully dependent on archaeological investigations than the written sources.

The corpus of timekeeping devices at Pompeii, discussed in the previous chapter, shows that most surviving devices recovered from domestic space come from the largest and most architecturally complex houses; only a single device was recovered from a property among the bottom 50% by those measures. Even with Pompeii's role as perhaps the best preserved and most thoroughly explored Roman archaeological site, there are known gaps in the record regarding timekeeping devices. Thirty-two of the 53 timekeeping devices lack provenience information, leaving open the possibility that

some of the unidentified corpus was recovered from non-elite spaces (though this would counter the observed trends in the contextually secure objects). Larger gaps in the record, however, are likely better able to elucidate how non-elites kept time in their own spaces. Small devices of less durable materials are surely underrepresented in the archaeological record, as evidenced by the consistent discussion of water clocks in the written record compared with the relative paucity of their preservation when compared to sundials. Portable sundials, though represented through 25 known devices, were likely more common than the record suggests due to their predominate construction of bronze, often with many small parts that could easily erode or be mistaken for other objects.⁸³

While there are many references to elites relying on slaves to convey the time to them, be it through tending devices in the home or being responsible for conferring with them in public contexts, it was also possible for the devices themselves to audibly

⁸³ Portable dials made of other materials are not unknown, though are rare and are generally of different types than the metal timekeeping devices. A fascinating example comes from Jerusalem, as the dial is simply a miniaturized conical dial complete with rosette decoration. The manner of carving is similar to that found on Jewish ossuaries of the Second Temple period (Avigad 1983: 119), suggesting the device has been separated from a funerary context. The excavators do note an attachment point for a metal gnomon, which in turn may indicate that the sundials found as components of artistic motifs (as on some Roman sarcophagi) may have been functional as well as symbolic.

and/or visually mark certain times of the day.⁸⁴ Vitruvius explains the ability of water clocks to act as ancient striking clocks:⁸⁵

A regular flow of water through the orifice raises an inverted bowl, called by mechanics the 'cork' or 'drum'. To this are attached a rack and a revolving drum, both fitted with teeth at regular intervals. These teeth, acting upon one another, induce a measured revolution and movement. Other racks and other drums, similarly toothed and subject to the same motion, give rise by their revolution to various kinds of motions, by which figures are moved, cones revolve, pebbles or eggs fall, trumpets sound, and other incidental effects take place. The hours are marked in these clocks on a column or a pilaster, and a figure emerging from the bottom points to them with a rod throughout the whole day. (Vitr. De arch. 9.8.6–13 passim (trans. Oxford University Press 1914, taken from Matyszak 2017))

The workings of such a clock are complex, thus potentially leading to costs beyond the reach of those in “middling groups,” however the ability of non-elites (or “subelites,” to revisit terminology from the previous chapter) to begin their day at particular (and early) hours appears to have been important at least insofar as their interactions with elites were often prescribed to occur first thing in the day through the *salutatio*.

Unfortunately no clear examples of the exact devices described by Vitruvius survive, though perhaps the closest are fragments from the rim of a device found at Vindolanda (Birth 2014), and a more complete version of unknown origin in the Frankfurt Museum (Meyer 2019). The more simple mechanism, present on both the Vindolanda fragment and the Frankfurt device, of adjusting the date on a water clock through either marking or creating small pegs for each day and thus adjusting the device to the changing

⁸⁴ Visually, here, implying a method of conveying the time beyond displaying it on the objects face (i.e. triggering some sort of motion).

⁸⁵ With thanks to John Steele, it is important to distinguish here between a striking clock and an alarm clock. The latter, though more familiar in modern experience, sounds at a specific, predetermined time. It is more likely that the ancient devices sounded at fixed intervals of time (i.e. every hour on the hour) rather than at single points set by a user.

seasonal hours illustrates that relatively simple water clocks for seasonal hours existed in the ancient world yet are largely unattested in the archaeological record. The fact that both known devices of this type are from the northwest of the empire and relatively late in date is noteworthy, though there is no indication that the presence of these two objects is evidence of differing practices in the region from elsewhere in the empire.

While the focus in this work has largely been on surviving timekeeping devices, of which large, permanently installed sundials make up the vast majority, there is also reason to believe that smaller metal devices were much more common. Writing in the High Imperial period, Ulpian specifically mentions small metal horologia as part of the *instrumentum* of a house (*Dig.* 33.7.12.23):⁸⁶

Figures and statues fixed in place are not included in the *instrumentum* of a house but are part of the house. However, those which are not fixed are equally not included he says; for they are reckoned with the furniture, except for a bronze *horologio* which is not fixed in place; for this, he thinks, is included in the *instrumentum* of the house, just as the vestibule of a house, if it is an awning, he says, is included in the *instrumentum* of the house. (trans. Watson 1985)

The inclusion of timekeeping devices here is instructive; the objects are specifically classified as tools of daily life rather than serving symbolic functions (as seen in their distinction from statuary) and are regarded as not permanently fixed in place, unlike the vast majority of surviving sundials. While the passage makes no reference to the particular type of timekeeping device being used, any known type of device during the

⁸⁶ *Sigilla et statuæ adfixæ instrumento domus non continentur, sed domus portio sunt: quæ vero non sunt adfixæ, instrumento non continentur, inquit: suppellectili enim adnumerantur, excepto horologio aereo, quod non est adfixum: nam et hoc instrumento domus putat contineri, sicut prothyrum domus, si velamen est, inquit, instrumento domus continetur.*

Imperial period could be produced from (or predominantly from) metal, particularly at the scale that the device would be considered movable. Though surely unusual (if not totally unique) in its form, the *prosciutto* portable sundial of Herculaneum offers a glimpse into the sort of device that could be described here. Recovered from the House of the Papyri, the small bronze sundial, shaped like a leg of ham, included a grid with hour lines intersecting labeled month-lines; the device was used by aligning the shadow of its gnomon, shaped like a pigs tail, with the current month and then seeing which hour line the gnomon tip intersected. Measuring only 11.8 x 8 x 1.7 cm, the object was clearly portable, though was calculated to work only at the latitude of Herculaneum (De Solla Price 1969: 244-246). With the exception of a Byzantine period portable dial from Aphrodisias (Field & Wright 1985), the *prosciutto* dial is the only example of this sort of *instrumentum domesticum*⁸⁷ recovered from a secure domestic setting. The House of the Papyri at Herculaneum, in which the *prosciutto* dial was found, is clearly an elite residence, but the dial is also unusual in its symbolic form. Perhaps more emblematic of a non-elite timekeeping device portable in nature is the cylindrical dial recovered from a tomb near Este. The bone device consisted of a pillar shaped body with intersecting hour and month lines with a “stopper” that could adjust the height of the gnomon for its shadow to fall along the appropriate month line (Talbert 2017: 11). While the

⁸⁷ “This sort” here loosely referring to portable sundials, as the type of each of these devices are drastically different. The Aphrodisias object is a more complex “geographical sundial,” with the ability to adjust to latitudes in 5 degree increments and with 28 place names and their associated latitude listed on the object reverse (Talbert 2017: 60-64).

surviving corpus of such objects is limited, Arnaldi and Schaldach (1997) contend that the refinement of existing examples show that these “pillar” dials belong to a tradition of similar devices rather than existing as one-off works of art (as the *prosciutto* clock is commonly held to be).

While portable sundials may have been more common than the archaeological record suggests, the use of the objects inside the home would still be dependent on sufficient access to sunlight in open-air spaces. As discussed in the previous chapter, the lone property in the “middling group” category with a timekeeping device has a ground-floor area of only 115m², but even that property’s inclusion of a 5x5m garden would be unusual among the domestic contexts of most Romans.

The notable lack of timekeeping devices recovered on the exterior of domestic contexts throughout the Roman world suggests that it was uncommon for even those with the appropriate frontages to incorporate timekeeping devices in building façades. With little evidence of permanently installed hourly timekeeping devices, it appears that much of the Roman world was dependent on either publicly displayed objects or communicated times to keep abreast of the current hour. A reliance on public time, though in some ways clearly less convenient, would enable synchronization among those without personal timekeeping devices. In a temporal context that led Seneca to claim that “philosopher’s will agree more often than clocks” (Sen. *Apocol.* 2.2),⁸⁸ a

⁸⁸ *Facilius inter philosophos quam inter horologia conveniet...*

shared reliance on public time addresses some doubts present-day conceptions of time would lead to in the utility of ancient hours.

Hours and Water Systems

Much of the surviving evidence for the use of hours in antiquity relates to timeframes that may seem somewhat soft. Being late for dinner, for example, may be a serious social faux pas but this violation of the temporal expectations of Roman high society would likely not result in any official punishment. Hours were not, however, only applied to situations of convention. An important aspect of social action shaped by hourly time comes in the form of policies of resource access. Specifically, hours were an important tool for measuring access to water. Scheduled access to water created a system less exact than distribution by measure (i.e., granting each user a specific volume of water), but that was predictable, enforceable, and prevented a zero-sum competition wherein one landowner could monopolize this essential resource (Bannon 2009). The use of such schedules is most often observed away from cities, thereby also allowing insight into the role of the hour in mediating social relations in rural contexts.

Roman law made provisions for the ownership of water resources, both empowering the state and calling for the organization of agreements for the distribution of the resource. This section focuses on rural communities and their legal approaches to water rights. These communities had two main mechanisms for controlling access to

water: cooperative community agreements or servitudes (Rodgers 2018: 17), roughly the equivalent of modern easements for accessing water on others' privately owned land. The former took the form of intricate legal arrangements that included provision for the allotment of water, obligations to upkeep components of the system, and a mechanism for its administration. These agreements would be drawn up by community members or administrators, but their ultimate approval and legal force came from decrees by local or regional authorities (Bruun 2015: 143).⁸⁹ The latter option, servitudes, were necessary given the wider legal practice assigning ownership over water resources on private land to the landowner (Bannon 2009: 1). The owner of the land upon which a spring was located, then, could freely use the water it produced as well as limit the access of others to that water. Access to the water resources found on another's property, no matter how necessary to one's own lifeways or endeavors, had to be arranged either informally with the landowner or through the use of a legal servitude (ibid.).

The Alban Hill town of Tusculum can serve as a case study in the use of hours in regulating water access, as it is the site of extensive writings on water issues by Cicero, owner of a *villa rustica* there, the recovery of a timekeeping device from among the country villas in the area, and the attested use of a time-based water allotment system

⁸⁹ The Lamasba irrigation decree, discussed below, is perhaps the most famous example: the outline of the system was created by a man named Valentinus (with others) and then approved by the *coloni* of Lamasba (Bruun 2015: 143).

similar to those found in surviving inscriptions. The recovered device, a hemispherical sundial, was recovered by Boscovich during 18th Century excavations of a Roman villa northeast of the Villa Ruffinella in modern Frascati (Giorgetti 1976).⁹⁰ The initial interpretation of the site claimed that it was Cicero's villa based on the interpretation of a brick stamp reading M. TVLI (*CIL* I.1498) as proof of Marcus Tullius Cicero's residence there (Dupré Raventós 2003). The mistaken belief that the presence of a sundial was particular to Cicero (McCracken 1935) also influenced early interpreters of the site, but the villa is ultimately only one of many in the area in and around the site of Tusculum. What the timekeeping device does prove is the presence of sundials typical of the Late Republican and Early Imperial period among the villas in the area, very likely greater in number than currently survive.

Appropriately for the topic at hand, Cicero makes mention of sundials adjacent to his discussion of water rights at Tusculum in a letter to Tiro:

What arrangement is being made about the Crabra, though now indeed we have enough water and to spare, I should yet wish to know. I will send the sun-dial and books, if the weather is dry. (Cic. *Fam.* 16, 18)⁹¹

Though the juxtaposition is interesting, it is the details of the water system in Tusculum that shows how hours played a role in the regulation of resources. The Crabra, an

⁹⁰ In yet another example of a near miss in the destruction of Roman timekeeping devices, Boscovich's notes record that the dial was recognized within a pile of stones being prepared for re-use by workmen at the site (Giorgetti 1976).

⁹¹ De Crabra quid agatur, etsi nunc quidem etiam nimium est aquae, tamen velim scire. horologium mittam et libros, si erit sudum.

artificial stream that supplied water to the writer's country villa, was a municipal service for which Cicero paid an annual tax (Cic. *Leg. Agr.* 3.8). This water distribution system was the main source for a number of such villas in the area, all belonging to elite individuals but of varying social class (senators, equestrians, and wealthy freedmen) (Bannon 2009: 141). Cicero's tax, and that paid by the others to access the water, was not a free pass to draw from the stream at one's desire. Frontinus also explicitly discusses the Crabra in *De Aquis* (Front. *Aq.* 9.4-5), making explicit of access to the system occurring "on regular days and in regular quantities" (trans. Bennett 1925). Mommsen used this passage to attribute an inscription (*CIL* 6.1261), though partial, that lays out details of a cooperative water sharing agreement in which water was accessed according to an hourly schedule, to the Crabra. This attribution need not be correct to show that the Crabra was governed temporally, as Frontinus states this explicitly and Cicero corroborates that access agreements like those below were in use in Tusculum at the time.

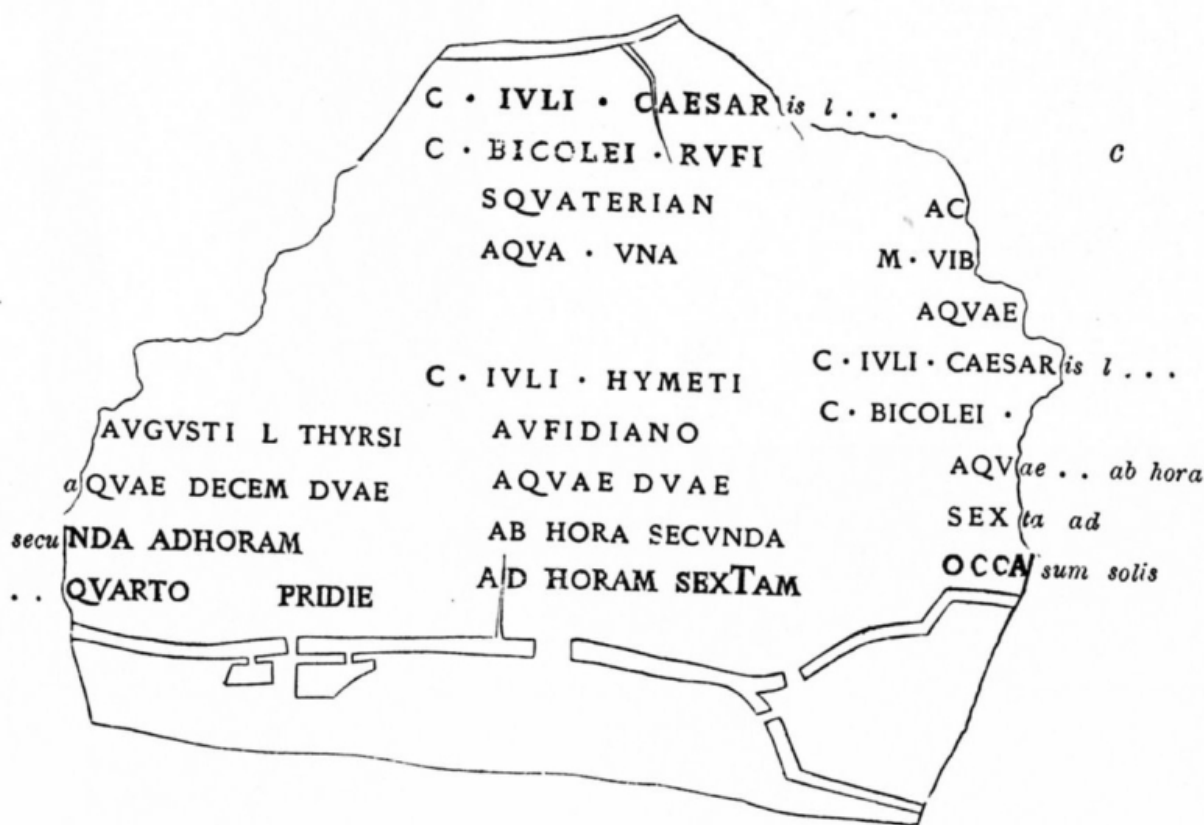


Figure 4.3 - Inscription (CIL VI.1261) with individual names and hourly allotments over a map of a water distribution system.

The inscription contains a map of the water system annotated showing access points for individuals with rights to the water it contains. The relevant annotations here include named individuals along the waterway, the point at along the system at which they would access water (i.e., “AQVAE DVAE” in the bottom center inscription) and the times that water would be available to them⁹². So, then, the example at center shows that one C. Iulius Hymetus, likely a freedman from the royal household (Bannon 2009: 141), had access to water from the 2nd to the 6th hours at the “aquae duae.” The partial

⁹² Rather than only controlling when a person could legally draw water, the times indicated may represent when water was available at a certain part of the system at all (Taylor 2000). Gaps in the map may represent sluices or gates and thus points of control for distributing water.

inscription to the right shows another individual, in this case assigned access from the 6th hour to sunset (*occasum solis*).

The use of particular hours here is interesting, especially in conjunction with using *occasum solis* as a temporal marker. Elsewhere scholars have argued that many recorded hours in antiquity served as stand-ins for a general part of the day (e.g., Llewelyn 1993, which argues that Ptolemaic post records simply used the 6th hour to mean roughly midday). In the case of the above water-rights, however, it is clear that specific hours are intended given the contiguous ranges (one slot from 2nd-6th, the next from 6th-12th) and use of hours not usually associated with breaks in the day (i.e., hours other than 1st, 3rd, 6th, and 9th). Moreover, the inscription uses a recognizable part of day as a stand in for an hour, the reverse of the relationship proposed by Llewelyn. *Occasum solis* may be used here to avoid the awkwardness of distinguishing between day and night hours, as sunset occurs at the end of the last hour of daylight or beginning of the 1st hour of the night;⁹³ granting access from the 6th hour to the 1st hour leaves open the possibility of a misinterpretation where the grantee can access water all through the night until the 1st daylight hour of the following day. Further, a clear distinction between day and night hours would be necessary to track time equitably given the

⁹³ Night hours were not inherently excluded from this type of inscription, as the first hour of the night (... *ab hora noctis primae*...) appears in a similar inscription from Tibur (CIL 14.3676).

variable length of day and night hours (and the potentially differing technologies used to measure them) (Shaw 1982: 75).

While the (real or imagined) connection to Cicero adds color to *CIL* 6.1261, the inscription is not the only example of temporal regulation of access to water resources. Many of the surviving sources on water management do not fall under the realm of servitudes, but are evidence of direct state management of water itself (rather than the access of water on another's property, as servitudes provide) (Bruun 2015: 144). Another inscription from the area of Tibur (*CIL* 14.3676) similarly portrays the channels of a water system and gives specific times that particular users can draw water. An inscription from Augustus' *Aqua Alsentina* also names allotments by time (though surviving fragments do not include references to hours specifically). The most detailed surviving temporal allotment of water rights comes from a decree from Lamasba (modern Algeria) during the reign of Elagabalus (218-222 CE), which includes temporal ranges during which particular properties were allowed to draw water from the system, as well as a preamble explaining the formulation of the decree (*CIL* 8.4440). The inscription, a table of properties and their water rights known as the Lamasba irrigation decree, provides highly detailed temporal map of the irrigation system in the region. Shaw (1982) conducted an in-depth analysis of the inscription, including a breakdown of the formula for each entry:

MATTIVS FORTIS	K CCCVIII IN H	EX H*I*D*VII*KAL*OCTOBR VS*D*EIUSDEM P P S H IIIIS
Which can be resolved as follows :		
Name of proprietor :	Mattius Fortis	
Size of property :	308 K(apita)	
Time period :	ex h(ora) · (prima) d(iei) (septimi) kal(endas) octobr(es) in h(oram) (quantum dimidiam) d(iei) eiusdem. (i.e., from 1 P.M. on the 25th day of September until 5:30 P.M. on the same day)	
Total time :	p(ro) p(arte) s(ua) h(ora)e (quattuor et) s(emis) (i.e., for his plot, a total of 4.5 hours)*	

* Schmidt in *C.I.L.* suggested different readings, such as *p(ro) p(ortione) s(ua)*, but the meaning remains the same.

Figure 4.4 - Shaw's (1982: 71) guide for reading entries of the Lamasba Water Decree.

The decree not only lists specific dates and times, but uses hours in multiple ways. Each entry, after defining the owner of a property and its size, presents both the start and end times of a given water allotment but also then reiterates the total length (in hours) of each. In the above example, one Mattius Fortis was to draw from the water system from the 1st hour to the middle of the 5th hour,⁹⁴ which the decree then clarifies as 4.5 total hours of time to draw on the water supply. The time of Mattius Fortis' allowed usage is clearly marked by the hours, which suggests either the expectation of reasonably synchronized timekeeping between the authorities charged with meting out the resource and between the consumer or a degree of active monitoring of usage (again along temporal lines). Further, hours are clearly used here as a unit of measure to ensure fair distribution of a finite resource. There is clear evidence that water rights were

⁹⁴ Counter to the translation provided by Shaw, *hora prima* would refer to the first hour of the day rather than 1pm. As a general guide, sunrise in Algiers on September 25th occurs at 6:38am, which would mark the begging of the *hora prima*. As the date presented happens to be shortly after the fall equinox, the seasonal hours would essentially be as long as a modern hour.

distributed along temporal (days and /or hours) lines as well as volumetrically in antiquity (Maganzani 2018: 97). Shaw (1982) argues that time was the standard measure of water access wherever a reasonably constant supply was present (as in the case of the perennial spring he identifies as the source of the Lamasba water supply), typically measured down to the half-hour, and that water distribution was sometimes based on a mathematical formula of time units (half-hours) per land unit. Not only were half-hour units the smallest division found in water distribution schemes, but sometimes they made up an entire allotment: a date orchard in Judea was granted a single half-hour of watering per week (Cotton & Yardeni 1997: 212). The Lamasba decree cites times on specific days over the winter, a period in which the region sometimes faced potentially catastrophic droughts and thus sought to create an equitable distribution of water from a perennial source (Maganzani 2018: 92). Legal digests also show, though, that temporal restrictions could be employed even where water was abundant:

The right to conduct or draw water over the same place can also be granted to several persons; and this can be done on different days, or at different hours. Where the water-course or the supply of water to be drawn is sufficient, the right may be granted to several people to conduct the water over the same place, on the same days, or during the same hours. (*Dig.* 8.3.2.1–2, trans. Maganzani 2018)⁹⁵

Even where water was abundant enough to be drawn by multiple individuals at the same time, the framework of hourly schedules remained an acceptable option for

⁹⁵ *Aquae ductus et haustus aquae per eundem locum ut ducatur, etiam pluribus concedi potest: potest etiam, ut diversis diebus vel horis ducatur. Si aquae ductus vel haustus aquae sufficiens est, potest et pluribus per eundem locum concedi, ut et isdem diebus vel horis ducatur.*

distributing the resource. Indeed, Pliny mentions time restrictions on the waters of the oasis at Tacapae in modern Tunisia even though the source supplied water for three miles in every direction.⁹⁶ The presence of temporal restrictions even in the face of abundance shows that these hourly allotments were not only in the interest of equitable resource distribution; they could serve as a backstop to manage water resources during particular times (especially times of drought) and played a role in mediating social relationships among members of the cooperative. Through managed temporal access, competition for the resource could be avoided. Further, such a system likely arose in response to antisocial or inequitable practices, as without enforced guidelines those upstream would have inherent advantages in accessing water and in determining how much they would draw. Temporal restrictions, in particular, allowed for equitable access no matter the flow rate, as (at least in a daily scheme), access to water would be granted along lines irrespective of high or low flow. Many system did somewhat work around natural water flows to ensure sufficient water, as in Lamasba where the time schedule also included provisions for the filling of stages (*scalae*) along the system during the hourly distribution schedule. This system is seen in the Lamasba decree, where at least 4 *scalae* are attested, one of which is said have been given one hour to fill prior to

⁹⁶ *Ternis fere milibus passuum in omnem partem fons abundat, largus quidem, sed certis horarum spatiis dispensatur inter incolas* (Pliny, *N.H.* 18.188–9)

There is a spring that distributes water over a space of three miles in every direction, giving a generous supply, but nevertheless it is distributed among the population only at special fixed periods of the day (trans. Bruun 2015).

allowing individual access (Shaw 1982: 74). The main irrigation channel of each *scalae* was apparently filled before individuals drew water from it, and once allotted times in that stage were complete the water would be allowed to flow further downstream to the next.

The listing of total time allotted per individual in the Lamasba irrigation decree gives some insight into the technologies of timekeeping at play in hourly water distribution throughout the Roman world. The approved hours for an individual to draw from the water supply can here be measure in multiple ways; marking the beginning and ending of the provided window (i.e. calibrating a portable sundial or water clock near the site and watching for the correct time to begin and end), by measuring the elapsed time water usage from its beginning, or by using a water clock as a timer (filling a water clock to track the allotted time and ending use once the device was out of time). The first method could be enacted with either a sundial or water clock, as it relies only on an indication of the current time. The second calls for the use of other timekeeping technologies like a chronograph, the type of timekeeping device that measures time passed rather than indicating the current time. Throughout the ancient world, these tasks were carried out by water clocks, as they could count a specific number of hours. While the distinctions between these timekeeping methodologies are minor, the technological abilities needed to pursue each informs the choice of technology for a given task. The use of water clocks in the regulation of water systems

intuitively makes sense, as the requisite materials (water) are sure to be at hand, and also allows for the tracking of nighttime measures where present in surviving inscriptions.⁹⁷ In the broader social network surrounding complex structures and agreements like water distribution, multiple timekeeping technologies were likely employed; even if a water clock was used to track water usage by an overseeing authority, for example, a consumer may have relied on a sundial for their own cue to begin their interaction with the system. In some cases, a consumer may not have even needed a timekeeping device, if for example they were to begin their watering at sunrise and could rely on authorities to enforce a stop at the end of their allotment.

The corpus of surviving Roman water clocks is small, but recent discoveries have recognized devices with potential implications for the temporal management of water. The Frankfurt clepsydra, a bronze calendrical water clock, is perhaps the most relevant such object. The device was recently brought to the fore by scholars interested in issues of short time in antiquity (Meyer 2019)⁹⁸, following the excellent monograph on the object published by Stutzinger (2001). While the device was received from a private

⁹⁷ It should, however, also be noted that a calendrical water clock (one that tracks the days in order to tell hours of the appropriate length) would be calibrated specifically to daylight hours. For example, if a device could be set to tell track a seasonal hour on a day in mid-May, it would not accurately also tell the (longer) nighttime hours on that date. This could be worked around by setting the device to a date with an inverse relationship of daylight to nighttime length: to return to the example of Algiers above, May 10th has daylight for the equivalent of 14 modern hours, so in order to track nighttime hours on that date the device would have to be set to November 23rd, a day with 14 hours of night. However, no record survives of such calculations being made in the use of ancient water clocks.

⁹⁸ Meyer gives credit to Alexander Jones for the initial recognition of the device's nature.

collection and thus has no provenience information, it is similar in form to fragmentary objects from more remote sites at Vindolanda (Meyer 2019; Birth 2014) and Hambledon (Pearce 2017), as well as objects in collections in Salzburg and Grand (Lewis 2009, though Birth 2014 differentiates these from the other examples). The Frankfurt device, by far the most complete, is a small bowl-shaped object marked around its rim with the inscribed names of the 12 months, the *kalends*, *nones*, and *ides* of each, and the equinoxes and solstices. Along the interior of the bowl a series of soldered dots along the axis of each month on the rim mark out the twelve hours of the day, with lines linking the corresponding dot for the next month. Along with the textual description of days, the rim also contains 368 hash marks, one for each day within the month plus an additional $2\frac{3}{4}$ days for the Julian calendar (apparently a result of scaling the marks to the size of the object, see Meyer 2019: 8 and Turner 2000: 538). The Vindolanda and Hambledon examples survive as similar rim fragments with inscribed month and day names and small holes serving as days within them, each hole equating to 2 days. The Frankfurt device (and, it is assumed, the no-longer extant portions of the other examples) contains an outflow hole in the bottom that would be plugged to fill the device and then removed to begin keeping time. This class of device could be used as a clock for the full 12 hours of the day by filling them to the uppermost mark for a given day and starting the outflow at sunrise, used as timers by filling to the appropriate mark for the number of hours to be counted (i.e. filling to the 4th mark from the bottom on a given day's date

to track four hours), or as a chronograph by beginning the outflow at the beginning of an activity and stopping it at the conclusion, tracking how many hours had passed. There is not explicit evidence of which of these methods was employed with this particular device, though all were possible without modification of the device itself or its core operating mechanism.

The utility of this technology to the management of irrigation agreements is apparent through its nature, as time could be tracked in any of the three methods outlined above using a small amount of the resource being monitored itself, water. The Frankfurt device contains further evidence of its relationship to water management issues through an inscription on its side:

Mapilius Mapilianus subpraefect of the waters of Borvo made [this clepsydra] from scrap bronze and the signal (?) in accordance with a vow. He fulfilled [that vow] freely and deservedly. (trans. Meyer 2019)⁹⁹

Meyer (2019) interprets this inscription as evidence of the object's connection to Borvo, a Gallo-Celtic deity of healing and water, and thus goes on to connect the device specifically to a bath complex. The association between Borvo and healing and the apparent alignment between the hour markings on the interior of the device and hours commonly associated with the function of bathing complexes based on the presence or absence of the above-mentioned soldered dots, for which Meyer refers to the specific times for the operation of baths mentioned in the city charter of Vipasca in modern day

⁹⁹ *Mapil(ius) Mapilianus su(b)pr(a)efect(u)s aquarum dei Borvoonis ex aere fracto excitatoriam f(ecit) ex voto s(olvit) l(ibens) m(erito)*

Portugal as an example. While there is a connection between this device and Borvo, and between Borvo and healing springs, interpreting the inscription in the context of water management rather than the operation of baths both better addresses the inscription itself and illuminates the broader temporal culture of water agreements.

While Borvo appears mainly in votive inscriptions seeking healing, the deity is also associated with springs, mineral and hot springs in particular, and has been argued to be connected to rivers more generally (MacCulloch 1911: 182). Borvo appears in 21 known inscriptions,¹⁰⁰ 12 of which alongside the goddess Damona. The pair are generally regarded as related to hot springs and the baths, largely owing to the provenience of 10 of the above inscriptions being recovered from Bourbonne-les-Bains, renowned as the site of mineral springs, and another 4 from Aquae Bormonis.¹⁰¹ One inscription to Borvo (*CIL* XIII, 5913)¹⁰² was recovered from the Roman catchment basin of the hot springs of Bourbonne-les-Bains (Chabouillet 1880), which has interesting implications for the role of the deity. This findspot argues for the deity to be associated with the spring itself, the efflux of water rather than the administration of bathing in it. The site is also the location of a remarkable amount of coin offerings to Borvo (and Damona), with over 4,000 coins recovered from the spring, almost 90% of which date to the Augustan period (Sauer 2005). A direct association with a healing mineral spring

¹⁰⁰ According to a search of the Epigraphik-Datenbank Clauss / Slaby (EDCS).

¹⁰¹ So named after

¹⁰² Deo Bor/voni / Vita/lia / Sas/sula / ex vo/to

doesn't preclude the use of temporally restricted access to water itself (rather than the operation of a bath complex receiving that water), as the general relationship of the deity to flowing water, the phenomenon Shaw (1982) identifies as the main context of hour and half-hour based water restrictions, remains.

Mapilius Mapilianus' position as *subpraefectus*, a title found in association with municipal offices like the *Vigiles Urbani*¹⁰³ or the *Cura Annonae*¹⁰⁴, further suggests a tie to the management of resources. Beginning with Augustus, the *Praefectus Urbi*¹⁰⁵ counted among its many charges the management of Rome's water supply, suggesting parallel positions may have called on *praefecti* and their *subpraefecti* to fulfill similar roles outside of Rome itself. For example, *subpraefecti vigilum* and *annonae* are attested at Ostia (*CIL* XIV, 4389;¹⁰⁶ *CIL* XIV, 4397;¹⁰⁷ *CIL* XIV, 4398)¹⁰⁸, Aquileia (*EAOR*-02, 00004)¹⁰⁹, Concordia Sagittaria (*CIL* V, 1877),¹¹⁰ and others. The issue of clearly identifying both the office of Mapilius Mapilianus and the office which would be responsible for monitoring timed access to water resources is not entirely solvable, especially in this

¹⁰³ As in honorific funerary inscription *AE* 1975, 00480.

¹⁰⁴ The title *subpraefectus* appear below the *praefectus annonae* in the time of Marcus Aurelius, before which the support role was called the *adjutores* (D'Escurac 1976: 50).

¹⁰⁵ An essentially different office from its Republican period predecessor of the same name (Smith 1875: 953)

¹⁰⁶ ...[M(arco) A]urelio Valenti[no subpraef(ecto)] vig(ilum)...

¹⁰⁷ ...Spectato subpraef(ecto) vig(ilum) v(iro) e(gregio)...

¹⁰⁸ ...Valerio Alexandro v(iro) e(gregio) / subpraef(ecto) vigil(um) item / Iulio Magno v(iro) e(gregio) subpraef(ecto) / annonae v(ices) a(gente) subpraef(ecti) vigil(um) / cohortes septem vigilum Gordianae.

¹⁰⁹ ...Daciae Apu]lens(is) subpraef(ecto) / [annonae pr]oc(uratori)...

¹¹⁰ ...[I]leg(ionis) X Ge[m(inae) sub]/[pr]aef(ecto) vi[gil(um) proc(uratori)]...

case given the lack of provenience information for the Frankfurt clepsydra. The large number of sometimes overlapping titles for those that oversaw water systems also poses challenges: Frontinus controlled Rome's water supply through his appointment as *curator aquarum* (Rogers 2018: 12-13), legal digests point to *praetori* that managed water systems (Maganzani 2018), and other more general terms like *aquarii*, a term also used for water sellers outside of civic administration (Rogers 2018: 13) are sometimes applied to officials charged with water systems. *Praefecti* sometimes appear as the named enforcers of communal decisions in the Late Republic and Early Principate, along with *magistri* (the most common term) and *aediles* (Beltrán Lloris 2006: 174-175). These titles also vary over time, with different offices being granted particular roles over the course of the empire or with the rise of new terms for both established and new positions. One concrete link between the office of *magister pagi* and timekeeping exists in the form of a dedicatory inscription for a horologium from Uchi Maius in modern day Tunisia, where public funds were used to construct the device in honor of the emperor (either Hadrian or Antonius Pius) in recognition of his assumption of the office of *magister pagi*.

The inscription on the Frankfurt device also names an *excitoria* as part of Mapilius Maplianus' gift, which Meyer (2019: 9) interprets as a signaling device, like a bell, connected to the clepsydra. *Excitoriam* appears to only occur elsewhere in a 16th

century pseudo-dialogue by Juan Luis Vives, though it is again in reference to a timekeeping device:

I set up my signaling horologium here, and I marked the fourth hour in the morning for I did not wish to sleep any longer (Vives 1618: 125-126).¹¹¹

Though from a substantially different time, Vives' dialogue shows the use of a device like the Frankfurt clepsydra to keep time in a way that cannot be achieved with a sundial. By setting the device to signal a particular time, the horologium in question is being used to mark a particular time for a passive user, one who is not relying on paying direct attention to a timekeeping device to know when a particular moment arrives. This is likely the sort of relationship that would exist between anyone overseeing a water system and their timekeeping, particularly given other tasks that need doing beyond the interest of a water consumer (i.e., filling *scalae* prior to the beginning of a water allotment, opening gates or sluices to allow further flow to later parts of the system after an allotment, etc.). While the particular term used on the Frankfurt device is rarely attested, the concept of clepsydrae used as alarm clocks is well known, most notably seen in Vitruvius' crediting of the invention of such a technology to the Hellenistic mathematician Ctesibius of Alexandria (Vitr. *De arch.* 9.8.4).

¹¹¹ *Colloca hic mihi horologium excitatorium, & obicem insigito in horam quartam matutinam neque enim volo diutius dormire.*

Despite being the best preserved example of what Meyer has termed the calendrical clepsydra, the Frankfurt device would not have been useful for tracking the sun or stars (i.e., carrying out a calendrical function rather than being calibrated to a known date) (Meyer 2019: 8-9). Rather than tracking days itself, this type of device was clearly designed for tracking hours on a known date, suggesting its use by people that knew the date from other sources. The possession of such knowledge can be safely assumed for administrators in the time of the Roman Empire, as even where local calendars continued to exist there would be pressure to use the Julian calendar to interface with imperial authorities (Feeney 2007: 210). Surviving water cooperative agreements sometimes include particular dates on which water is to be accessed by a given individual, thus betraying a knowledge of calendar date and a reasonable expectation to find adherence to those dates by administrators and users.

The apparently portable nature of the calendrical clepsydra type, though not certain for want of a fully intact example, also further support the Frankfurt device's use in water management. Meyer (2019: 10) points to a passage from Lucian in which the author praises the architect Hippias (*Luc. Hip.* 8) for including two timekeeping devices in the bath he designed and built:

Moreover, it is beautified with all other marks of thought-fulness—with ... two devices for telling time, a water-clock that bellows like a bull, and a sundial (trans. Harmon 1913).¹¹²

¹¹² ... ὡρῶνδὲ διττὰς δηλώσεις, τὴν μὲν δι' ὕδατος καὶ μυκήματος, τὴν δὲ δι' ἡλίου ἐπιδευκνύμενον.

Lucian's use of μυκήματος, roar or bellow, suggests a device similar to that attributed to Ctesibius by Vitruvius, a pneumatic signal that may more likely function with a permanently installed object. The example of Hippias' bath shows that a water clock with an alarm, as the Frankfurt device, was sometimes utilized in bath complexes directly. This type of device could also be useful in the administration of water rights, though. Returning to the Lamasba agreement, the preamble of the cooperative agreement names a small cohort of arbitrators that built the agreement, with the name of one member, Valentinus, surviving (Shaw 1982: 70). Valentinus is not given a title, suggesting he was not a member of the local administration, though the participation of other officials cannot be clearly proven or disproven. While the enforcement mechanism of cooperative water agreements is often not explicitly laid out, Beltrán Lloris (2006: 190) argues that the *magistri pagi* (a title sometimes replaced with *praefecti*) is likely the office typically responsible.

The regulation of water systems along short time scales, likely using the type of timekeeping device found in the Frankfurt device, is clear evidence of the impact of hours on Roman life. Notably, the cooperative agreements and servitudes discussed here are rural phenomena, offering evidence of the hour's influence outside of city life. There is a long-standing trope of time in rural contexts as a romanticized "other" to time in cities (Van Oyen 2019: 2). While conceptions of rural time as task-oriented and thus outside of scientifically measured time has been strongest in discussions of modernity

and the impacts of mechanical clocks (see, for example, Thompson 1967), even ancient Roman authors advocated for inherent difference in urban versus rural time. Whether it be reflections on the supposed Golden Age of country life found in Virgil's *Eclogues* or Pliny's accounts of his unstructured days at his rural villa, where he wakes when he wishes and his day has "no fixed time having been measured out" (Plin. *Ep.* 9.36.3),¹¹³ the idea of the country as unrestrained by the measured hour permeates discourse from antiquity through to today. The use of hours in rural water management, however, shows that rural contexts were not only able to keep hours in the same way as urban contexts, but also that they further developed specific deployments of measured time to meet rural needs. This latter point allows that some differences in the use of hours exist between urban and rural, just as they exist between any variations in context and purpose, but to discount the role *chronos* from rural settings out of hand shows clear bias toward the romanticized view of country life that has influenced discussions of temporality for so long.¹¹⁴ Indeed, the inclusion of half-hours in water decrees, along with surviving evidence that such limits were not only conceptual but actually enforced, shows some of the most refined timekeeping practice outside of astronomic contexts. The claim that civil and administrative employments of short time were never

¹¹³ Neque enim certum dimensumque tempus

¹¹⁴ Van Oyen 2019 offers the best discussion of this phenomenon in relation to the broader temporalities of country life.

based on units smaller than whole hours (Jones 2019: 129; Remisjen 2007: 140)¹¹⁵ is clearly not the case in water administration. While the only surviving ancient timekeeping devices that specifically denote half hours are two sundials (Houston 2015: 203), both without secure dating for their construction, it is a fairly simple task to divide an hourly mark in half given the evidence that the concept of a half hour existed in antiquity (at least by the time of the High Empire).

Beyond only illustrating the existence of hours in rural life, water sharing agreements provide an example in Roman law where using specific hours is necessary in individual lives. Indeed, legal references dated to the Early Imperial period on water servitudes suggest that accessing water outside of one's prescribed time constraints could lead to forfeiture of their water rights (*Dig. 8.6.10.1*). The level of temporal detail imparted in the above inscriptions, especially in light of potential consequences for violation of time-based regulations, are clear evidence of the impacts of hourly time on daily life. Local civil administration clearly utilized hourly time both to guide permissible behavior and as units of measure for calculating and dispensing resources. While there is no evidence of the exact mechanism policing of temporal access to water, as in an administrator with calendrical clepsydra looming over each approved use of

¹¹⁵ This claim may appear more strongly stated than the authors intend; Jones cites Remisjen, and a close reading of Remisjen suggests that the claim is specifically applicable to civil (as opposed to military) postal systems.

the water system, the repeated presence of decrees using temporal frameworks and of legal references to the violation of such terms proves their enforcement.

The use of temporal limitations allowed hours to directly affect the individuals that relied on managed water systems. The indication of a particular time became, in effect, commands as Landes (1998:2) describes time discipline in the modern world; one could only carry out the essential task of watering arable land within the temporal framework issued by decree or agreement and indeed had to in order to avoid ceding their rights of access (as seen in *Dig. 8.6.10.1*). As noted by Glennie and Thrift, the creation of such a framework is not simply technologically determined by a single timekeeping device, but rather those devices are “key elements in *networks of interaction*” (2009: 72); timekeeping devices allowed the segmentation of the day into smaller units that could in turn be used to synchronize activities or place temporal restrictions, but the actual operation of such structures depended on many factors. In rural contexts, for example, the greater distances between residences suggests that, in order to remain punctual under an hourly scheme, each property had some ability to track time (or, at least, the excess labor force to allow for approximations and waiting). Additionally, the human actors involved in enforcing and using time-based systems would have also functioned broad networks. While water decrees like that from Lamasba name only the owners of a particular property, there were wider networks involved in taking advantage of the temporal windows allowed. Owners of large estates

would likely have masters, overseers (see Cato *de Agr.* 1.2), and workers all working with some degree of coordination (see Columella *Rust.* 2.2.22) in addition to the interactions with both neighbors and authorities that a managed water system would entail.

Bannon (2009: 125) argues that the system of servitudes in place by the late Republic and early Empire is the formalization of what she refers to as the “neighborliness” that governed rural social networks previously; conflicts had been resolved between and among neighbors without the involvement of proper authorities but intensification of water use lead to greater involvement of the state in such affairs. This system of mediated neighborly interaction further evidences the ability of hours to mediate social relations, as the time unit came to serve as a key component of the equitable distribution of resources. The granting of a servitude for access to water was an inherently asymmetrical relationship; one landowner had water and another needed to access and use it, often at no direct benefit to the former (Bannon 2001). The hour’s (or half-hour’s) role as the unit of limiting such access allowed the temporal unit to shape these asymmetrical relations. The system is also particularly Roman in origin, seeming to develop in the *suburbium* surrounding the city before its eventual adoptions across the empire (Ronin 2018: 108).

The use of hours in water sharing cooperative agreements also show the power of short time on social relations, notably in their ability to empower those

disadvantaged in a water sharing system. Water sharing agreements, in general, are formalizations of expectations and informal codes of conduct. These formalizations become desirable especially where existing systems are complex and/or serious enough to seek the intervention of authorities in maintaining them (Beltrán Lloris 2006: 187). In the case of Lamasba, authorities appear to have taken an active role in creating an agreement by appointing the cohort of arbitrators to draft the document, to then include the system's users by seeking the approval of the local population. The preamble to the decree shows that unformalized agreements were being abused to the point that the *coloni* sought state intervention (Shaw 1982: 69-70). Hours became the basis of defining and enforcing individual action in the communal system. These temporal restrictions would limit the ability of some parties, such as those in the upstream portions, to abuse their privileged access to the water system at the expense of those downstream. The hour also functioned as a protective measure for smaller landowners dependent on the irrigation system, as the application of a land area to time allotment formula was applied across the decree, limiting the ability of more influential members of the community to argue for privileged access on the basis of economic output or luxury needs. Even if members of the irrigation community were unequipped to track hours themselves, water sharing agreements clearly laid out expectations and punishments for their violation (such as fines in the *Lex Rivi Hiberiensis* of Hadrianic Spain (Beltrán Lloris 2006)). Those suspecting violation of the temporal restrictions of the timed

allotments of water could call on the state to take some sort of official measure to determine if water rights were being abused; relations between individuals were mediated by hours and the state was able to establish itself as the arbiter of those hours.

Conclusions

The physical presence of timekeeping devices in the Roman world and those objects participation in broader assemblages of Roman life effected the use of a particular artificial sense of reality, a culturally contrived and shared division of daily time. Writing on the earliest examples of urbanism, Liverani argues that the creation of standardized, conventional relations was a key factor in the rise of centralized and impersonal administration (2006: 59), and the Imperial embrace of hourly timekeeping is a continuation of those efforts. By enacting a system of seasonal hours, timekeeping devices in the Roman Empire made a particular artificial subdivision of reality accessible to, and impactful on, people across class and status lines. The complex nature of cultural relationships to time mean that everyday practice situates any human actor within many different systems of time and timekeeping (Moran 2015), from rising with the sun to drawing water based on the hour, and the widening employment of hours in Roman contexts allowed for a type of time that was particularly attuned to measurable distinctions to become increasingly utilized; sundials and water clocks, as Smith argues about the efficacy of assemblages more broadly, “established the facts” of a particular material order (2015: 15) and therefore the practices that come along with it. While the

examples laid out in this chapter are far from exhaustive, they show the breadth and depth of hours impact on the social lives of people across class, location, and status in the Roman Empire. Jones contention that hours were “seldom invoked” in private life in antiquity (2016: 28), a common misconception in discussions of time in the ancient world, takes ancient written sources too literally; if considers only written accounts of hours used to organize private life, as the ancient sources that proclaim the proper time for hosting dinner is the 9th hour, one misses both the wider usage of hours and, perhaps more importantly, the cascading impacts of a timed event at a wealthy house. Laurence compiled a list of 12 daily activities that were organized along hourly lines for his discussion of urban life at Pompeii: public business, operation of the baths, the workings of the Temple of Isis, the *salutatio*, financial business, rest, dinner, the operation of *popinae*, games, the opening hours of shops, *mercennarii*, and the law courts (Laurence 1996: 106). These examples alone show that expectations on timing and timeliness could impact life across the spectrum of individuals in and around the city.

Elites, for example, faced social expectations on their hourly time, with pressures to perform particular duties or attend certain functions at precise times; one could be late to dinner, could receive guests at an unusual time, or fall victim to moralistic critique if their timing did not adhere to widely held social expectations. The particulars of these expectations need not be universal to show the influence of hours, but rather the very notion of a proper hour for aspects of social relations is the core notion at play.

These temporal restrictions were simultaneously limiting, forcing actions to take place at particular times no matter the whim of an elite actor, and empowering, granting individuals (particularly elites) a degree of control and influence over the actions of others. The elite that sought to enjoy a trip to the baths , for example, was beholden to the schedule of that municipal service. The *salutatio*, on the other hand, allowed patrons a known and limited window of interaction with clients who would then likely adhere to their patron's schedule for a substantial portion of the following day. Even where action could be coordinated without specific hours, as in the case of the *salutatio*'s traditional beginning at dawn, the use of hours to define the endpoint of that activity (after the second hour) constrained when a patron was released from the expectation of receiving clients in that way. Variations in scheduling no doubt exist, passed on in the record of exhortations for those that don't keep to "proper" schedules among other sources, but the interplay between officially timed happenings, social expectations of timeliness, and the availability of hourly timekeeping devices across the empire (see Chapter 4 for discussion of the breadth of timekeeping devices' distribution) show that the hour was invoked in private life more often than a surface reading suggests.

The impact of a scheduled event also expands much further than the particular individual or individuals addressed in written records. As this chapter shows, the enslaved and free people of lower standings were temporally impacted by the schedules of elites. Keeping to a schedule requires substantial underlying work, like the

preparation of a meal or the operation of a bath, that, in the case of written records on Roman hours, almost exclusively fell on individuals not explicitly mentioned in the texts. Enslaved individuals working in elite households had a host of temporal obligations to attend to, from preparing the house and meal to the very observation and communication of the hour itself. That the hour served not only to impose structure on an enslaved person's day but also created opportunities for resistance further illustrates the complex interplay of hourly time and private life.

The reach of hourly time into social life is perhaps best illustrated by the rural example of temporally based water rights. Hourly time also appears to have reached into the water systems of Roman *suburbium*, though the Tusculum water map, and may have been applied to urban water systems as well, as Frontinus shows that days and measures were applied to water access in urban contexts. However, both the rural nature of the documents centered on more remote locales and the fact that they are typically studied as administrative in nature, water servitudes and cooperative water decrees highlight how the hour reaches beyond the urban elite (and the networks around them) to impact social life. Rural settings were not isolated from the keeping of hours, as depicted in romanticized stories from antiquity to the present, but instead offer some of the most essential examples of keeping hourly time. A lack of access to water could be catastrophic for the economic survival of rural interests, and the hour's role is especially highlighted by the use of un-utilized timed access to revoke water

rights entirely. While water rights, either servitudes or cooperative agreements, were enforced by imperial or local authorities (as seen in legal digests discussing water cases and as implied by the discussion of the Frankfurt calendrical clepsydra above), they were socially arranged and impacted interpersonal relations.

CHAPTER 5: HOURS AND THE IMAGE OF THE ROMAN CITY

NE VIATOR ABERRET
(*Alleins, France, Date Unknown*)

The introduction of short time in the civic sphere was an early innovation in Rome, with the first clear evidence pointing to the practice of subdividing the daylight hours occurring through a crier announcing the sun's passage from at least 450 BCE (Wolkenhauer 2020: 218). Hours themselves were introduced into the public realm in the city by 295 BCE (*ibid.*), going on to expand in usage and reach as shown by the large collection of timekeeping devices disbursed across time and empire as discussed in previous chapters. As Dohrn van-Rossum (1996: 126) observes in the case of the introduction of mechanical clocks in the middle ages, the introduction of daily time generally, and the hour specifically, was not only a technological development but also a social innovation. Hourly time in public space introduced a new means of organizing and coordinating city life, and thus a new way of understanding that life. With the increased spread of timekeeping devices outlined in Chapter 3, cities in the Roman Empire came to increasingly rely on hours and the devices that made them possible as

symbols of civic identity; Roman cities were a place of particular tempos and schedules, each structured on a system of measuring time that was sharply defined. Further, that system of measurement was universally usable, despite containing variations based on season and location, as sundials and water clocks divided the day and night into their respective 12 equal portions wherever installed.

In Scott's influential *Seeing Like a State* (1998), systems of measurement are shown to be integral components of state apparatuses' ability to understand and control. Hourly time is largely absent from the work, except in the context of labor after the industrial revolution, however the general observations on measurement systems remain relevant for short time. Hours served as means of making the temporal ordering of a place legible, to use Scott's terminology, to outsiders. For the Roman cities under discussion here, those outsiders may consist of other Roman's new to a particular city or those whose trade or travel had lead them to encounters with Roman temporal culture previously. This legibility was achieved in two ways, through shared tempos and rhythms of life and through consistently applied rules on what makes an hour. First, one could expect many temporally ordered activities, such as the opening of the baths or the beginning of a dinner party, to begin at a predetermined hour. While there were certainly variations in custom across an empire so vast, as well as dinners hosted at locations without nearby sundials to gauge the time, the breadth of literary and artistic references to specific times for certain activities shows that ordering those events by the

hour was fairly common. Secondly, seasonally (and locationally) varying hours could be read and reckoned in any place, no matter how much variety one encountered in the length of each hour in the day: the ability to read a sundial in Trier allowed one to read a sundial in Alexandria despite the local differences in the sun's arc across the sky or the intricacies of the local water supply (in the case of *clepsydrae*). Public timekeeping devices opened this legibility to the general populous, while maintaining the association of such ordering and the civic or state authorities.

Chapter 3 highlighted the trends of hourly timekeeping across the Roman Empire and Chapter 4 discussed the ways in which the hour shaped interpersonal interactions. This chapter explores the ways that hourly timekeeping became a locus of Roman identity, and particularly civic identity, through shaping the conception of Roman cities. The ability to create meaningful signs and symbols in urban life, like Scott's legibility, is also central in Lynch's (1960) *The Image of the City*, which seeks to explore the formation and spread of the mental image(s) of a city held by its citizens. Lynch argues that urban design is a "temporal art" (ibid.: 1), meaning that the conception of place is formed over time and evolves alongside both the built environment and the populous that navigates it. The phrase "temporal art" is here expanded upon to show that rather than just taking place over time, the design of cities and the experiences derived from it occurred within the context of a timekeeping system and the time discipline it effected. Favro (1996) has applied Lynch's model of the

urban image to the Augustan Rome, noting that the idea allows scholars to move beyond biases in surviving contemporaneous descriptions of cities¹¹⁶ and to more accurately capture the means by which information about cities was conveyed in antiquity. Ancient Romans built their understanding of a place through direct experience, art, and stories. Literacy rates in antiquity would have prevented the majority of people from engaging with the written discourse, though the settings of theatrical performances and the content of orations would also convey degrees of information about one's own and other places in the Roman world.

While the surviving records of elites and their engagements with short time are fruitful and do much to explain both how timekeeping devices came to be where they were and why particular objects and locations were selected, those perspectives were not the only lens through which an urban image could be constructed. The Roman ideologies or concepts known to us are often those communicated by patrons and elites, but the reception of those ideas would have been tied up with the identities and perspectives of the viewers and users of the devices. What is applicable across the many and varied identities of the Roman Empire is that timekeeping devices had the ability to shape practices and concepts, and that the systems of time they effected did so in particular ways. As discussed in the last chapter, the framework that hours imposed on

¹¹⁶ Namely, the lack of non-elite perspectives and an outsized representation of the cities of the Hellenistic East in surviving examples (Favro 1996: 4).

a day could be more or less enforced and more or less an axis of power. Any tool can be used multiple ways, some of them counter to the interests of its makers or patrons.

In order to identify the efficacy of timekeeping devices in shaping urban image, this chapter both shows that timekeeping objects were used as key symbols of individual places and that the devices came to serve as identifiably Roman features of city life more broadly. First, this chapter explores the use of timekeeping devices as landmarks that define either particular cities or spaces within them. Artistic representations of timekeeping devices in place provide evidence not only of the prominence these devices could hold, but that they came to serve as markers of their broader contexts. The inclusion of sundials on the glass souvenir flasks of Puteoli, decorative flasks with schematic maps of the city's landmarks intended for sale to travelers (Popkin 2018, discussed in depth below), evidences the place of timekeeping among the defining features of a city. These objects are uniquely situated to study the presentation of a city's identity to outsiders, as they compile the features of Puteoli that both defined its individual character and illustrated its connection to Rome.

After establishing this defining characteristic of timekeeping devices in public space, this chapter goes on to investigate the spread of those devices in public *fora* across the Roman empire and the significance of this distribution. These devices were centrally and prominently placed in areas of broad social action. Writing on early-modern England, Glennie and Thrift argue that public clocks “provided time

indications central to the ‘feel’ of town life” (2009: 116). The same is true of public clocks in antiquity, though their underlying technologies of tracking and announcing time differed greatly. The indications directly given by timekeeping devices in antiquity were more limited than later devices, as sundials, for example, would give their time only visually. Even in cases of modern clocks and their bell towers, though, awareness of the time relied on shared cognizance of the time and “part of the web of social practice and relationships” (Birth 2012: 66). While the sundial’s shadow could not be seen or heard from the opposite side of the city, it served as a central node of temporal practice and, along with the wider timekeeping assemblage of a given place, enabled the social practices and relationships of time that Romans adopted. Timekeeping devices in fora were broadly accessible, while also situated in such a way as to be involved in many important aspects of urban life.

Next, the chapter takes the monumental sundials of two North African Imperial cities, Thamugadi and Lambaesis, as case studies of the ability of hourly time to shape urban image. Both cities were established on the frontiers of the expanding empire with strong connections to the military, a context where the explicit embrace of Roman identity was both desirable to the city’s founders and an important tool in establishing local identity. Over the course of their histories, each city saw the eventual construction of a monumental sundial within prominent public space. While the previous section introduces the ability of timekeeping devices to act as defining characteristics of Roman

cities, the examples of Thamugadi and Lambaesis are contexts where such definition is specifically cultivated by members of the community, for both political and personal reasons. Further, the broader social context of each city at the time it undertook the construction of its device situates the construction of public timekeeping amid trends in the development of Roman cities across the empire.

Finally, the chapter offers reflections on the role of timekeeping devices in the creation of urban image. Given the formation of such images over time and the role of individual experience in the processes of their formation, this concept must be approached from multiple perspectives. First, urban image is something that can be specifically crafted inasmuch as established forms and concepts can be intentionally deployed to cultivate a particular image. While there is not a direct relationship between the goals of the individuals or authorities that seek to foster a particular image for their city, those images are formed within vocabularies of thought and form that are both carried to new places and fostered within them. Second, the built environment itself is an active participant in the process of forming an urban image; the monumental sundial of Thamugadi, for example, directly effected organizing structures of urban life and made possible direct experiences of life in the city that would have otherwise not have been available.

Timekeeping Devices as a Feature of the City

At the same time that they functioned as symbols of knowledge and science, the timekeeping devices of the Roman world came to stand as symbols of particular places. This role can be seen in those objects' inclusion in representations of place, especially when those images served to transmit ideas about a location. While the majority of representations of timekeeping devices come in the form of sundials included in the decorative programs of sarcophagi, depictions of these devices appear in other media (including mosaics, wall paintings, intaglios, terra cotta, silver and gold, sculptural relief, and on late manuscripts) and serve a variety of purposes in those varying depictions. In instances where timekeeping devices are used to depict place, the objects can identify a location by two different means: they can be a literal representation of a real place (i.e., the hypothetical situation of a representation of the *Horologium Augusti* to depict Rome or the Campus Martius) or they can set a scene (as in the palaestra where sages gather in the Pompeian mosaic of the Seven Sages, discussed below, partially defined through the presence of a sundial in the background). Each of these types of representational placemaking can influence identity and authority. For the former of the two categories, identifying a place through depiction of its real timekeeping device(s) marks its participation in Roman temporal practices. For the latter, associating oneself with the place of a particular activity also builds connection with what that place and activity *mean* culturally; a depiction of actions in the academic setting of the palaestra in

one's home, for example, carries the implication that the owner him- or herself is associated with scholarly pursuits. Both types of representational placemaking also contribute to the image of a place, what Lynch (1960) calls the "urban image." Building spatial associations and defining key landmarks in the built environment, especially when those landmarks impact daily practice in the ways that timekeeping devices do, defines a place as having certain features and characteristics. Timekeeping devices have the power to create the "choreographed experiences, imprinted signs and symbols, and unifying narratives" that "affix [a place] in the memory" (Favro 1996: 4) that is core to the creation of an urban image.

The use of timekeeping devices to define a particular location only survives in a few key examples, though this work presents an addition to the small existing corpus. Bonnin (2015: 321-323) lists three instances of time being a defining characteristic of known, real locations, however does not see the objects as defining features of the cities in which they are contained. His examples include a silver Vase from Anzio depicting the trial of Orestes, the theater *pulpitum* of Sabratha, and a manuscript illustration from Syria depicting the biblical life of Joseph. In each of these examples, the presence of a sundial gives some indication of the location of the action, as in the Anzio vase where the presence of a sundial can be argued to mean that the action has moved outside of the trial itself, where a water clock would be the operative tool for tracking time, though

none of the timekeeping objects here are definitive of the city in which action takes place (ibid.).

Olszewski (2015) takes a broader view of the depictions of timekeeping devices in mosaics, noting examples of dials included in depictions of surrounding cities from Late Antique churches in Jerusalem and Umm al-Rasas. Further, he includes depictions of cities with obelisks that he interprets as serving some gnomonic function, adding more Late Antique representations of Madaba, Umm al-Rassas, and Jerusalem (though this time depicted away from the city itself at Santa Cecilia in Trastevere). Olszewski's also proposes a third category of depicted timekeeping devices that is the most relevant here, as he also includes obelisks with a presumed gnomonic function depicted in circuses and at games. This category includes depictions as early as the late 2nd century CE, with objects in Lugdunum, Barcino, Volubilis, Piazza Armerina, Gerunda, Carthage, and Cafsa. While the identification of these depictions with timekeeping is less direct than seen in literal depictions of sundials, the influence of the *Horologium Augusti* in installing obelisks as gnomons fits nicely within the broader context of the spread of Augustan timekeeping and building programs. These depictions also temporally fit with broader patterns in the depiction of timekeeping devices, which Bonnin (2015: 313)

notes is mostly a 3rd-4th century CE phenomenon with just over half of all datable depictions of the devices coming in those centuries.¹¹⁷



Figure 5.1 - Representations of timekeeping devices by their depiction of space and by period.

Figure 5.1, above, shows the distribution of representations of timekeeping devices and their depiction of context. The objects are categorized by four representations of space: (1) Not depicted in real space (i.e., shown in abstract space only), (2) shown in real and identifiable cities, (3) shown in identifiable contexts (i.e., clearly shown in a *palaestra*), and (4) Olszewski's category of obelisks with a potential gnomonic function at games. The map is also color coded by broad temporal categories

¹¹⁷ Bonnín's numbers are based on 101 dated depictions, though his database does not include the potentially gnomonic monuments under discussion here.

to which the representations have been dated. The most explicit iteration of timekeeping devices as features of a particular place's landscape comes in the form of the sundials explicitly placed among the defining structures of a given city. The *solarium* of Puteoli is perhaps the best example, given the unique purpose of the objects on which it is depicted. The city's *solarium* is included on a class of objects Popkin (2018) calls "souvenir flasks," Late Imperial glass objects produced to commemorate a place or event.¹¹⁸ Figure 5.2 shows two flasks that include the *solarium* depicted among the defining features of the city. Puteoli is known from other sources to have a *horologium* gifted to the city directly by Tiberius, though the exact nature of that device is unclear. The device is known from a dedicatory inscription that reads, "Emperor Tiberius set up the horologium (...) and the city had it repaired (...)." (CIL IX 2324)¹¹⁹, and though the mention of repairs can sometimes be used to infer the more complex workings of a water clock¹²⁰, there are also extant examples of repaired sundials (as, for example, in the case of a spherical dial from Vindonissa (#910)). The depicted object of the flask, though, need not be the same device given by the emperor to serve as a notable feature of the city. Two of the thirteen surviving flasks from the city depict a structure labeled "SOLARIV" (the Prague flask) or "SOLAR" (the Pilkington flask). While Popkin argues

¹¹⁸ Popkin (2018: 427) notes that, though the word "souvenir" is derived from the latin *subvenire* ("to come to one's mind" or "to assist or aid"), the term was not used in antiquity. The connection to "coming to one's mind," though, is apt for the objects role in establishing an urban image discussed here.

¹¹⁹ Ti(berius) Caes(ar) (A)ug(ustus) horolog(ium) po[suit ---] [---] res public(a) refec(it)...

¹²⁰ This interpretation occurs at several places throughout Winter's (2013) catalog of timekeeping devices.

that these labels are in reference to a temple of Sol Invictus following Aurelian's depiction of a temple to the god on coinage (ibid.: 440), the word *solarium* most frequently appears in the written record in reference to sundials.

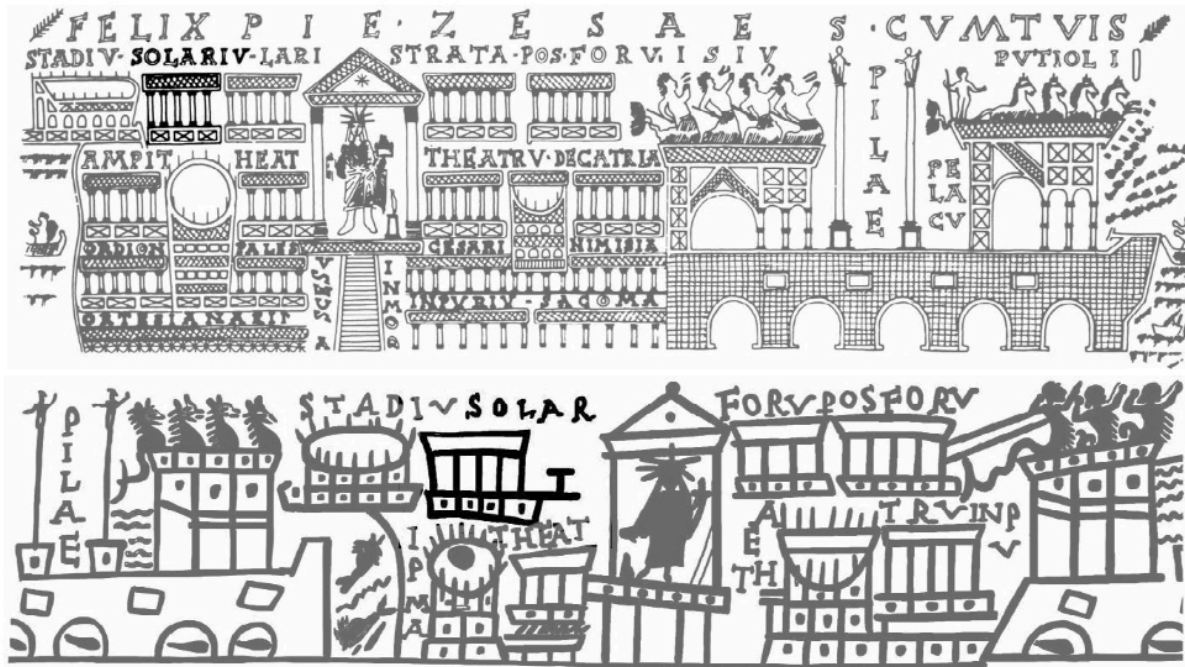


Figure 5.2 - Engravings of Puteoli from Prague (top) and Pilkington (bottom) souvenir flasks with *solarium* highlighted, adapted from Popkin 2018.

Solarium is used in reference to sundials by Pliny (Plin. 7.60), Varro (Varr. *Ling.* 6, 4), Gellius (Gell. 3.5.5), and by Cicero to refer to the place in the forum where a sundial stood (*ad solarium*, Cic. *Qfr.* 18, 59). Even accepting the interpretation that the flasks refer to a *solarium* as a temple to Sol Invictus leaves the sundial itself as a defining feature of the temple and thus key in a flask's representation of the city's landmarks. While somewhat earlier than the Late Antique mosaics discussed previously, the Puteoli flasks are similar in their depictions of timekeeping in urban contexts. The examples of the

solarium at Puteoli and later Christian churches show a relationship between religion and the depiction of timekeeping as a feature of the city associated with changes in the religious landscape in these periods. Roman timekeeping, according to Hannah, reflects a strong cultural sense of entanglement with the broader cosmos (2009: 110); even water clocks, initially divorced from the motion of celestial bodies in their ability to track time, were adapted to show the passage of time in relation to the rising and setting of stars. Sundials were not only connected with the cosmos through their translation of astronomical phenomena into the hours, but also directly connected to divinity. Sundials were an appropriate gift to divinities themselves, with surviving dedications to five Olympian divinities, the Theoi Megaloi,¹²¹ Isis Regina, and the nine muses (Houston 2015: 310-311). Even when these dedications associate the gods directly to the sun, as in the case of associations between Jupiter and Sol Invictus and Apollo with Helios (ibid.), the sundial added something to the relationship with divinity, bearing the capacity to connect with cosmological forces through objects that rendered those forces understandable. For Augustus, the ability to control objects of time allowed him to exercise a degree of control on the cosmos itself (Rehak 2006: 92). Even where outright control of the cosmos was not seen as possible, as in Petronius' mocking portrayal of a

¹²¹ Jupiter, Apollo, Artemis, Liber Pater, and another interpreted to be Hermes.

freedman's attempts to exercise the same type of authority, sundials still held an imagined capacity to connect with that cosmos in a unique way.

The inclusion of the *solarium* on an object intended to highlight the most defining features of a city shows a clear position for that structure in the urban image of the city. On the one hand, the object portrays the features of Puteoli that make the city unique. The "*pilae*," the city's harbor mole decorated with statues atop high columns, is one such example as the city was known for its substantial port. In order to accurately depict the highlights of a visit to Puteoli, this defining feature could not be left out. On the other hand, many of the places depicted on the souvenir flasks are of a more mundane character. The inclusion of the amphitheater and the palaestra, for example, do little to differentiate Puteoli from many other cities of similar size across the Mediterranean. Those more banal places do, however, point to the cosmopolitan and Roman nature of Puteoli; rather than only defining the city as the home of unique features, these objects also situate Puteoli as a proper Roman city with all the trappings one might expect, be they entirely unique or not. The *solarium* straddles these two categories; the inclusion of that place, be it a temple tied to the sun (likely with a sundial) or the sundial itself, the *solarium* marks a notable way that Puteoli participates in important aspects of Roman religion and daily life. Marking a city as actively engaged with the sun's hours may have served a similar function to 2nd and 3rd century mosaics that marked out individual characters as timely or untimely.

Timekeeping devices are depicted as features of the built environment in ways less explicitly connected to specific cities or even real environments. Among the best known is the Seven Sages mosaic from Pompeii (and another similar copy from Sarsina) from the 1st century CE, which depicts a conical sundial behind seven philosophers. The figures, and sundial, are set within a porticoed space open to the sky (as shown through the inclusion of both the sundial and a large tree further in the background). The realistic depiction of space surrounding the figures is likely tied to broader movements in art at the time, as the object is dated to roughly overlap with the Second Pompeiian art style that emphasized architecture and space, but nevertheless provides a contextualized view of timekeeping devices existing in space. Further, earlier iterations of the same theme do not include a sundial, as seen through the earliest such depiction from a 3rd century BCE tomb at Pella (Jones 2016: 34). That earlier example of the theme does include reference (though less direct) to time in the form of a celestial globe (see Evans 2016 for discussion), which is also included in the Pompeiian example.

The inclusion of a sundial in the Pompeiian example, then, is particular both to the artistic movement of its day and also the role of hourly time in that historical period. The depictions of sundials in Pompeii fit within trends in both the spatial and temporal distribution of depicted timekeeping devices. Bonnín (2015: 315-317) observes several relevant trends for the Pompeiian examples: while timekeeping is most frequently depicted in the 3rd-4th century CE (52% of datable examples), the period between the late

1st BCE - 1st CE is the second most active (29%); peninsular Italy accounts for more than half (52.5%) of all known representations of timekeeping devices in the Roman world; and spherical or conical devices are significantly more prevalent in representational art in the 1st BCE-1st CE. These depictions again show participation in imperial time discipline.

Two additional examples appear in wall paintings at Pompeii that also fit within these trends. A fresco from the garden of the House of the Small Fountain (VI.8.23) includes a hemispherical dial mounted atop the porticoed wall of a garden in a villa scene (Figure 5.3). Additionally, though not included in previous catalogs of such depictions, a hemispherical object placed atop a pillar appears in a landscape fresco from the Hortulus of Potitus (IX.8.2). The latter representation also introduces the familiar connection between timekeeping and knowledge, as the structure has been identified as a school operated by the house's owner, the *ludimagister* Potitus (Figure 5.4).



Figure 5.3 - Recreation of the House of the Small Fountain fresco from the west wall of the garden, with sundial atop the doorframe containing the seated women. Image from Niccolini F, 1854. *Le case ed i monumenti di Pompei: Volume Primo*. Napoli. p.2, Tav. IV.



Figure 5.4 - Recreation of the landscape fresco from the Hortulus of Potitus, with sundial at far left. Photo from Deutsches Archäologisches Institut, Abteilung Rom, Arkiv.

The sundials in these examples serve a similar function to those in depictions of entire cityscapes; they defined a place and built associations between it and time.

Sundials are recognized as symbols of both the passage of time and of astronomical knowledge in antiquity (Evans 2016: 151) and their inclusion in depicted spaces lent those associations to particular places. The depictions go further when associated with

real spaces, either in literal cities or in the porticoed gardens or palaestrae depicted in the Seven Sages mosaic at Pompeii. The inclusion of timekeeping devices in representations of cities recognizes their role as landmarks, objects either useful for understanding a space or that are themselves key characters within the broader urban environment. Further, these depictions also reinforce the ability of sundials (as water clocks are not clearly represented in the same way) to *be* landmarks, identifying them as notable features of a city. Landmarks are in themselves essential components in the “imageability” of a city (Lynch 1960: 46), the ability of a place to establish a broadly held understanding of itself, and sundials are all the more powerful for the social meanings they convey. The souvenir flasks of Puteoli communicate this role explicitly, including sundials¹²² among the named features worthy of remembrance at the city. These objects created a nostalgic sense of Puteoli (Popkin 2018), seeking to shape memories of the place and its remarkable features. The audience of such objects would also extend beyond those that had experienced the city directly; the solarium (and other landmarks included on the flask) would be instilled in the minds of viewers that had never been to Puteoli as a feature of that place, a highlight to experience directly should one someday venture there.

Depictions of timekeeping in place also serve to connect built environments with the ideas that those objects are connected with; knowledge and timeliness. Just as the

¹²² Or, at least, the structures with which such devices are associated.

sundial in the Seven Sages mosaic communicates the philosophers' controlled use of time and their scientific ability to track it, so too do those depictions associate those characteristics with the particular spaces in which they are found. The sundials in the Pompeii and Sarsina mosaics are only one feature among many that associate the space in which they reside with knowledge, but the broader depictions of cities have fewer direct allusions to those values. Beyond the association between timekeeping and knowledge in art, sundials would also speak to the lived experience of those that navigated the cities of the time. Even the frescos within private gardens at the House of the Small Fountain and Hortulus of Potitus contributed to understandings of the way cities worked. In those cases, timekeeping was a component of the built environment and could be expected in the sacred landscape as well as private contexts. Through their own lived experience, viewers would understand how sundials fit into those spaces, such as their impact on the timing of rites or the scheduling of social activities. While depictions of public timekeeping devices as features of a given city appear later, they too would draw on the lived experience of viewers while simultaneously encouraging engagement with timekeeping.

Timekeeping in the Forum

While the forum serves as a notable location for the sundials depicted in late antique mosaics, the actual placement of timekeeping devices predate this artistic practice significantly. Devices displayed in the fora of Roman cities (or cities that came

under Roman control), though limited to 40 known examples¹²³, appear to track temporally with the expansion of the Empire. Given the inexactitude of much available dating for timekeeping devices, the distribution of objects is here discussed in the broad terms of century from the 2nd BCE to 4th CE. In some cases, inscriptions accompanying timekeeping devices clarify exact dates for their installation, which in turn allows for explicit connection to historical events affecting the sites of installation (i.e. the granting of *municipium* status, for example). Where exact dates are not provided either explicitly or contextually, I here follow Winter's (2013) dating of objects, generally applied by century based on stylistic and contextual information. The lack of temporal specificity is particularly noteworthy in the transition from 1st century BCE to 1st century CE, as much of the apparent cause for the installation of timekeeping devices appears to relate to Augustan practices and preferences, but the devices oftentimes cannot be directly tied to specific years within or immediately following his reign.

The earliest example of a timekeeping device in a Roman forum is reported by Pliny, the previously discussed dial taken from Catania and re-installed in near the *rostra*. Pliny further reports that another, properly calibrated, sundial was installed immediately beside the Catanian dial in 164 BCE, though neither device (nor their reported points of installation) survive. The first extant device to be constructed by

¹²³ Many of these are known not from the devices themselves, but through surviving dedicatory inscriptions.

Romans in a forum comes with the lone 2nd century BCE example in the form of a water clock established among the buildings of the Roman Forum by P. Cornelius Scipio Nasica during his tenure as censor beginning in 159 BCE. This device is again reported by Pliny¹²⁴, though Freyberger (2007) links the hydraulic mortar lining of Taberna 9 of the Basilica Aemilia with the device. Winter (2013: 520) clarifies that Freyberger's interpretation of the room does not mesh with the known functioning of any ancient water clock, though does argue that the room could have served as a pressurized water tank for such device outside of the space. Further, Winter notes that the location of the room in question would situate the device nicely near the *rostra* and *comitium*, as reported by Pliny.

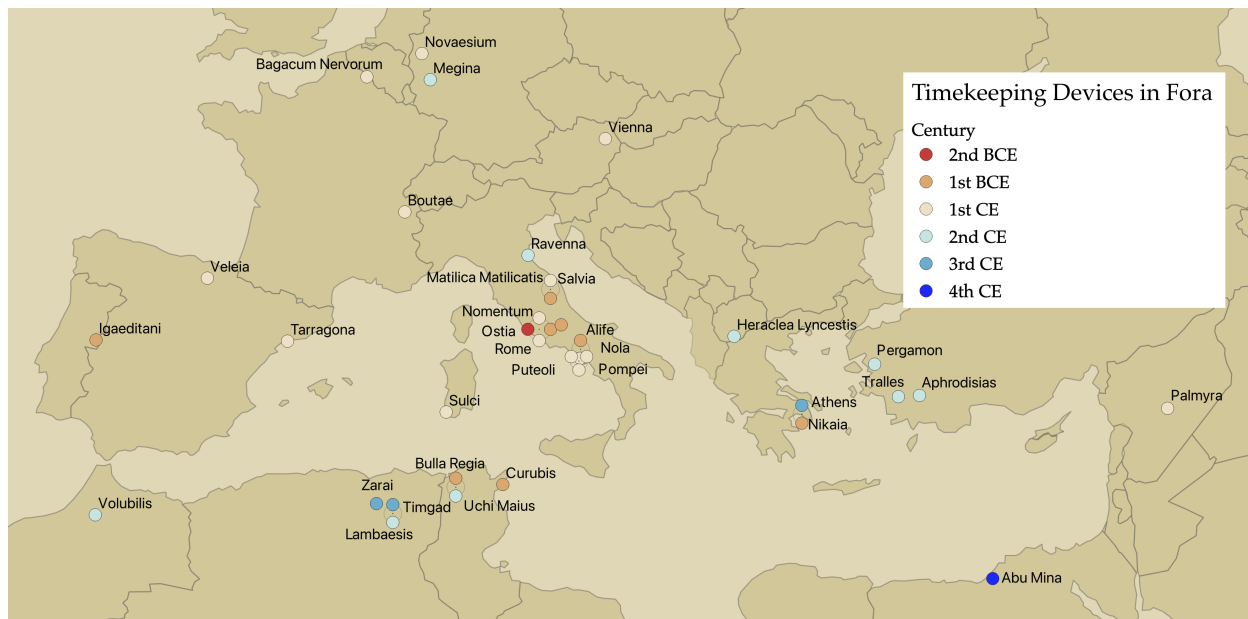


Figure 5.5 - Map of timekeeping devices installed in public fora, 2nd Century BCE - 4th Century CE

¹²⁴ Varro (I.I.6) and Censorius (23.7) also comment on this device, the apparent remnants of which have been identified in the Basilica Aemilia.

The installation of timekeeping devices in Roman *fora* begins in the Republican period and extends through the 4th century CE. Figure 5.5 shows the spatial and temporal distribution of these timekeeping devices. The rise of the Roman Principate saw an increase of timekeeping devices installed as features in the forum of a city, with 4 examples in the Italian mainland, two modern-day Tunisia, one in Athens and one in Civitas Igaeditani in modern day Portugal. To this number could also be added devices like the *Horologium* of Augustus, though that device is considered separately elsewhere in this work. The Igaeditani device, which is lost but survives as a dedicatory inscription, appears to have been gifted to the city by one Qunitus Tullius, a citizen of Augusta Emerita, upon the Imperial granting of *municipium* status in early 16 BCE. The granting of *municipium* status to the city also coincides with the establishment of three Augustan provinces in Hispania in the same year. The gift of an hourly timekeeping device,¹²⁵ to an outlying city at the edge of the Roman sphere of influence here indicates an interest in, as Etienne (1992: 355) phrases it, “integrat[ing] the indigenous civitas in social customs which regulated the life of the community as well as individual practices.” A citizen of Augusta Emerita is a fitting benefactor for a gift to mark

¹²⁵ Winter (2013: 378) notes that the format of the dedicatory inscription on a small plaque is typical of a water clock, whereas a sundial would typically have such an inscription applied directly to its base. Previous interpretations had focused on the unusual use of the term *orarium* for the device, arguing that it was derived from *solarium*. Etienne (1992) contends this unique word conveyed that the device conveyed “solar hours,” meaning that the device could be a water clock but nevertheless tracked seasonal hours. Since, however, there is little evidence for the use of equinoctial hours in common temporal practice throughout the Roman world, the point is moot.

incorporation into the Roman Empire, as that city later developed its own practice of counting years from the moment of its foundation as a Roman city through its *anno coloniae*, the use of the city's founding in 25 BCE as "year one" for the local system of counting years (Johnston 2017: 56). In this corner of the expanding empire, incorporation into the Roman sphere carried with it dramatic redefinitions of time itself.¹²⁶ The ability of a device of hourly timekeeping to symbolize Roman identity, then, was not only achieved at the behest of the community in which such an object was built; the symbol could also be imposed, an indication that Rome had come and had expectations of the organization of life amongst the local population. These instances show intentional action to alter the urban image of a city by making Roman identity a defining feature of the visual and lived experience there.

The 1st century CE saw a continuation of the upward trend in sundials within fora, most notably through their broader expansion out of peninsular Italy and across Gaul. These cities outside of mainland Italy with public timekeeping devices in this period tend to be recently founded or to have undergone changes in administrative status, often related to Augustan expansion and the creation/reorganization of provinces. Tarragona, for example, has a dedication for a *horelogium* [sic] dating

¹²⁶ Many of calendrical changes, like those discussed here at Emerita Augusta or the use of consular eras in the Iberian town of Cantabria appear to have been organized later and counted back to their foundation in hindsight. Rather than discounting the role of the empire in reformulating local temporal traditions, however, this argues that the practice was longstanding and timekeeping continued to be a means of navigating identity within the Roman Empire.

(roughly) to the 1st century CE despite the city's existence from as early as the 8th century BCE. Augustus' reorganization of the Roman provinces, however, saw Tarragona receive the status of *conventus iuridicus*, the capital of the newly founded province of Hispania Tarraconensis in 27 BCE. While the timekeeping device in the city is broadly dated to the 1st century CE, a possible connection to changing administrative status or minor error in dating should be kept in mind. For other sites, the connection between founding or administrative change and timekeeping is more straightforward, as can be seen in the table below. While changes in the status of a city or region may be expected to carry along with them building programs and acts of munificence of the type that would lead to new timekeeping installations, it remains noteworthy that timekeeping devices were consistently introduced to the fora of places undergoing such changes throughout the late 1st BCE and 1st CE.

The 2nd century CE sees fewer timekeeping devices installed in Roman fora, though new additions in Volubilis to the west and in Pergamon, Aphrodisias, and Tralles in Asia Minor show expansion of the practice further into the Roman provinces. In the case of the latter cities, as well as a timekeeping device installed in the forum of Heraclea Lyncestis, it is important to note that the cities had long existed in a cultural context familiar with the seasonal hours as practiced by Imperial Romans as inheritors of earlier Hellenistic temporal practices. The objects discussed here are simply meant to reflect a particular type of public display of timekeeping, not the introduction of

timekeeping itself; Pergamon, for example, is the site of 10 known timekeeping devices with the earliest created in the 2nd century BCE. Heraclea Lyncestis is instructive as an example, as despite existing within the Greek sphere of influence from its 4th century BCE founding until incorporation into the Roman empire, it was only during the consulship of one Caius Iulius Silanus in 157 CE that a dial was constructed in the forum (IG X 2, 2 111). Volubilis is noteworthy for the opposite reason, as the city does not have clear connections to Hellenistic urban practices. Indeed, Volubilis has a strong history as an indigenous settlement, the “the second city of the kingdom of Mauretania” (Daniels 1995: 88) that was more connected with Punic and early Roman culture than Greek. The variation of cities installing central timekeeping devices in this period points toward those objects connection to Roman practices, rather than holdovers from previous influence. The device at Lambaesis is also worth mentioning here, as the monumental device may have been influential in the later monumental dial at Thamugadi (both discussed below). The Lambaesis dial is unfortunately little published, preventing detailed discussion here.

The 3rd century sees a continuation of the decline of the overall number of (surviving) dials installed in fora, with such objects appearing in Nikaia in Macedonia and Zarai and Thamugadi in modern day Algeria. These objects show a continuation of some earlier practices, as at Zarai where the timekeeping device placed in the forum was dedicated directly to the emperor (discussed in a later chapter) in 237 CE. The

device installed at Thamugadi is noteworthy for its placement literally within the forum of the city, as the device took the form of engraved hour lines within the paving of the forum itself. The object covered an area of 8.7m x 15m, thus comprising roughly 10% of the surface area of the forum (Winter 2013: 573). Guerbabi (1994) proposed a widely accepted reconstruction of the device, which would have had a gnomon of roughly 3m in height though this, in addition to most of the forum pavers with inscribed hour lines, is no longer extant due to later robbing and reuse of materials.¹²⁷

The lone example of a timekeeping device installed in a Roman forum from the 4th century comes from Abu Mina outside of Alexandria. The conical sundial, installed outside of the Xenodecheion in the forum, appears to itself have been constructed earlier than its final installation place, though. Winter dates the object itself to a 4th century CE construction, likely in Alexandria, and its re-installation in Abu Mina to roughly the 6th century CE.

The inclusion of a timekeeping device within a Roman forum, though it takes various forms from water clocks to monumental sundials and spans 6 centuries¹²⁸, does illustrate meaningful patterns in the justifications for establishing such an object. First, the practice is clearly concentrated around the 1st century BCE - 1st century CE,

¹²⁷ The engraved paving stones that contained the 5th and 6th hour lines, for example, were recovered from the walls of a nearby Byzantine church (Winter 2013: 573).

¹²⁸ Or perhaps 8, if one includes the gap of time between the construction of the Abu Mina dial and its final installation point

especially the reigns of the Julio-Claudian emperors. This temporal clustering comes as no surprise in the broader context of Early Imperial engagements with timekeeping. Augustus' overt embrace timekeeping systems as a means of asserting his own cosmological authority, though most visibly preserved in his calendrical revisions and *fasti*, also included short time. Tiberius' gift of a timekeeping device to Puteoli is a clear extension of this practice, as the object reified the connection between the person of the emperor and the cosmological power to impose order on time itself in an important location for the maintenance of imperial authority, here the main port of the capital.

City	Status / Event	Date of Status	Date of Device
Boutae	Vicus	27 BCE	1st CE
Alife	Colonia	Triumvirate (~60 BCE)	1st CE
Marruvium	Municipium*	2nd half of 1st BCE	Mid-1st BCE
Nomentum	N/A	N/A	Mid-1st CE
Novaesium	Founded	16 BCE / (refounded) Mid-1st CE	1st CE
Ostia	Forum built	Tiberian	1st CE
Palmyra	Annexed/Tributary city ¹²⁹	Tiberian	64 CE
Pompeii	Rebuilding	Augustan	Augustan
Puteoli	Colonia status under Augustus✚	Augustan (or later)	Tiberian
Salvia	Refounding/Reconstruction	Augustan ¹³⁰	Augustan
Sulci	Municipium	Claudian	48 CE
Surrentum	Municipium✦		80-81 BCE
Tarragona	Conventus Iuridicus	27 BCE	1st CE
Veleia	Municipium	Post-Cantabrian Wars (19 BCE)	Before 92 CE

¹²⁹ The timing and exact nature of Palmyra's status on the Roman Empire remains disputed. The city is traditionally seen as either annexed or made a tributary city under Tiberius, however the outer bounds of official incorporation under Roman control can vary between Pompey and Vespasian (See Edwell 2008: 34-35 for discussion).

¹³⁰ Dating is again difficult here, as the site was host to a *colonia* prior to Augustus but there is a general consensus that the city was either refounded or largely reconstructed during Augustus' reign (See Perna 2006: 3-5).

Vindobona	Municipium	80 CE	1st CE
Bagacum Nerviorum	Civitas	70 CE	Late 1st CE

Table 5.I - Table of Roman locations with change in administrative status near the installation of a forum timekeeping device.

*Though the dedication doesn't directly tie the horologium to the granting of *municipium* status, the inscription is the earliest reference to the town possessing that status (Bonnin 2015b).

*Puteoli first achieved colonia status with its founding in 194 BCE, but was given imperial colonial status again by each of Augustus, Nero, and Vespasian in recognition of the city's special role in the empire.

*Surrentum's status and date of timekeeping device are unclear, though the city was granted *municipium* status at some point between the reigns of Augustus and Hadrian.

The connection between publicly displayed timekeeping devices and changes in administrative status further represents an ongoing concern for hourly time as a component of the empire's *imperium* or ordering of the world (see Table 5.I). In Igaeditani, this connection takes the form of the imposition of a particular ordering on a place (and people, in the tribe from which the *municipium* derived its name) newly brought under imperial influence. The dedicatory inscription there names a Roman citizen of Augusta Emerita as the responsible party of an object given to the Igaeditani, and the inscription is the earliest surviving reference to the *municipium* status of the place; becoming a place within the empire occurred alongside achieving the ability to track time with a Roman device. Sulci also shows the recent granting of *municipium* status coinciding with the installation of a public timekeeping device, though appears to reflect a different relationship between giver and receiver: the device was given on behalf of the *Qurinia* tribe to Emperor Claudius. Here, though the same occasion appears to be the impetus for the installation, the local people are appealing to the empire by overtly pursuing its ordering of time.

The installation of timekeeping devices in fora, despite its connections to the emperor and to *imperium* more broadly, was not undertaken as a means of staking claims to the emperor's authority over time. Zuiderhoek (2009: 110-111) argues against the notion of civic gifts (such as the timekeeping devices in question, buildings, statues, etc.) being motivated by a desire to directly emulate the practices of the emperor himself. The early Imperial emphasis on time, seen here in devices constructed by Augustus and Tiberius, did not only provide local elites with an example to copy, but rather a system to buy into. The grandiosity of the *Horologium Augusti* sought to entangle the emperor with cosmological ideas, but the typical timekeeping device served as an acknowledgement of that connection rather than an attempt to recreate it at smaller scale. It is in this context that the connection between timekeeping devices and changes in administrative status becomes clear. Incorporation into the empire (the new establishment of the *vicus* at Laebactium, for example), or further incorporation through the granting of additional rights (the awarding of *municipium* or *conventus iuridicus* status) created opportunity to emphasize the adoption of imperial practices. The messaging behind such adoption varied, as in the cases of Igaeditani and Sulci, but nevertheless imposed imperial ordering structures on life in the cities in question. The growth of timekeeping devices seen in elite residences during the early empire (discussed in Chapter 4) serves a similar function. Hourly timekeeping devices in a private context allowed a *pater familias* to exert highly localized control of time within

the home and its dealings, but this ability was ultimately subservient to that of the *pater patriae* and his cosmological reach. Similarly, leading figures in a given city could use timekeeping to build their own profile, but not to claim status akin to or beyond that of the emperor.

Finally, beyond the connections to power and authority, timekeeping devices created links to Roman ways of seeing the world and organizing activity. The installation of a sundial or water clock in the forum of one's city was a way to define that city, to create a notable landmark individual to a specific place, while also entering the city into the broader conversation of Roman identity. Woolf notes that there was not a "a ready-made cultural package" that qualified a city as Roman (1998: 11), but rather that it was participation in the broader practices of the empire and the ability to have some say in the debate on what was or was not "Roman" that marked full membership.

Hours and Roman Civic Identity

The above examples show that the installation of public *horologia* did not only add a means of tracking hours to the shared spaces of cities, but also added a key feature in the civic landscape. Though generally not produced at the scale of truly monumental constructions linked to time like the *Horologium Augusti* or the Tower of the Winds, timekeeping devices nevertheless were a physical presence in civic space and could be called upon as symbols of both the city that housed them and of that city's Roman identity. Not all sundials are inherently Roman of course, and indeed many

timekeeping devices existed before the rise of Roman imperial influence in a given part of the empire. Some timekeeping devices on display in cities that came under Roman influence persisted from earlier traditions, such as the Hellenistic Triton sundial (# 207) from the gymnasium at Delos, which was reinstalled in 90 BCE from an earlier iteration of the building (Schaldach 2016: 73). Similarly, earlier Egyptian water clocks either continued to be used into the period of Roman domination or were brought to Rome and used there, as in the case of Device #635, recovered from the Temple of Fortuna at the Porta Portese in Rome but constructed in Ptolemaic Egypt. Despite the ability of timekeeping devices to persist across periods, often clearly evoking their earlier contexts, timekeeping devices still served as noteworthy features, if not defining symbols, of places that contained them.

The installation of a public sundial was both an ends in itself, the incorporation of an important symbol into the built environment, as well as a means to achieving wider goals in regards to the functioning and identity of one's city. Examples presented above show that these wider aims could include the "gift," be it genuine or coercive, of Roman ways to newly formed cities as at Igaeditani or the direct imperial recognition of a place and its importance as in Tiberius' gift to Puteoli. Across the known corpus of sundials in *fora*, each object enabled time discipline in the broader Roman mode while simultaneously playing a unique role in the negotiation of identity and authority in its given context.

Sundials Urban Image: Thamugadi & Lambaesis

To explore the role of public timekeeping in redefining urban identity in greater detail, this chapter now turns to the monumental sundials of Thamugadi and Lambaesis in modern-day Algeria. These two cities are separated by fewer than 50km and, indeed, are joined through their history as military outpost (Lambaesis) and veteran's *colonia* (Thamugadi). Each of these founding purposes instilled the respective place with a profound sense of Roman identity; Lambaesis as the home of a frontier military outpost actively projecting and protecting Roman interests in the region and Thamugadi as a home for veterans following their service to the empire, with the added benefit of maintaining a paramilitary presence in the area (Raven 1993: 74). Civic identity, however, is not static but rather continually negotiated. These two sites both took the step of installing monumental sundials well after their founding, and those timekeeping devices played an important role in the identity of each place and its connections to Roman culture.

Modern Timgad, founded by Trajan as *Colonia Marciana Ulpia Traiana Thamugadi* in 100 CE, has long been recognized as a shining example of Roman town planning. Haverfield (1913) held the city up as one of the best examples of Roman planning from a *tabula rasa*, as the “chess-board” regularity of the city's streets was created from nothing for a colony of Roman veterans. Indeed, it has been argued that the form of the city was decided in part based on a specifically timed event; Barthel (1911) proposed

that the *decumanus*, the central street around which the city grid was planned, as oriented toward the exact point the sun set on Trajan's birthday.¹³¹ The particularly Roman nature of the city observed by Haverfield has more recently been described as an intentional effort on the part of those founding and administering the city to conspicuously embrace Roman identity; Fentress (1984) described such efforts as attempts to both use Roman identity as a protective barrier in life on the frontiers and as an important tool of local elites in proving their worthy participation in the economy of imperial signs and signals. The city illustrates of the role of timekeeping in the urban identity of the Roman world, as even this most Roman of places added a monumental sundial as a means of expressing close ties to Rome and its culture.

In his investigations of colonial encounters in the ancient world, Dietler observes that "all settlements have a coherent structural organization that is integrally related to the structuring of social relations and daily practice" (2010: 292). Despite the fact that such an organization may be "inscrutably opaque to an outsider not familiar with the cultural codes and conceptions," Dietler views the presence of such a structuring principle to be as inherent in the built environment as grammar is to a language (ibid.). The implementation of spatial ontologies serves to express, cement, and, in the case of colonial settlements like those under study here, also to create identities that "legitimize

¹³¹ Sparavina (2019) recently applied astronomical models to the city and surrounding landscape and found the proposed orientation and date plausible, though not definitive given variability in how one measures the street angle and other such issues.

the cultural and social cohesion” of places of colonial encounter (Delgado & Ferrer 2007:

5). The centuriation of ancient Thamugadi is an example of the arrangement of a city acting as a tool of expressing identity. Not only were the city streets laid out in a Hippodamian plan that would be legible as Roman to those experienced in the empire, but it was also arranged using imperial practices. Further, the urban plan applied Roman systems of measurement to the built environment, with city *insulae* averaging 70 Roman feet squared (Haverfield 1913).¹³² Raven (1993: 73) describes Thamugadi as “reveal[ing] the military mind at work” through “following the logic of set-square and ruler” in its urban planning, though the city should also be read as a product of the Roman mind.

This Roman mind, and arguably especially the Roman military mind, carried with it Roman conceptions of time. These conceptions would influence life in the newly founded *colonia*, especially given the importance of timekeeping and synchronized action in the prior military lives of its veteran inhabitants (see Cupcea 2017). Laurence has argued that daily schedules, and thus the hour, “structured city space” (Laurence 1996: 108) through their organization of citywide activity and elite desire to participate in those activities in a conspicuous manner. The small initial footprint of Thamugadi,

¹³² While the Roman use of Roman feet should come as no surprise, the structuring of the built environment following imperial systems reflects the particular ontology of Roman space, as ordered and measurable, that was becoming increasingly reflective of Roman time as well. Scott has argued that, prior to the sort of broad standardization represented by Roman feet, “every act of measurement was an act marked by the play of power relations” (1998: 27), and the spread of imperial standards ratcheted up the role of power through its imposition of such standards across the Roman world.

with its grid expanding only about 360 x 390 yards and housing around 2,000 people (Haverfield 1913), and relative equality in social standing among the settled veterans that founded the city make this type of temporal structuring less apparent. However, the measured schedules of military life could have the same impact on activity and thus city structure. Though the written record only explicitly transmits discussion of military timekeeping in antiquity in the form of Caesar's mention of water clocks (Caes. *B Gall.* 5.13), surviving fragmentary records of daily schedules and references to a position of the *horologiarius* suggest that a (or several) official timekeeping devices were a feature of military life (Cupcea 2017). While military timekeeping shaped the lives of veterans settled at Thamugadi across their 20 year military careers, that temporal culture was part of the broader Roman engagement with short time.

Despite this strong connection between the Roman military and the keeping of hours, Thamugadi did not initially feature the monumental dial at the focus of this analysis. While the city does have 6 known sundials associated with it, only the monumental dial retains specific contextual data on its installation place. Only one of the other timekeeping devices of the city, a conical dial with a base decorated with the face of a bearded man (#729) has an available date range, placing it in the early 3rd Century CE (similar in date to the monumental dial). While this corpus of devices, and especially information about it, is limited it nevertheless illustrates that Thamugadi had a similar or even richer investment in hourly timekeeping than cities of similar size

throughout the empire. The city's rich epigraphic record betrays the interest of citizens there in flouting their association with Rome, and it is against this backdrop that the installation of a monumental sundial in the forum can be seen as an act of building a particular urban image.

Around the end of the 2nd century CE hourly timekeeping was brought very literally into the forum of Thamugadi in the form of a large sundial carved directly into the paving stones (#728). Lying in the northeast quadrant of the forum, the dial consisted of numbered hour lines spanning between date lines for the solstices. While much of the dial has been lost to spoliation, four hour lines corresponding to the 7th to 10th hours survive in situ, with the label for the 8th hour still intact (Winter 2013: 572). Further pieces of the forum pavement with the markings of the 5th and 6th hours have been observed incorporated into the nearby Byzantine castle (Guerbabi 1994). The sundial also appears to have functioned as a full yearly calendar, given the identification of markings corresponding to the signs of the zodiac (with an "S" for Sagittarius and "A" for Aquarius). The dial is unusual in its omission on the first and last hours of the day, with the reconstructed portions of the object beginning at the 2nd hour and ending at the 11th. These omissions appear to correspond to the encroachment of shadows from other structures surrounding the forum, which are useful in providing a date for the timekeeping device.

The letter forms of the extant markings were used by Guerbabi to broadly provide a date range for the device, placing its construction somewhere in the late 2nd-early 3rd centuries CE. Winter (2013: 574) also expands on this dating by situating the dial in the history of the development of the forum, which was not paved until after the construction of surrounding buildings between 121-132 CE. Further, the construction of the *curia*, which cast shadows over the area in which the first hour line should have been placed given the parameters of the dial, was completed in 152 CE. Given the apparent omission of hour lines on the extremes of the device, it is very likely that the problematic shadows were known to the sundial's designers. The second half of the 2nd century CE was generally a period of growth and prosperity in the city, further arguing for the sundial's construction in this period rather than the city's initial founding.

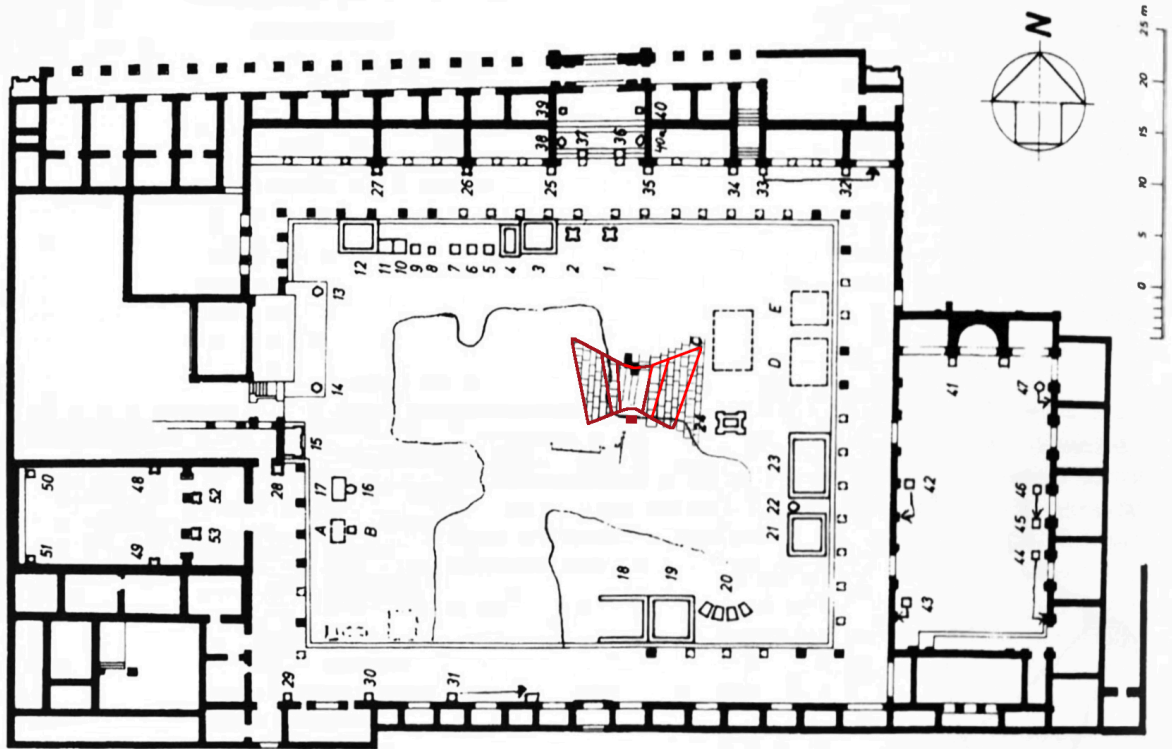


Figure 5.6 - Forum of Thamugadi with shadow receiving face of sundial. Extant portions in bright red, reconstructed corresponding portions in dark red. Modified from Winter 2013: 572.

The inscribed face of the Thamugadi dial, shown in red in Figure 5.6, occupied an area roughly $8.7 \times 8 \text{ m}$,¹³³ with Guerbabi calculating the no longer extant gnomon having stood at the exact center of the forum (an area that has since been robbed out). The gnomon of the device likely measured 3 m in height (Guerbabi 1994: 384) and was placed along the meridian line of the device (the 6th hour or noon line). The large size of the device and its placement near the center of the city forum, and indeed the center of the city itself owing to the forum's extension beyond the grid pattern of the rest of the city, would have made the dial a prominent feature of the city. Thamugadi was not,

¹³³ The omitted first and last hour lines would have greatly expanded the area of the device, as the distance from the extreme lines (first and last) to their next nearest hour lines was twice that from the penultimate lines to the meridian, given the extreme angle of sunlight at dawn and dusk (Guerbabi 1994).

however, the only site in the region to include a monumental horizontal planar dial at its core.

The nearby settlement of Lambaesis, the legionary outpost that likely held the soldiers who would later go on to settle Thamugadi as veterans, had an even larger such device. The Lambaesis timekeeping device covered an area 24 m (east-west) by 11 m (north-south) in the city's forum (Bel 1932).¹³⁴ The Lambaesis dial has not been the subject of extensive study, but Winter (2013: 405) dates the dial to the 1st or 2nd century CE. Given the unusual nature of both dials and the proximity and intertwined history of their respective cities, both devices are likely similar in age.

The construction of two monumental sundials in central areas of North African outposts¹³⁵ of the Roman empire is not a mere coincidence of interest in timekeeping. The devices were, in both cases, designed to provide an accurate account of the hour for the surrounding community. The monumental nature of the devices, however, was selected to also allow those devices to convey messages to and about their respective cities. In both instances, the designers of the sundials made concessions to the surrounding environment in order to produce dials at grand scales. At Thamugadi, the shadows of surrounding buildings made it impossible to track all the hours of the day

¹³⁴ Bel (1932) calculates the gnomon of Lambaesis to have been roughly 3.5m, which would account for some of the variation in overall area of the two devices, though the inclusion of the first and last hours would also greatly expand the footprint of that device when compared to Thamugadi.

¹³⁵ Or, at least, former outposts. By the time of the construction of the dial at Thamugadi, the city was well north of a Roman military road that pushed the empire's frontier further south (Raven 1993: 74).

with the device; the omission of hour lines at Thamugadi could have easily been avoided by using a more modestly sized timekeeping device placed in an area of uninterrupted daylight sun. An average sized dial atop a column would have remained a prominent, though more mundane, feature of the city's forum as seen across the many such installations discussed in this work or presented in its catalog. The device at Lambaesis, though not published as extensively, is reported to similarly adapt to the local environment at the expense of truly accurate timekeeping. Bel (1932) reports that the Lambaesis device was asymmetrical, which he explains by arguing that the device was calibrated to the variations in local topography; because of mountains to the west the sun set about 4° higher on the horizon during part of the year than it did in the rest. The hour lines of the Lambaesis dial reportedly take this discrepancy into account, angling sufficiently to display local rather than true noon in the winter.

In both cities, temporal accuracy (or comprehensiveness) was sacrificed to create monumental devices, despite the use of a local analemma in the design of the Thamugadi device (as proven by Guerbabi 1994). The timekeeping devices that appear at central places in both, the forum of Thamugadi and in front of the *capitolium* at Lambaesis, emphasized monumentality in conspicuous places central to the life of each city. These devices, among the largest surviving examples of sundials in the Roman world, would have been visually imposing features of the urban environment. Further, though, both timekeeping devices are examples of efforts by elite funders of

architectural projects to convey messages kinetically and haptically (Favro 1996: 10). Sundials with their shadow receiving faces literally inscribed into the pavement of the busiest places in a city for pedestrian traffic offered unique potential for direct engagement. Individuals consulting either sundial could touch the object, use themselves as an alternate gnomon of some sort, disrupt the reading of the dial by casting shadows across it, and any number of other direct engagements with the dial or its shadow. The unusual nature of the dials also allowed for, and likely demanded, kinetic engagements in ways other dials were not capable. The large area each dial both on the horizontal planes of their faces and the vertical planes of their monumental gnomons offered a variety of perspectives for an eye inspecting the device. Despite the large size of the dialface in each case, viewing angles for actually assessing the current time would be somewhat limited by its placement at ground level; one would need sufficient height to read the dial from any great distance.

The unique engagements afforded by the form of these two monumental dials show again how timekeeping devices can function across several categories of Lynch's image elements in cities. The dials of Thamugadi and Lambaesis functioned first as landmarks through their grand scale, unusual nature, and prominence both visually and in adhering to the time discipline of life in a Roman city. Their nature as useful tools that impacted the ability of activities to be coordinated and/or carried out in accordance with social expectations also made the devices nodes, as they could be destinations or

waypoints for any activity where timing was relevant. While neither city preserves direct evidence of the temporal limitations on use, it remains likely that the devices, in concert with the broader distribution of timekeeping devices consulted throughout the city, established meaningful edges to city life. Thamugadi, for example, had multiple baths likely to function along established opening and closing hours and each place certainly had some variation on the Roman emphasis of appropriate timing for certain social activities observed throughout the time and space of the Roman empire.

All of this proves that these monumental sundials contributed to the urban image of the cities that held them. The devices served as notable, if not defining, features of the urban environment that impacted the appearance and functioning of their cities. They impacted both of the core aspects of a city that define its image, the direct experience of an urban environment (the sights, sounds, smells, etc.) and the “internal conceptual reaction determined by culturally conditioned notions of what a city is, does, and means” (Favro 1996: 1). The question remains, though, of who sought to cultivate a particular urban image within these contexts. Much of the image of a city is built on environmental factors; a Roman city in the deserts of Africa Proconsularis looks and feels different than one in the rains of Britannia no matter what degree of “Roman-ness” one tries to impart or pursue. This is particularly true given the role of the observer in creating an urban image, as building and image is a “two-way” process

(Lynch 1960: 6) dependent on both the variations in an environment and the lenses through which it is interpreted.

Despite the individualized nature of perceiving and forming an urban image, the influence of specific actors is often present in an urban environment and recoverable archaeologically. Favro's study of the image of Augustan Rome offers an extreme case where a city was "redesigned in the conceptual and physical image of one man" (1996: 19). Augustus occupied an unprecedented position in Roman history, and with it came similarly unprecedented ability to shape the image of his capitol. The Augustan building program was able to pursue coherent themes across the face of an entire cityscape. Even in this extreme instance, though, the urban image of Rome under Augustus was neither monolithic nor static, constantly being negotiated and renegotiated and subject to the perceptions and preconceptions of its viewers (ibid.: 20-22). Augustus was able, though, to influence the context, identity, and structure of the city and thus its inhabitants and visitors.

Monumental Sundials and Urban Image

Rather than seeking to fully transcribe the urban image of ancient Lambaesis and Thamugadi here, this study can shed light on the role of the two cities' monumental sundials in this shaping of context, identity, and structure. Central to each of these aspects of urban image was both cities' founding identity as Roman outposts, initially

purely military in the case of Lambaesis and colonial¹³⁶ in that of Thamugadi. Roman identity remained an important influencing factor in the construction, renovation, and overall organization of both places well after their original military functions were de-emphasized or forgotten.

The use of identifiably Roman forms and mores in the peripheries of the empire was a tool for displaying one's connection to the center of power and culture. The epigraphic record of Thamugadi provides examples of some of the strategies employed by elite individuals in displaying and justifying their connections to Rome. Two influential community members from the Severan period, Pompenianus & Sertius, show differing paths to expressing Roman identity in Thamugadi. Pomponianus shows the administrative and cultural claim to Roman-ness, emphasizing his inherited senatorial status and positioning himself in the intellectual tradition of Rome, while Sertius sought to build the city into a more Roman form (while being sure his name was attached to the changes) through the gift of new structures and renovations (Fentress 1984). Each of these figures sought to change the urban image of the city, through either the reshaping of the built environment itself (Sertius) or the introduction of arts and culture (Pomponianus). While the sundial of Thamugadi lacks a dedicatory inscription

¹³⁶ Raven (1993: 74) adds that these frontier places maintained a paramilitary use, as large settlements of veterans could at least potentially prove quite useful in the imperial designs of Rome even beyond their active service. Even the "soft power" of an urban outpost was beneficial to imperial designs, as it established Rome and its ways as power in the region.

identifying either a patron or an exact time of creation, the device participates in both strategies simultaneously.

The strategies of local elites like Pomponianus and Sertius are less effective at broad-scale change in urban image than the building program of Augustan Rome both because of the substantial gulf in authority and resources between the main actors, but also in the context of the places they represent. Augustus focused on reshaping Rome specifically because it was the center of power for his burgeoning empire. Ancient sources themselves report the significance of Augustus' reinvention of Rome, with Seutonius famously reporting (Suet. *Aug.* 28.3) that:

Since the city was not adorned as the dignity of the empire demanded, and was exposed to flood and fire, he so beautified it that he could justly boast that he had found it built of brick and left it in marble. He made it safe too for the future, so far as human foresight could provide for this.¹³⁷

Rehak (2006: 1) points out that the remaking of Rome was portrayed, even in antiquity, as a necessity for the empire to grow. Not only was the city beautified, but so too was it protected from flood and fire. Perhaps most importantly, a city clad in marble was a more appropriate capitol, one more worthy of admiration and imitation. Pliny further expounds on the value of Augustus' remaking of the city, claiming "The wonders of our city show that we have conquered the world" (Pliny *H.N.* 36.12).¹³⁸ That monumental

¹³⁷ Urbem neque pro maiestate imperii ornatam et inundationibus incendiisque obnoxiam excoluit adeo, ut iure sit gloriatus marmoream se relinquere, quam latericium accepisset. Tutam vero, quantum provideri humana ratione potuit, etiam in posterum praestitit.

¹³⁸ Verum et ad urbis nostrae miracula transire conveniat DCCCque annorum dociles scrutari vires et sic quoque terrarum orbem victum ostendere.

timekeeping participated in this remaking of a city, and the conquest of the world, in the form of the *Horologium Augusti*, speaks to the efficacy of the hour in shaping the Roman worldview. Indeed, the unique ability of Augustus' timekeeping device to illustrate his *imperium*'s extension to the cosmos itself speaks to the unique capability of time to remake the world.

The elites of cities like Thamugadi and Lambaesis, however, could not make claims as large and encompassing as could Augustus. They could, though, shape their corner of the world and, in doing so, situate themselves among the lineage of Roman *imperium*. Dufton points to the rebuilding efforts of Sertius as an act of gentrification, a concept common in the contemporary world that Dufton recognizes in the ancient world as the pursuit of three re-defining changes in neighborhoods of an ancient city: "the displacement of less affluent communities, transformations to the overall character of the built environment, and subsequent waves of gentrifying elites" (Dufton 2019: 264). This type of redevelopment is clearest in the private residences of figures like Sertius, who drastically changed the character of an established part of the city by replacing a portion of the original city wall and the space both within and outside of it into a single elite residence. Fentress also situates the development of Thamugadi in the period around the sundial's construction similarly, though without applying the term gentrification, through noting that the city's initially more egalitarian land distributions collapsed under the "carefully managed speculation in urban property" (1984: 401)

pursued by local elites. These process of gentrification is not limited only to residential properties, though, as wider improvements to areas of the city similarly transformed its “overall character.”

The renovations of the forum that include the installation of the city’s monumental sundial participated in the broader project of gentrifying Thamugadi. While the sundial itself did not directly displace less affluent communities, the improvements to the forum and the construction of large, public buildings in the surrounding area did. The sundial did change the character of a neighborhood, again in concert with the broader suite of changes to the city’s public space, by introducing particularly Roman values and systems into the part of the city where elite business was traditionally conducted. It is reasonable to believe that the elites of Thamugadi held to similar temporal restrictions as did the elites reported to us in the written record, for example conducting business in the forum between after the *salutatio* at the second hour and the opening of the courts in the 3rd hour (Mart. 4.8). Further, as both Dufton and Fentress point out, the process of rebuilding and reshaping the city took place over the long term, with the “subsequent waves” of gentrifying elites. Sertius himself proves this point well, as he acquired his equestrian rank through only after supplementing

whatever inheritance he may have received through amassing further wealth (Fentress 1984: 406).¹³⁹

The sundial at Thamugadi changed the character of the forum in a way the bolstered the city's perceived connections to Rome. The most direct connection would be to the *Horologium Augusti* as a direct comparison of a monumental gnomon casting shadow on a pavement instilled with the markings needed to read the time. Favro highlights Rome's monumental gnomon as one of its greatest landmarks, and thus points of reference, that Augustus was able to create in the already dense city of his day, noting the device's "solemn isolation" and ability to "rivet attention from a great distance" (1996: 194). The scale and sight-lines of the Thamugadi gnomon are not quite so grand, but the object nevertheless would have served a similar function in its own way. Lynch notes that landmarks ingrain themselves in public awareness through visual prominence, but also through their "singularity" (Lynch 1994: 78). Despite being lost, we know that the gnomon stood roughly 3 m tall (according to Guerbabi 1994) and that it was prominently placed near the center of the forum. Indeed, singularity is a defining feature of a gnomon, as in order to function the device must both stand alone inasmuch as it needs unobscured views of both the sun and the shadow receiving face and in its need to create a discrete point to convey time with any precision. Whether the parallels

¹³⁹ Fentress goes on to speculate that this fortune may well have been amassed through the gentrification that reshaped the city, if indeed Sertius had interests in construction.

between the timekeeping devices of Rome and Thamugadi's forum were apparent to all observers is unclear, but building such connections was an important exercise among those that sought to function as cosmopolitan members of the empire. In order to portray themselves as members of Roman society, those living at the edge of the empire needed to "employ the metropolitan system of signs with grace and fluency" (Fentress 1984: 400). Timekeeping provided an excellent avenue for this conspicuous and apt use of such signs, given its connection to *imperium*, Roman practices, and its connection with long traditions of science and knowledge. These connections were not only embraced by the individuals responsible for the construction efforts that gentrified the city, but were made to be features of the city itself through their reification in the monumental sundial.

Conclusions

The concept of urban image carries with it an implication of a specifically visual engagement; Lynch himself introduces the task of his *The Image of the City* as "consider[ing] the visual quality of the American city by studying the mental image of that city which is held by its citizens" (1960: 2). The elements of a city's image that he outlines, however, relate rather explicitly to the experience of a city as well as its visual legibility: paths, edges, districts, nodes, and landmarks. Each of these elements can be defined by its visual singularity, such as the density of Italian language signs in New York City's Little Italy or the defining presence of the Flatiron Building in its Flatiron

District. While the vistas of these areas contribute to the mental image of the city, they are not wholly determinative of its function, but rather enable particular actions and perceptions that are ultimately at the hands of the actors populating a place.

Timekeeping devices occupy an intersection between visual and functional activity. The monumental sundial at Thamugadi certainly created a unique visual scene and transmitted important symbolic messages. At the same time, though, using the dial for its intended function of marking time would lead to particular functional impacts on social action. Hölscher (2018: 332) argues that the relationship between scenes created by visual images and lived experience was “was obviously close but not functional.” As an example, the scenes of Roman wall paintings in banqueting contexts could spur conversation directly relevant to the themes portrayed, but those were clearly not the only conversations to be had in that space. Timekeeping devices, in their role as visual phenomena either as landmarks or *objets d’art*, could lead to the sort of reflection on time’s meanings: the differences between *chronos* and *kairos*, the connections of the empire to the broader cosmos, or any number of other ideas about time and the hour. These objects simultaneously, however, were embedded in specific functional relationships to social action, and both the limits they imposed and the actions they enabled also contributed to the character and image of place.

This chapter first illustrated the ability of timekeeping devices to serve as symbols of certain locales, either of specific cities or of places of particular action and

meaning. While representations of timekeeping devices in place do not comprise a huge corpus, they are useful in illustrating the power of those devices as landmarks. It was not only the timekeeping devices depicted in art that functioned as symbols of a place or its identity; real world timekeeping devices themselves participated in the visual scenes of their surrounding area in a city while also being richly entangled with the senses and experiences of urban life in myriad other ways.

The chapter then moved on to show the spread of a particular type of timekeeping display that was prominent in the construction of urban images and civic identity. Timekeeping devices placed in the *fora* of Roman cities could not help but be prominent through their inclusion in an important node of city life. These devices were sited at locations actively used by broad swaths of the surrounding community, either directly or in passing as one navigated the city. This centrality made such installations a desirable feature of a Roman city, either to express a community's own affiliation with Rome or to impose Roman ways of being onto a place. The relationship between administrative change and public timekeeping devices highlights these connections; with new sets of obligations and benefits in a city's relationship to the center of power came new methods of displaying and enforcing one's adherence to cultural norms around timekeeping.

Finally, the chapter showed how even established places could acknowledge or reaffirm their Roman identity through these same means. Distinctly Roman places like

the military outpost at Lambaesis or the veterans' *colonia* at Thamugadi still had use of prominent public timekeeping devices. In each of these cases, that prominence seems to be largely the point of the devices under discussion, as each made comprises in function in order to install devices of impressive scale. In both of these North African cities, these installations occurred in the broader context of the negotiation of civic identity, in each city as concerted efforts by city elites to reshape the core of their city as a cosmopolitan center following the example of Rome's *Horologium Augusti*. While this aim was not the only reason timekeeping devices were installed publicly, it nevertheless shows how timekeeping was central in the urban image of a city through its role as a central component in negotiating and redefining that image.

CHAPTER 6: TIMEKEEPING IN URBAN EXPERIENCE

MAGNI MOMENTI MINUTIAE (*Grand Seminaire, Avignon, France, c. 1600*)

It is surprisingly easy to experience the bustle of life in ancient Pompeii. Listen to the Pompeians. Wandering through the city with your eyes and ears open, you can hear a thousand timeless voices which, from the stones, from the graffiti, from the writings painted on the facades of houses, tell you of the public deeds and private passions, the events and emotions of life in Roman times. (Varone 1990: 27)

The recognition that experiences, perspectives, and emotions of people in the past offer invaluable insight and understanding of the ancient world has engendered a desire to walk in their shoes. While recent scholarship has drastically expanded the methodologies of accessing sensorial experience in the past, in the case of the Roman world accessing past experience has often been explored through guided “walks” of ancient contexts. Varone (1990), for example, leads readers on a meandering route through ancient Pompeii introducing the characters and places one might expect to encounter on any given day in the city while also situating those people and places among literary references of the day. Favro (1996) introduces a measure of chronological control over the exercise, leading readers on (mapped) routes through Rome in 52 BCE and again in 14 CE to show the experience of the city before and after Augustus. Matyszak (2013) goes a step further in controlling for time, leading readers through the 24 hours of a late summer day in 137 CE Rome, each hour representing its own vignette

of daily life. Matyszak's approach is obviously of interest for this work given its explicit recognition of the hours as key and meaningful divisions of the Roman day, but this exception proves the rule that the timing of events in the imagined strolls through the past are often taken for granted. At the very least, the characters' knowledge of the time and ability to arrive in a timely fashion is left unstated.¹⁴⁰

While this chapter does not engage in its own imagined walk through a Roman city, it does use movement through an ancient city to help understand the experiences of timekeeping devices and the temporal culture of Imperial Rome. Understanding the particular contexts a Roman citizen or visitor to Roman town found themselves in and the sequence of places and scenes they would encounter in a given day helps situate the role of hourly time in the economic and social realms of life. Previous chapters have begun this work, of course: Chapter 3 discussed where (and when) timekeeping devices were found in ancient cities (taking Pompeii as the most intact collection of timekeeping devices in the Roman world), Chapter 4 explored some ways in which hours impacted social interaction and the structuring of one's day, and Chapter 5 introduced the efficacy of timekeeping devices in shaping Roman civic identity. After a brief introductory discussion of archaeology's ability to access experience in the past, this chapter adds to this analysis in two ways: first, the direct experience of engaging with timekeeping

¹⁴⁰ Again with the exception of Matyszak, though even he limits explicit discussion of determining the time to an imagined 7th hour visit to a clockmaker and a passing reference to an enslaved girl timing her pre-morning preparations by referencing the stars in the night sky.

devices and second, the impacts of enforced time (made possible through the infrastructure of hourly time affected by the timekeeping assemblage) on the experience of daily life itself. The former is accomplished through a discussion of the particular experience of contextualized timekeeping devices in Imperial Ostia, a city with a small but varied suite of timekeeping devices to draw from. The latter takes temporal restrictions on urban traffic as a case study of the efficacy of hourly time of shaping experience indirectly - that is, not through an explicit engagement with timekeeping devices but rather through the temporal structure those devices create.

The connection between a walk (imagined or otherwise) and the acquisition of knowledge is hardly a new invention of the late 20th century archaeologist. Indeed, this connection first appears in the Western canon through Greek philosophy of the 4th century BCE, most explicitly through the Peripatetic school.¹⁴¹ There is also, however, something distinctly Roman about the imagined walk as a thought exercise as it is so often concerned with understanding the social and experiential dimensions of ancient life. Romans inherited a tradition of walking as an end in itself from the Greeks, but made the tradition their own through by adding an emphasis on walking as a social activity (O'Sullivan 2011: 6). While the modern embrace of walking in the sandals of

¹⁴¹ The school so named for the Greek word "περιπατητικός," "given to walking about, esp. while teaching or disputing," for the *περίπατοι* or covered walkways where Aristotle met with his students.

ancient Romans is not itself social, it does combine the Greek interest in walking to think and understand and the Roman emphasis on doing so as part of a social unit.

Imagined walks through the ancient world are often presented as a more widely accessible type of scholarship than is dry exposition, as seen in Favro's description of her tours of ancient Rome as "recreated experiential walks through the ancient city accessible to general readers" (1996: xx). The end product of these thought exercises may be more directly accessible to non-specialists, but to be done accurately they require both substantial research to accurately recreate the spaces in which they take place and the suite of people, things, and sensorial engagements that realistically may have been encountered. The exercise in "walking" through ancient spaces has also moved beyond narrative (and even on-site tourism) through digital reconstructions. From user generated passion projects like the recreation of ancient Rome on the online roleplaying game *Second Life* to academically driven recreations like Digital Hadrian's Villa to popular video games set in the ancient world, interactive digital recreations have been used to convey the spaces and sensorial experiences of the past (Holter et al. 2020).

The uniting theme in these engagements with imagined and simulated walks through the ancient world, and their relevant contribution for the study of ancient timekeeping is the recognition that the experience of the built environment was a vital component of understanding it. In addition to the sights of the ancient city, there has

been a turn toward the senses in general in the humanities and in archaeology most relevantly here. In a recent edited volume on sound in antiquity, Holter et al. (2018: 44) describe this new engagement as focusing on “[the senses] historical and situational specificity on the one hand and the sensory embeddedness of both knowledge and conceptual understanding on the other.” Not only, then, does a consideration of the senses in antiquity seek to understand what sensorial engagements there were to be had in a given time, but also the role the senses in creating knowledge about the past. Beyond only affecting our understandings in the present, the senses were also used as tools in the past to “create and express a huge range of cultural meanings” (Toner 2014: 2).

In order to understand the full functioning and meaning of material culture and the built environment, we must access (where possible) or imagine how it was interacted with. This has traditionally been carried out through an emphasis on the visual, usually at the expense of other senses (and therefore a wholistic notion of ancient experience). Surviving contemporaneous depictions of Roman cities offer important insight into the perceptions of space and place in antiquity, though they are perhaps most notable for their paucity. The Roman understanding of city, both in the sense of its actual construction and the ways in which it functioned, was built on direct experience more than today’s reliance on depictions (Favro 1996: 1), for example as the setting of television shows and movies or as the background of highly curated social

media posts. Ancient experience was both literal, the interaction with a city and the sensorial engagements it produced, as well as conceptual through culturally conditioned ideas of what cities were and how they worked.

Timekeeping in Urban Experience

The previous chapter of this work touched on the sensorial engagements of Roman timekeeping devices, notably their reliance on visibility. Visually accessed timekeeping devices require more of their users than do aural time signals (Glennie & Thrift 2009: 42), as one must be able to read and understand the object independently rather than have the time communicated by crier or alarm. These and other sounds were certainly also used to communicate time in the Roman world, though it appears most aural engagements with timekeeping were more localized than those brought about with the rise of clock towers in the medieval and early modern periods. Engagements with timekeeping devices, then, most often occurred at particular sites, either the location of a device that could be visually accessed or within earshot of an announcement of a given time. The embodied nature of these encounters allowed timekeeping devices to not only serve as landmarks as defined in Lynch's elements of city image, but also as nodes. As both explicit destination and as waypoint, the sites of timekeeping devices were regularly and directly experienced by the residents, guests, travelers, traders, and others that navigated city streets.

Lynch defines nodes as points of convergence, junctions, places of a break in transportation, or points that derive meaning from being "condensation of some use or physical character" (Lynch 1960: 47). Timekeeping devices fit into this category in several ways, despite Lynch's reliance on spatial metaphors for initially defining the concept. Installed timekeeping devices, firstly, were stationary¹⁴² objects that were often sited at or near points of convergence (within fora, outside of temples, etc.). The use of timekeeping devices would also likely engage with their location as a sort of waypoint; while the point of a trip to a public sundial may have explicitly been to learn the current time, that information was in service of synchronizing some other task. The enslaved child sent out from the courts to determine the time reported by Cicero (Cic. *Brut.* 200),¹⁴³ for example, would have to return to their master with that information for the task to be complete. Timekeeping devices were certainly at the site of the "condensation" of a particular use, as they were the only sites that time could be read to the accuracy of the hour without a portable device of one's own. The meaning of these devices is also derived from their use and character, as has been discussed throughout

¹⁴² At least, were stationary for significant periods of time. These objects, other than building-sized water clocks or features directly installed on a building (like the sundials on the Tower of the Winds), could be moved but would have been used in an established location for each phase of their operation. Pliny's report of the first sundial in Rome clearly states that the object was brought from Catania, however any Roman that used the device to tell the time would have done so at its stationary location atop a pillar in the forum.

¹⁴³ Videt oscitantem iudicem, loquentem cum altero, non numquam etiam circulantem, mittentem ad horas, quaesitorem ut dimittat rogantem: intellegit oratorem in ea causa non adesse qui possit animis iudicum admoveere orationem tamquam fidibus manum.

this chapter; timekeeping devices directly derived their utility from consultation by human actors and influence over those actors' schedules while also carrying meaning-bestowing characteristics through their associations (such as those with the emperor, as discussed above).

Because of the experienced nature of urban image in the Roman context, patrons of civic improvements like public timekeeping devices "considered how their urban projects conveyed meaning kinetically and haptically" (Favro 1996: 10). Timekeeping devices, then, were not only appealing gifts for acts of civic munificence because of their low cost (relative to the construction of entire buildings as often done by the most elite) but also because of the high degree of engagement they produced. Donated timekeeping is centered around high traffic areas like fora, temples, and baths through which many people passed in their daily life. The devices also afforded kinetic engagements of the sort Favro identifies as high-value to elite givers. People would both seek out and move past these objects, allowing them to be experienced both actively and passively at various points throughout one's day. The object's own ability to lend order to the temporality of the day enhances the engagement passersby had with the gift.

Understanding sundials and water clocks as both landmarks and nodes highlights their outsized contribution to the urban image of ancient cities that featured such devices prominently. Favro argues that cities that sought to cultivate a particular

image, rather than just allowing an ad hoc urban image to form, relied on choreographed and unifying experiences and the imprinting of signs and symbols (Favro 1996: 2) to establish their image in the minds and memories of contemporary viewers. Objects that tracked hours clearly participated in each of these actions; through their efficacy they allowed synchronous and/or time-constrained action in ways not possible without measured time, they were themselves important symbols of knowledge and order, and they served a unique role in the narrative of shared experience throughout the empire and its place in broader cosmology.

Timekeeping devices further contribute to the urban image of a city through Lynch's category of edges, the "boundaries between two phases, linear breaks in continuity" (Lynch 1960: 47). While Lynch again firmly grounds his analysis in spatial analogies, the temporal order that hourly timekeeping devices create neatly fits into this category with a more thematic reading. Lynch emphasizes that edges both "close one region off from another" while simultaneously "holding together generalized areas" (ibid.). Hours created edges that were experienced as directly as those spatial barriers at the center of Lynch's analysis.¹⁴⁴ Hours defined when a given space was open and available in conjunction with, and often at the same level of enforcement as, the physical barriers that defined spaces and activities. The operating times of baths are a

¹⁴⁴ It is worth adding here that edges do not need to be entirely impermeable for Lynch, as modern readers are no doubt familiar with from our navigation of contemporary cities. One needs look no further than the expedient pathways of dead grass throughout a university quad to see that, while edges may be clearly defined, they are not infallible.

frequently cited example in this work, and could serve as edges that closed off a space entirely or to a select group of people.

In some instances the keeping of hours would drastically change the character of one's urban experience in the city at large, beyond more tightly confined spaces like a bath. The prohibition on wheeled traffic within cities prior to the 10th hour reported in the *Lex Iulia Municipalis* would transform the usage of city streets drastically, moving them from the active bustle of pedestrian traffic and the interactions and business it enabled to a more contested experience of unwieldy carts and the animals that pulled them through the city streets. The use of a specific hour prior to the natural "edge" of the sun's setting shows that there was an expectation of temporal knowledge and time discipline beyond the observation of natural phenomena. Poehler rightly notes that the timing of wheeled access to streets corresponds with the typical end of the public day (of elites) (2017: 236), thus showing that an edge was intentionally created between the "space" of elite interaction with the city at large and that of more industrious portions of daily life.

The spaces and timings of an ancient city were essential to its participation in the broader realm of Roman culture. Tacitus provides a key list of what Laurence and Trifilo call "the transpatial signifiers of Roman culture" (2015: 103), those features that were held in common as symbols of participation in the Roman world across its vast expanse: the toga, Latin, fora, temples, baths, porticoes and dinners (Tac. *Agr.* 19-21). It is no

accident that several of these institutions, understood even in antiquity to be a representation of proper Roman identity, have frequently served as examples of the utility of hourly timekeeping throughout this work. Bathing and dining are perhaps the most frequently cited occasions where timeliness was essential in Roman life, both in terms of cultural expectations of peers (dining at the 9th hour) and in the smooth administration of public life (the opening hours of baths, limitations on their use along temporal lines, etc.). The activities of Roman *fora*, similarly, called for time to be kept (the expectations on when business was to be conducted) and also regularly served as sites of timekeeping. So, too, were temples often entangled with timekeeping, either through their holding of an hourly timekeeping device and/or the specific timing of rites. The hour served as an essential component of core elements of Roman culture, and itself represents a particular cultural institution that defined Roman identity. Hours, though predating the Roman Empire and first expanding in utilization during the Hellenistic period, were not universally used in antiquity. The use of hours, then, was both a marker of Roman identity and simultaneously a tool for enforcing Roman practices and conceptions. By looking at the use of hours in shaping the urban image of cities, the impact of Roman identity on how cities functioned, how they were understood, and what they meant becomes clear.

Experiencing Time Systems

Timekeeping, as discussed in Chapter 2 of this work, is a complicated phenomena to assess archaeologically. The devices at the core of time systems based on *chronos*, the “fundamental conception of time as measure” (Smith 1969: 1), often occupy a position at the nexus of archaeological artifacts, features, and networks. This is particularly true of timekeeping in antiquity; even though portable timekeeping devices were available, the vast majority of extant devices and literary references center on objects installed in place. This work has argued that timekeeping devices have efficacy in creating time systems, in that the objects themselves made things happen (see Smith 2015, following Bennet 2010). This efficacy is not the result of material objects acting agentively and independently, but rather through their participation in assemblages of material objects and in networks of social action. Given this relational efficacy, the experience of these objects and their contexts becomes an essential component in understanding first how they are able to be effective and, second, what exactly their given effects were. As discussed above, archaeologists and historians often seek to understand experience through the thought exercise of putting themselves (and their readers) into the sandals of the people in the past and seeking to recreate the interactions of daily life.

Accessing experience in the past is a fraught endeavor, as so much of experience is personal and contextual in ways that cannot fully translate between individuals,

much less between millennia of social change. Attempting to fully capture the experience of people in the past, especially their emotional states and feelings, has potential to become an “essentialist, universalizing and ahistorical” (Harris 2016: 123) exercise. The interest here is not the individual emotional response of particular actors in the past, but rather an investigation of the cultural and material contributions to the generation, enactment, and manifestation of lived experience. Smith says the following of understanding landscapes, which overlaps with the study of timekeeping in several ways:

the landscapes in which we live can be understood as instrumental in shaping the way we move through the routines and surprises of our daily lives, the affective responses engendered by places of particular meaning, and the ways in which we imagine our lives being reshaped (Smith 2003: 25).

First, the sited nature of much timekeeping itself clearly situates the phenomenon within broader discourse on landscape. The example of the monumental sundial in the forum of Thamugadi from the previous chapter illustrates this point, as the dial was a prominent feature of both the viewshed of life in the forum and a participant in the organization of daily activity. Timekeeping devices like that at Thamugadi are both experienced and interacted with, like other features of the built environment though in ways and to ends particular to the devices. The same is true of other timekeeping installations, even if at different scales; the dial in the peristyle garden of a Pompeian villa was interacted with by fewer people, but still participated in the network of temporal practice both within and beyond the house. Second, Smith’s formulation of

landscape inherently includes time, as landscapes are not static nor can they exist outside of time. Ingold refers to this relationship as the “fundamental temporality of the landscape itself” (1993: 164). Finally, Smith (2015) went on in a later work to discuss the role of assemblages in producing and reproducing social and political outcomes similar to the function of landscapes. Smith (ibid.: 33) defines assemblages as “material forms linked by distinctly social relationships with assemblies of humans that are likewise defined by the engagement.” To summarize, assemblages are not only a series of objects, but are instead made up of objects that define aspects of human sociality and that are themselves defined by that sociality. A timekeeping assemblage, then, may look like the collection of timekeeping devices across a given space, the humans that interact with them, and other objects that participate in the practice of timekeeping (i.e. the signaling horns of the *horologiarius* in a military camp, the structure casting shadow across the face of the Thamugadi sundial, etc.).

With this recognition that timekeeping devices are experienced as features of the built environment and within assemblages of temporal practice, the experience of interacting with those objects comes into clearer focus. The assemblage of hourly timekeeping made certain social realities possible, and also made them actually happen, as components timekeeping assemblages. Smith argues that the assemblage acts across three domains: “the physical, experiential elements of object form and assemblage distribution,” “the perceptual, ideological qualities of things that articulate objects with

social, political, and cultural values,” and “the imaginative domain of affect in which representations place objects within affective regimes” (ibid.: 15).

Timekeeping at Ostia

In order to explore the intricacies of experiencing hourly time in the Roman world, a case study with a corpus of timekeeping devices that has known contextual information is key. Context is necessary both spatially, as discussed above in the role of timekeeping as installed features, as well as temporally, to avoid conflating objects in use at different times.¹⁴⁵ In the interest of being thorough, variety among those contexts also increases the types of experience with measured hours that were available to the people of an ancient. The sundials, water clocks, and representations at Ostia and its environs well meets these requirements, as excavations at the city have yielded 10 timekeeping devices (Table 6.I), 2 representations of devices, and 1 dedicatory inscription for a *horologium*. For the sake of this chapter, the sundial recovered from the Imperial villa at Tor Paterno is also be included among the finds from Ostia and its immediate surroundings.

¹⁴⁵ The understanding of usage over time here, of course, comes with the recognition that timekeeping devices had durability and could remain in use for extended periods of time, even before being repaired or repurposed. The House of the Menander at Pompeii serves as a cautionary tale, though, as the property had both an installed sundial in its peristyle garden as well as a sundial that had been placed in storage during renovations.

Site	ID	Device Type	Location	Century	Period
Ostia	440	Sphere	Baths	1st - 2nd CE	Imperial
Ostia	445	Sphere	Unknown	-	Early Imperial*
Ostia	444	Sphere	Imperial Villa	1st CE	Early Imperial
Ostia	446	Sphere	Funerary	1st - 2nd CE	Imperial
Ostia	438	Cone	Temple	1st BCE	Early Imperial
Ostia	441	Cone	Compitum	1st CE	Early Imperial
Ostia	447	Cone	Unknown	-	Imperial*
Ostia	439	Plane	Unknown	-	Late Antique*
Ostia	442	Plane	Unknown	-	Early Imperial*
Ostia	443	Plane	Baths?	-	Early Imperial*
Ostia	435	Representation	Funerary	3rd CE	Imperial
Ostia	436	Representation	Funerary	3rd CE	Imperial
Ostia	1000	Inscription	Compitum	1st BCE	Early Imperial

Table 6.I - Table of timekeeping devices, representations, and inscriptions recovered from Ostia.

* Broad dates based on object form.

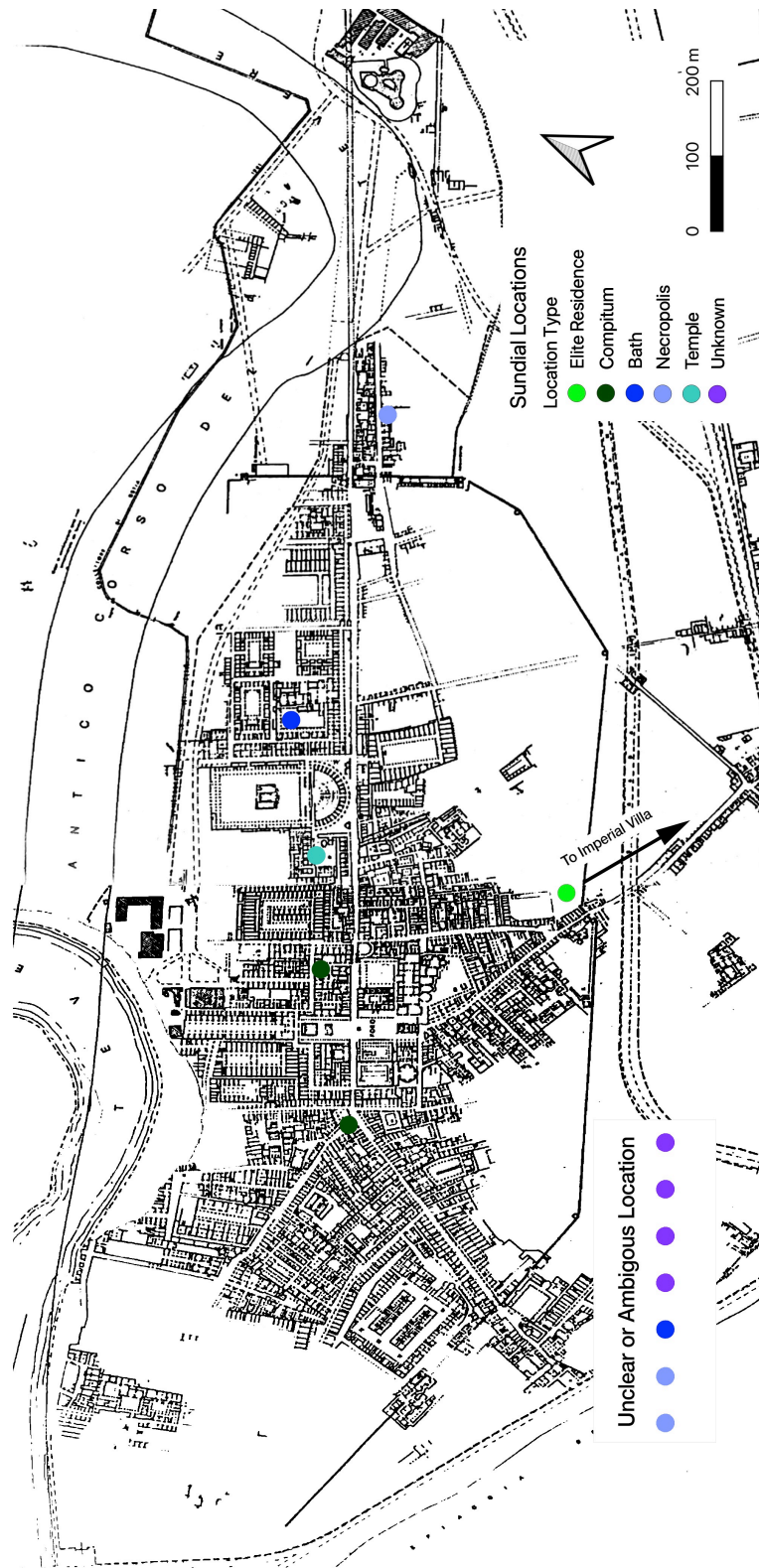


Figure 6.1 - Map of Ostian timekeeping devices and representations, by location type. Modified from Ricciardi 1996.

Among the timekeeping devices known from Ostia, mapped in Figure 6.1, 5 objects have location data sufficient to at least characterize the type of setting in which they were installed. All of these objects are datable to either the 1st BCE or the 1st CE, with the earliest device recovered from the small temple district near the Tiber river port (#438), and the others from baths (#440), public space in/near the Piazza dei Lari (#441), at a tomb just outside of the Porta Romana (#446), and the imperial villa outside of the city limits (#444). Additionally, the dedicatory inscription for a *horologium* (#1000) was located in a public *compitum*, preserving the location of the device even though the object itself is lost. The *compitum*, traditionally defined as a crossroads, has been more widely identified to “constitute the place where different territories (*partes*) meet, which means that the shrines should not by definition be located at (a conjunction of) roads” (Stek 2009: 119). Though fewer in number than the preserved corpus of devices at many other sites, the Ostian devices retain a high proportion of contextual information and well represent the most typical locations for timekeeping devices; at baths, in public squares¹⁴⁶, in funerary contexts, and in elite housing by way of the Imperial villa south of the city. The devices themselves are split in type between spherical (4), conical (3), and planar sundials (3) with no clepsydrae recovered from the site. Though a small number, the distribution of types is similar to that seen across all sites in the 1st BCE-1st CE, to which most of the Ostian devices have been dated. Ostia also benefits from

¹⁴⁶ Through the objects placed at *compitum*-shrines.

possessing two representations of timekeeping device, both on sarcophagi dating to the 3rd century CE. The exact findspot of both objects is unknown, however the nature of the objects allows them to be securely assigned to funerary contexts for at least a significant portion of their biographies.

Sundials

The most remarkable individual object among the devices from Ostia and its environs is that recovered from the imperial villa at Tor Paterno outside of the city (#444). The device takes the form of a kneeling, bearded figure hoisting a spherical shadow-receiving surface with 11 hour lines and three date lines (for the solstices and equinoxes). All hour lines extend above the winter solstice dateline, though only the 3rd, 6th, and 9th hour lines are extended beyond the summer solstice line at the bottom of the device. The object was recovered in 1790, and thus has little in the way of contextual information. Winter (2013: 456) interprets the device as originating from a funerary context near the Porta Paterno, though other sources place the object at the extramural villa itself (and instead attribute sundial #446 to extramural tombs). As discussed previously (Chapter 3) in comparison with another dial featuring a kneeling Atlas discovered at Pompeii (#507), the Tor Paterno dial (Figure 6.2) requires a cautious approach as the hour lines are arranged to reflect equinoctial, rather than seasonal, hours (Evans 2016: 153). While equinoctial hours were understood at the time and used in some specialized contexts (i.e. astronomy), their inclusion on a highly decorative

sundial is suspicious. These hour lines have been regarded as decorative, explaining their unusual nature as a result of the device not being functional.¹⁴⁷ The device does include a hole for the placement of a gnomon, but this feature is not sufficient to guarantee a functional dial. The hour lines may also have been added after the device was recovered archaeologically to increase its desirability for collectors. There is some precedent for the later inscription on timekeeping devices from antiquity at Ostia, as another of the spherical dials at the city (#446) was inscribed with its location and year of discovery at some point between its excavation and its current placement in the collections of the Vatican Museum. The other sundial-esque features of the kneeling Atlas dial, however, suggest that it is unlikely for the hour lines to have been added in modernity. The object has been stylistically dated to circa 2nd century CE (Evans 2016: 153), though the presence of a similar dial at Pompeii also provides precedent for an earlier date.

¹⁴⁷ The potential of the device to be wholly decorative may be the reason for Winter's differing interpretation of the object's findspot, though her work does not specify.



Figure 6.2 - Tor Paterno (or Porta Paterno) sundial with kneeling Atlas (#444). Photo © Sir John Sloane's Museum, London.



Figure 6.3 - Spherical dial from Ostia (#446) with later inscription naming the city and the year of excavation, 1858. Berlin Sundial Collaboration, Image of Dialface ID 62, Vatican City State, Inventory Nr. 2534, 2015, Ancient Sundials, Edition Topoi. Creative Commons BY-NC-SA 3.0 DE.

The remaining timekeeping devices found at Ostia contain only typical decorative features, such as a torus molding (#440) or lion's feet (#441) adorning the base. The planar dials appear to have been oriented vertically, with one (#443) bearing a partial inscription of which only a "B" survives (#443). This latter dial was recovered from a secondary deposition context, as it had been reused as a paving stone in the *Decumanus*. The lone device from the Late Antique period (#439) was notably simple in design; the vertical dial consisted only of an inscribed semicircle with 11 hour lines

radiating out from the gnomon hole at center. The Late Antique devices is also roughly inscribed, with unevenly spaced hour lines throughout.

While few of the devices recovered at Ostia retain detailed provenience device, owing to both early archaeological interest in the site and the frequent reuse of the devices as building materials in (and since) antiquity. While the spatial information is not exact, the reported findspots of some objects strongly suggests their original placement, especially in the context of known distribution patterns (as discussed in Chapter 3). Two devices, a spherical (#440) and a planar (#443) dial, were recovered in the vicinity of bath complexes in the city. The former was within the Neptune Baths to the east of the city's theater (Calza & Squarciapino 1962: 17-18). This bath complex was constructed under Hadrian though not inaugurated until 139 CE in the reign of Antonius Pius (Hänninen 2020: 148), calling either for flexibility in Winter's (2013: 454) 1st century dating of the object or the possibility that it had been reinstalled there from elsewhere. The other device in proximity to a bath complex is the planar fragment (#443) previously mentioned to have been recovered as a paving stone in the *Decumanus*. The provenience information is again unclear, with Gibbs (1976: 357) claiming only that the dial was found on May 12, 1962 "along the Decumanus near the baths."

The location of a sundial recovered from a temple context is more precise, as its findspot is known to the level of the four small temples on a shared podium near the

Tiber river port. Gibbs (1976: 282) again provides a cryptic account of the objects provenience, claiming it was “found while cleaning a small temple in the area of the four temples at Ostia Antica.” The four temples, known collectively as the *Quattro Tempietti*, have been associated with Venus, Fortuna, Ceres, and Spes through an inscription at the port and were constructed between 90-60 BCE. The four deities have been associated with “hope, good luck and prosperity and connected to navigation and commerce” (Mustakallio 2020: 343), explaining their grouping at a central point of navigation near the river port of the city.

The lone functional device from a funerary context at Ostia was recovered from the necropolis just outside of the Porta Romana. The tombs, excavated in the mid-19th century under the auspices of Pope Pius IX, reportedly stood at the corner of the *Via dei Sepolcri* and another street and was remarkable for its number of fine marble, bronze, and ivory objects (Paschetto 1912: 434-435). Chief among these was the perfectly preserved white marble sundial (#446) (Figure 6.3), which Calza & Squarciapino (1964: 17-18) claim is identical in form to the device recovered from the Neptune Baths. The *Via dei Sepolcri* runs parallel to the *Via Ostiensis* for a short way beyond the Porta Romana, with at least two preserved intersecting roads leading south. The *Via dei Sepolcri* also led to a small city gate today known as the *Porta Secondaria*. The space between the two parallel roads was home to the tombs that lend the more southerly road its name, with some tombs also being placed to the south after the Flavian period.

The final extant device with find location data is a conical device (#441) found on the “southeast junction of the Decumanus and the plaza of the Altar of the Lares” (Gibbs 1976: 283). Winter (2013: 455) regards this location as a sort of public plaza, classifying it in her broad category for *fora* and other public squares. The recent publication of Ostia’s dedicatory inscription for a *horologium* at a *compitum* shrine (discussed below), however, suggests that the contents of the plaza may be the operative factor in a sundial’s placement there: the Piazza dei Lari, as the square is known today, is so-named for the *compitum* shrine to the *Lares Vicinales* that stands there. These points likely served as meeting places within or between the areas they defined, thus leading to their selection as the location of timekeeping installations in Ostia. Whether considered as a *compitum*-shrine or simply as a generally accessible public square, the sundial recovered from the Piazza dei Lari was publicly accessible.

Inscription

As is often the case, the inscription naming a *horologium* in the city provides contextual information for a device that is no longer present. Ostia’s dedicatory inscription for a timekeeping device provides both the name and station of its donor, Gaius Cartilius Heracleo, a freedman of Gaius. The inscription in its entirety reads:

Gaius Cartilius Heracleo, freed from Gaius, magister of the vicus, put down the sundial, at his expense (trans. Van Haepelen 2019: 124).¹⁴⁸

¹⁴⁸ [C(aius) Car]tilius C(ai) l(ibertus) / [He]racleo / [mag(ister)] v(e)ici / [horo]logium / [suo(?)] posuit

Though the inscription was found reused in a *fullonica*, the person of Gaius Cartilius Heracleo is known from another inscription at a *compitum*-shrine in the city. The *Compitum* of Poplicola, so named for the *duovir* and *censor* C. Cartilius Poplicola who approved its relocation to a new site, has been identified with a rectangular building just outside the western gate of the city's *castrum* where the *Decumanus* splits and is intersected by another major road (Bloch 1964: 222-223). Another inscription registering the movement of the *compitum* again lists Gaius Cartilius Heracleo, along with two other freedmen *magistri vici*, as the donors behind the *compitum*-shrine (CIL XIV, 4710).¹⁴⁹ The reuse of the horologium inscription near the proposed site of the *compitum* further supports the identification of the structure with the larger inscription (Van Haerepen 2019: 124).

Representations

While their original deposition contexts are unknown, both of the known representations of sundials from the city are found on sarcophagi and thus can firmly be assigned to funerary contexts (at least in their original use). Each of these representations dates to the 3rd century CE, again situating them among trends in the distribution of timekeeping devices and representations thereof, but also placing them

¹⁴⁹ Po[st]umus Plotius M(arci) f(ilius) quarto, / A(ulus) Genucius A(uli) f(ilius) iter(um) duouiri, / locum dederunt compiti aedificandi.

C(aius) Cartilius C(ai) f(ilius) Poplicola, duovir VII, / cens(or) III compitum transtulit. / D(ecimus) Caecilius D(ecimorum duorum) l(ibertus) Nicia, medicus, / L(ucius) Marcius L(uci) l(ibertus) Stephanus, P(ublius) Naeuius P(ubli) l(ibertus) Heraclida, / mag(istri) uici, maceriem et columnam de suo fecerunt. / C(aius) Cartilius C(ai) l(ibertus) Hera[cleo].

at a remove from the extant devices in the city. The sundials on both sarcophagi appear in different scenes: cupids playing and a travel scene. The first (#435) situates the sundial atop a column in the background of cupids playing, shown as a vertical planar dial complete with gnomon. The sundial here is a dihedral vertical planar dial, composed of two flat slabs joined at a 90° angle. Bonnín (2015b) has shown that this dial type, long known predominantly from artistic depictions with only a small corpus of extant examples, was likely much more common as functioning devices in antiquity, as surviving fragments have often been misinterpreted as remnants of flat-faced planar dials. The second depiction from Ostia (#436), divorced from its original context as it was found in the façade of a 16th century house, contains a sundial depicted in the background among architectural features, behind three toga-wearing men traveling on a cart. Neither of these depicted sundials participates in the scene, as neither interacts with the subjects of the depiction; the first behind playing cupids, the second an architectural feature behind traveling figures. Each does function, though, to set a scene; the former placing the action of playing youth within the sundial-hosting space of a garden or a palaestra and the latter marking movement away from an urban environment.



Figure 6.4 - Sarcophagus recovered from Ostia with dihedral planar sundial (#435), circled in red at center. Though the device resembles a column capital, Bonnín (2015b) has shown that this form represents a dihedral vertical planar sundial. Photo © The Trustees of the British Museum.

The scene of Cupid's playing (Figure 6.4) is especially notable for the way that the attributes behind the figures define their location. Cupids playing is generally a common motif for Roman children's sarcophagi, and there are several other extant examples from the 3rd century CE of the figures engaging with nuts in some sort of rolling game as depicted here (Huskinson 1996: 44-45). Scenes of daily life, and particularly of education, were often included in Roman children's sarcophagi used to convey the virtues and accomplishments of children over their short lives (Huskinson 2007: 333). The inclusion of a herm in the background of such scenes is likely intended to situate the action within the *palaestra*, as can also be seen in the Ostian example (Huskinson 1996: 44-45). As discussed elsewhere here, sundials are also regularly

employed as symbols of the *palaestra* in Roman art, most notably in the Seven Sages mosaic at Pompeii (and Sarsina). The sundial is placed in the background of the scene of play to establish its location, and that location is a reflection of the real life experience of the child before their passing. This role of the sundial surely also functioned alongside its symbolism of times passage, a theme which became increasingly common in Late Antique and early Christian art.

Finding Time in Ostia Antica

With this introduction to the known objects of timekeeping at Ostia, it is possible to now consider the experience of timekeeping that one would have navigating the city in antiquity. The unique nature of ancient Ostia as a bustling port town very near the power center of the empire created unusual conditions for both daily life in the city and occasional visits. The density and size of the city resulted in unusual demands for housing, met during the city's peak of development in the 2nd Century CE through the use of multistory and multi-occupancy housing blocks that functioned like modern apartments (DeLaine 2020). The layout and construction of ancient Ostia make the *flaneur's* perspective especially useful, as the city must be considered in its own right and among the unique forms and social interactions it facilitated. To tour the experience of accessing hourly time in the city, I first consider the device at the *villa rustica* at Tor Paterno, perhaps the most typical in its placement and usage given the preservation of 24 other devices (and a single representation) preserved in rural villas throughout the

Roman world. Next this section considers the role of hourly time for those entering the city, particularly through the port and its proximity to the device among the *Quattro Tempietti* district. The section goes on to explore Ostia's evidence of both unique engagements with timekeeping associated with its predominant apartment-style housing and a more typical Roman relationship with time at the baths. The devices and representations in funerary contexts are considered through movement out of the city, both of the mundane variety and in death. Finally, this section also considers the experience of time discipline and temporal structure those devices created through their impacts on traffic and movement in the city.

Villa at Tor Paterno

The complex at Tor Paterno is a sprawling Imperial Villa with remnants of at least three separate bath structures, an aqueduct, and a nymphaeum. The villa complex covers an area of roughly 27 hectares near the coast to the south of Ostia. Herodian (*Hdn.* 1.12.2) reports that Commodus fled the plague at Rome to *Laurentum*, the ancient name for modern Tor Paterno, in 189 CE, supporting the assignation of the villa to the imperial family. The villa complex has not been fully excavated, however targeted excavations of parts of the villa have revealed the above mentioned features as well as cisterns, residential portions of the villa, and even traces of an earlier *villa rustica* put out of use by the construction of the later imperial structure begun around 160 CE (though

with ongoing construction in various sectors through the 4th century) (Marzano 2007: 317-325).

The sundial from the villa appears to have first been mentioned in a published work in 1816, when Settele (1816: 19) discusses the arrangement of hour lines on its face and mentions that it was recovered from Tor Paterno about 25 years previous to his writing and sent to England. The lack of detailed provenience and the sprawling nature of the property make placing the sundial within the complex a difficult task, given the preponderance of potential locations. The form of this particular timekeeping device further complicates the issue, as it is not clear that the device was in fact a functional timekeeper. Despite having the full number of day- and hour lines and a place for a gnomon, the equinoctial nature of the hours on the device have led to questions about its actual use in tracking hours. The object was included in the Institute for the Study of the Ancient World's *Time and Cosmos in Greco-Roman Antiquity* exhibition as "Statuette of Atlas Bearing Ornamental Spherical Sundial" with Evans (2016: 153) observing that "probably it served as a piece of garden art" in the accompanying exhibition book.

While the object may or may not have been used functionally, its presence in an imperial villa fits well with imperial messaging about the emperor's special relationship to the cosmos that helped define the hour's significance in the imperial period. The sphere upon Atlas' shoulders has long associations with Roman (by way of Greek) understandings of the cosmos, and the development of the science behind hourly

timekeeping, from as early as Pythagoras' 6th century BCE recognition of the earth as a sphere (and the ecliptic) and Eudoxos' 5th century BCE geocentric model with concentric celestial spheres (Rehak 2006: 63). While Hannah (2009: 71) cautions that the relationship between the celestial spheres of early Greco-Roman astronomy and the development of spherical forms in sundials may not have been as direct as it appears in hindsight, the use of Atlas ensures that the object was intended as a sort of visual pun between the two cosmic spheres.

Given its general find context within a sprawling imperial villa, it is unlikely that the Atlas sundial would have been encountered by anything approaching an ancient *flaneur*. The audience of this device, though, would be one well versed in the emperor's relationship to hourly time. Even if the device were inoperable, its possession by the imperial household would likely have seemed natural given the emperor's connection to the cosmos. The example of Augustus' *Horologium Augusti*, constructed nearly 200 years previous to the completion of the villa at Tor Paterno, had long cemented the imperial connection to and *imperium* over cosmic forces.

Entering the City

Those entering Ostia from the water, especially during the city's flourishing in the late 1st and early 2nd centuries CE, would find themselves in a bustling trade and shipping center. After disembarking boats that carried seafarers from the main port at Portus along a canal to Ostia, traders, merchants, and any others in their company

would be only a short distance from the Quattri Tempietti, as river transportation created a “concentration of traffic” in that part of the city (Laurence 2020: 141). The grouping of four small temples among which one of the extant timekeeping devices from Ostia was recovered. The temples to Venus, Ceres, Spes, and Fortuna were placed near the Porta Romana as recognition of their protection of goods and trade, and the location would have also led to a constantly evolving mix of traders, merchants, ship owners, seafarers, and others. Indeed, the port sanctuary likely doubled, in an equally important role, as the main meeting point for those working on ships and the traders that depended on them (Rieger 2004: 90), at least prior to the construction of the *Piazzale delle Corporazioni* in the 2nd century CE.

The exact location of the timekeeping installation among the *Quattro Tempietti* is again unknown, and the device’s situation among the temples gives little further implications for an exact installation point. Roman practices of installing timekeeping devices at temples are less frequent and less clearly defined than their Hellenistic predecessors (Winter 2013: 194), with a shift in the focus of public giving of sundials and water clocks to civic spaces. Of the four deities honored at the temples, only Fortuna has an extant example of a timekeeping device from temples elsewhere. Even this overlap, though, is a tenuous connection between the goddess and hourly time, as the device from the Temple of Fortuna at *Porta Portese* in Rome is an imported Egyptian diorite *clepsydra* (#635). It is also worth noting, however, that Cuyler (2019) has called

the assignation of the *Quattro Tempietti* into doubt, the four deities appear on an inscription found at the Forum of Portus and only Venus has been directly related to the archaeological remains of the temples. The nature of the *Quattro Tempietti* as a major meeting point in the city and the lack of clear association between the deities present, if they are even the correct deities worshipped at the respective temples, and timekeeping elsewhere suggests that the device may have been placed among the temples for secular reasons; the device may simply have been intended to convey time among a gathering of people rather than being directly tied to religious practice.

The *Quattro Tempietti* have been dated to the late Later Republican period for their initial construction, with Cuyler's (2019) reappraisal of the archaeological and epigraphic evidence placing their founding in the late 2nd Century BCE. Winter (2013: 454) dates the timekeeping device from the temple district based on a stylistic comparison to devices found at Pompeii, thus placing it in the 1st century BCE or perhaps the early part of the 1st century CE. The sundial, then, may date alongside the initial construction of the temples or their major reconstruction shortly after in the early 1st century BCE.

Given the (roughly) contemporaneous dating of the construction of the temples and the sundial discovered nearby, as well as the fact that the sundial remained in the same area through to its discovery by early excavators at the site, it is reasonable to assume that the device remained installed at or near the temples through to their

abandonment. A traveller who approached the city during the period of its greatest growth, the imperial construction boom at Ostia in the late 1st and 2nd century CE would have encountered a longstanding installation on or near the temple podium. While the city was connected to Rome by both the Tiber and overland by the *Via Ostiensis*, it is possible that the land route was generally preferred for accessing reaching Rome. Traveling by road between Rome and Ostia would take roughly half a day, while the Tiber's meandering route covered about twice the distance, with barges hauled by oxen and less predictable river conditions leading to up to a 3-day upstream trip along the river (Laurence 2020). Though longer (at least going upstream toward Rome), the river routes were an essential part of the transit system with myriad specialized laborers facilitating the upriver transfer of cargos (Tuck 2013).

The eastern part of ancient Ostia was the center of movement into and out of the city; land traffic going to or coming from Rome would center on the *Porta Romana* at the eastern end of the *Decumanus Maximus* and Tiber traffic would also be concentrated on the part of the city east of the forum (Laurence 2020: 141). Arriving in this part of the city, already remarkable for its density in antiquity, would thus mean entering the city at its most bustling and busy. Those entering via the *Porta Romana* would travel into the city by the *Decumanus Maximus*, passing the city's sprawling Baths of Neptune and theater before coming to the *Quattro Tempietti*. To reach the temples from the main road, one would have to cross a porticoed entrance at the southern end of the piazza abutting

the temple platform. This entrance channeled visitors through a roughly 2m passageway between two of the eight *tabernae* that lined the southern edge of the piazza. This separation between the small temple district and the *Decumanus* was no accident, as a similar arrangement is seen in other sacred districts across the city (Kaiser 2011: 132). This separation, particularly here among the busiest traffic of the city, likely served to exclude cart traffic and other noisy aspects of the busy street from the temples and adjoining piazza. The variety of vessels used to move cargo from the sea into Rome would also lend hefty activity to Ostia and its surroundings; the proliferation of bridges in Rome during the late Republic and early Principate saw a transition from seagoing vessels heading directly into Rome to the development of several specialized vessels for ferrying cargo and passengers through the narrowed channel of the river (Tuck 2013: 237-238).

After leaving the main thoroughfare behind, a pedestrian would enter the district of the *Quattro Tempietti* with a view of all four temples on a raised platform at the northern end of the open space. The eastern side of the piazza also boasted a *sacellum* of Jupiter and a *nymphaeum* providing water to the district. Though the wording of the context for the sundial's discovery is opaque, it stands to reason that the device would be present near the temples, or at least on the podium upon which they stood, as this portion of the district possessed the largest southern exposure and sufficient height to protect the device from shadows cast by surrounding buildings or features.

Given the irregular nature of both sea and overland travel at the time, the sundial at the *Quattro Tempietti* would likely not be of much use to the records or planning of incoming vessels. There are particular contexts where transportation networks did closely tend the hours, though such records generally only appear in relation to the postal system (Remisjen 2007). Ships, it seems, did not depart on a fixed schedule either, instead basing their departure on conditions, omens, and rites (Casson 1994: 155). However, the point of intersection between sea (and river) travel and city life likely still found the hours a useful measure, as those moving between the two realms would need orientation to the tempos of the other. Even if hours were not kept in official records or calculations of transportation, they can be found amongst accounts of travelers.

Horace's fifth satire includes a passage about travel into Rome in the 1st century BCE via barge from the *Forum Appii*. The end of his trying journey aboard the ferry, complete with buzzing mosquitoes and the singing of drunk boatmen, is marked by the time: "Finally at the fourth hour we can disembark and wash [our] faces and hands" (Hor. *Sat.* 1.5.38-40).¹⁵⁰ The sundial at the *Quattro Tempietti* offers an apt comparison to the Forum Appii; a waypoint at the end of a day's travel from Rome where overland and river (or, in the case of Appii, canal) traffic intermix. Horace's description of the *Forum Appii* itself also overlaps with the role of the *Quattro Tempietti* as a meeting place for

¹⁵⁰ Quarta vix demum exponimur hora.
ora manusque tua lavimus, Feronia, lympa.

shipping and trade. Horace describes the scene as full of boatmen and nasty inn keepers seeking to profit from the traffic on canal barges, and particularly dwells on the cacophony of boatmen trying to recruit passengers and their shouts with travelers' slaves while trying to load for departure:

Slaves would revile the sailors; sailors would inflict the same in kind: "'Bring the boat over here!' 'You've packed three hundred [passengers] in there already: whoa, that's quite enough!' As they collected fees and reined an ass, a total of an hour passes (Hor. *Sat.* 1.5.11-14, trans. based on Gowers 2012).¹⁵¹

Not only does Horace's scene show the bustle of the open spaces surrounding river ports, but he also orients the scene temporally by marking an hour's time. Gowers (2012: 191) argues that the reference to an hour, rather than a literal reflection on the passage of time, is meant to show that no time was wasted in the rushed process of loading the barge. Either reading of "*tota abit hora*," as literal or as a reflection on haste and efficiency, still places the hour as an important reference point in Horace's worldview. The scene is also anchored with other references to time that could implicate the hour. For example, the loading of barges at the *Forum Appii* takes place as night approaches, as the scene starts with Horace waiting for his fellow travelers to finish dinner. The ninth hour, so commonly cited as dinner time in Roman sources, would make an efficient loading time important if the boatmen hoped to load in daylight.

¹⁵¹ Tum pueri nautis, pueris convicia nautae ingerere: 'huc adpelle'; 'trecentos inseris'; 'ohe, iam satis est.' dum aes exigitur, dum mula ligatur, tota abit hora.

Whether at the *tabernae* surrounding the *Quattro Tempietti* or elsewhere, similar scenes clearly unfolded at Ostia as well.

With the rise of the Roman empire, space was reorganized in Ostia. Notably here, the *Piazzale delle Corporazioni* was constructed immediately adjacent to the *Quattro Tempietti*. Prior to this construction, the open space before the four temples was used as a staging and organization point for river and sea crews (Rieger 2004: 90-91), though the new *forum* with upwards of 40 *collegia* offices likely took over these functions upon its completion. Even with this new center of activity, the sundial at the *Quattro Tempietti* would have been viewed by those passing through to the new forum, especially since the entrance into the forum from the theater directly to its south was at some point blocked, leaving only narrow passages in the southeast and southwest corners of the *Piazzale* (Terpstra 2014). The southwestern passage channeled traffic past the *Quattro Tempietti*, thus maintaining the temples as a key waypoint for those doing business at the waterfront. The *Piazzale* became a center for the shipping industry in the Roman world, with both foreign shipmasters and local Ostian guilds (like the *codicari* who operated tiber barges and the *restiones* that made rope for the shipping industry. The intermix of these groups along with the land-based merchants and traders with whom they conducted business made the *Piazzale* a place that “facilitat[ed] community interchange” (Terpstra 2014). As this work has argued, these types of exchanges were

made both manageable for those directly involved and legible to local and imperial authorities through the implementation of hourly timekeeping systems.

Apartment Living

While the device recovered among the *Quattro Tempietti* offers connections between life at Ostia and the transportation networks that linked the city to the world, there are more examples of time being utilized in daily life in the city. The case study of Pompeii in Chapter 3 showed that timekeeping devices were increasingly brought into private residences beginning at the end of the Republican and into the early Imperial period, though this growth was naturally centered on residences with significant outdoor space in which to house the objects and give them access to the sun. Ostia, despite being relatively nearby in the scheme of the Roman empire and well within the sphere of influence emanating from Rome itself, offers a very different set of material circumstances for a timekeeping assemblage.

The most significant difference between Ostia and the other sites given direct focus in this work is the former's extensive use of apartment-style residences to house its dense population. By the 2nd Century CE the mostly brick apartment blocks, referred to as *insulae*,¹⁵² dominated the housing market of the city with up to 5 stories of living space each. While some of these *insulae* were arranged around shared interior garden

¹⁵² The term *insulae* is not to be confused with the use of the same word for city blocks at other sites in the Roman world, notably for this work at Pompeii.

space, as seen in the *Domus delle Muse* and the *Insula di Giove e Ganimede*, most did not have the type of open courtyard space (DeLaine 2020) typical of the elite or subelite housing at Pompeii that holds essentially all of that city's private timekeeping devices.¹⁵³ Though the *insulae* were limited to 70ft in height by Augustus and the maximum was further reduced to 60ft by Trajan (DeLaine 2018: 318), their height would also have imposed limitations on the use of sundials in interior open space even where present.

Where, then, could a resident of the city go to read the time? The publicly accessible sundial at the *Quattro Tempietti* provides some clue, as there were surely other devices in these large public squares that could be consulted when one was out and about in the city. So too was there a device associated with the Baths of Neptune, though this device was surely on the interior of the structure and targeted toward the use and administration of the bathing complex. Ostia's unique challenges with displaying the time, though, seems to have been met by another peculiarity of the city: the use of *compitum*-shrines as central gathering places for neighborhoods.

Compita are traditionally associated with crossroads, though it is more accurate to consider the shrines with a broader definition as meeting points or points of intersection; the meeting of two (or more) roads certainly qualifies, but so too should the meeting of different territories or neighborhoods (Stek 2009: 119). While the shrines

¹⁵³ With one notable exception at the House of Narcissus, discussed in Chapter 3.

and the *compitalia* celebrated there have rural roots, this broader meeting seems particularly apt for urban environments like the examples found at Ostia. The exact role of these shrines in marking urban boundaries seems to vary, as, for example, in Rome *compita* serve as the cult center for each *vicus* whereas the greater relative number of shrines at Pompeii suggests that they instead mark boundaries between *vici* (ibid.). Ostia likely functioned closer in function to the examples from Rome, but in either instance the *compitum*-shrine served as a gathering place within its associated *vici*. The connection between these shrines and the surrounding *vici* is made clear at the shrines themselves, including that found at the *Piazza dei Lari* that also produced a sundial. An inscription associated with the shrine there marks its dedication to the *Lares Vici[ales]* (CIL XIV S I, 4298). This *compitum* shrine, just like the other with an inscription also naming a *horologium* among its features, was constructed by the local *magistri vici*. The *vicus* was originally an informal grouping, one Wallace-Hadrill characterizes as “a street-gang not a parish” (2003: 198), that was transformed into spatial administrative unit by Augustus. With this official recognition and incorporation into Augustan hierarchies, the *vicus* incorporated local power into wider city administration. At the same time, this new realm of authority created “a field of competition within which local distinction could find expression” (Wallace-Hadrill 2003: 199), particularly valuable for those of lower status that previously had less influence in civic

administration. The entrance of timekeeping into this new realm of competition¹⁵⁴ is perhaps the best expression of Houston's observation that sundials were excellent civic gifts by those of moderate means (2015: 310).

The two timekeeping devices at *compitum*-shrines in Ostia, a sundial (#441) and a dedicatory inscription for a *horologium* (#1000), were thus not only situated at *compita* but also at active sites of community action and identity. The shrines hosted the celebrations of *compitalia*, but the rest of the year also remained as notable fixtures in their respective neighborhoods. The *magistri vici* that built the shrines and outfitted them were providing locations for cult rituals while also shaping a central space within their *vicus*. These *magistri*, all freedmen, built prestige for themselves through gifts like *horologia* that also provided value for their community.

The two *compitum* shrines with timekeeping devices offer very different situations in the broader scheme of Ostian daily life. The device recovered from the *Piazza dei Lari* is set off from the main traffic routes of the city and, unlike the example from the *Quattro Tempietti*, is also at a remove from areas of dense commercial activity. The shrine here has been identified with a round altar and the square building behind (Bakker 1994: 119), which appears to have had entryways present on all four faces. This building stands in the middle of the small piazza with the altar, and likely the sundial, on its southern edge. The reported findspot for the sundial is along the eastern edge of

¹⁵⁴ New in that both Ostian devices date to the Augustan period or shortly after.

the square on the side nearest the *Decumanus*, which also lies to the south. The piazza could be entered in antiquity through a north-south trending road at its southeast corner, the road that connected to piazza to the *Decumanus*, or along its entire northern edge which abuts the *Via di Diana*. This northern road is so named for the *Casegiatto di Diana*, an *insula* apartment building across the road from the piazza. Though it survives to only two stories, the *casegiatto* shows evidence of having been carefully deconstructed after its abandonment in order to reuse its materials, and thus likely reached greater heights in antiquity. This *insula* is one that had an open courtyard space at center, though it is unclear if the building's height and roughly 6x8m open space could house a fully functioning sundial.

The presence of large, apartment style living quarters that may not have been able to support a functioning sundial suggest that the *compitum*-shrine device may well have served the timekeeping needs of residents Ostia's neighborhoods. As outlined above, this shrine would have been an important part of *vicus* identity, and through both its nature at the center of the local piazza and its location on the most direct route to the *Decumanus* surely saw a high degree of traffic and interaction, particularly for an area set off from the major thoroughfares and business districts of the city. The *Casegiatto di Diana* was itself a neighborhood hub as a large residential block that was also lined with *tabernae* along its ground floor. The main entrance to residential apartments on the ground floor and the partially preserved staircase to higher floors are

located along the southern frontage of the structure, leaving the *Piazza dei Lari* and its sundial just outside of the building's front door.

This timekeeping device, tucked away as it is, is one that calls for the *flaneur's* eye to understand its role. The sundial recovered here, especially given some haziness in its exact location of installation, could easily be lumped in with the devices of hourly time attested at temples or sacred sites throughout the ancient Mediterranean. Though these devices were surely accessed casually as well, they are a tempting target for assignation to roles in religious rites more than daily life. A close reading of the devices' context, though, reveals a much richer set of experiences for this object. The placement at a central meeting place in a neighborhood, one officially recognized and sanctioned through Augustan changes to urban *vici*, situates the site as a place of civic as well as religious action. The location of the *piazza* at the northern-eastern edge of the founding *castrum* of Ostia, though close to the city center at the forum, was removed from the main axis of movement in the city along the east-west *Decumanus*. Actually heading into the forum would likely take one past the sundial on their route to the *Decumanus*, and traveling eastward in the city certainly would, as the *Via di Diana* terminates at the Grand Horrea just one block to the east.

Though the roads meeting at this *compitum* are minor in the scheme of Ostian movement, they would be central in the experience of members of the *vicus*. *Compitum* shrines were the location of "boisterous ceremonies" asking for blessings for the

neighborhood, with Augustus amplifying activities there by donating flowers for *compitalia* offerings twice each year (Kaiser 2011: 43). Beyond planned and sanctioned activities, *compita* were also used to make offerings in times of stress, as Livy reports their use for offerings during plague at Rome (Liv. 27.23.7).¹⁵⁵ Boisterous activities were apparently not only limited to the religious role of the shrines though; Propertius brags that every *compita* offered opportunity to meet new lovers (Prop. 2.22A.3).¹⁵⁶

Not only does the pattern of movement around the *Piazza dei Lari* give depth to the role of timekeeping there, but the meaning of place also came to color interactions with, and the meaning of, the sundial. As discussed above, the installation of timekeeping device here participated in a new economy, created by Augustan reforms, of prestige on the local level. It was not only those named as having donated to *compitum*-shrines or their accoutrement that were effected by this competition, though. Community members were active participants in the *vicus* and its meaning; and the presence of fine decoration or the functional addition of hourly timekeeping brought value to the neighborhood. As seen in the example of gentrification in North African cities (Chapter 5), timekeeping brought value to specific neighborhoods

The *horologium* inscription at the *Comptium* of Poplicola, on the other hand, offers an example of a timekeeping device being used to display the time very much among

¹⁵⁵ ...eius pestilentiae causa et supplicatum per compita tota urbe est...

¹⁵⁶ Nulla meis frustra lustrantur compita plantis.

the busiest parts of the city. The *compitum*-shrine was located at the *bivio del castrum*, the major intersection to the west of the city center (which itself was based around the *castrum*, the original fortifications built when Ostia began as a fortress in the 4th century BCE. This intersection marks the curve of the *Decumanus Maximus* to the south and an intersection with the *Via delle Focae*. The broad intersection of these major roads remained one of the busiest and most important portions of the city throughout the empire, becoming increasingly monumentalized as it was one of the most travelled and visually accessible points in the city (Stöger 2011: 224). This intersection linked the city center, and its centers of commerce and exchange discussed above, to the sea coast and the bustling *suburbium* outside of the Porta Marina to the west.

The history of the *compitum* shrine at this major urban intersection is reported through inscriptions, though none were found in situ. In addition to the fragmentary inscription that mentions the gift of a *horologium* by freedman Gaius Cartilius Heracleo, a larger inscription also names Heracleo along with other *magistri vici* as donating an enclosure, column, and other features at the shrine. The inscription reads:

Postumus Plotius, son of Marcus, duovir for the fourth time, and Aulus Genucius, son of Aulus, duovir for the second time, assigned the place to build a *compitum*. Gaius Cartilius Poplicola, son of Caius, duovir for the seventh time, censor for the third time, transferred the *compitum*. Decimus Caecilius Nicia, freed from Decimi, doctor, Lucius Marcius Stephanus, freed from Lucius, Publius Naevius Heraclida, freed from Publius, *magistri vici*, made the enclosure and

the column at their expense. Gaius Cartilius Hera [cleo], freed from Gaius [---] (*CIL* XIV, 4710)¹⁵⁷ (trans. Alexander 2016).

This inscription was recovered in the debris of a landslide along the banks of the Tiber, however its association with the structure at the *bivio del castrum* has long been argued and was supported by the nearby recovery of the *horologium* inscription (Van Haepere 2019). The offices provided in the inscription date the movement of the shrine to about 20 BCE.

The *Compitum* of Poplicola participates in the same realm of *vicus* related competition as the shrine at the *Piazza dei Lari*, though likely communicated with a different, and broader, community of viewers than the previous example. The shrine's, and thus the *horologium*'s, location at a major intersection for cart traffic in the city would have created a busier and louder scene than found in the more residential intersection of the *Via del Diana* and *Via dei Lari*. This heavier cart traffic was also joined by more typical daily movement from the *suburbium* beyond the Porta Marina and the rest of the city; beginning in the Augustan period the suburb grew to include several large elite residences, three bath complexes, shrines and temples, a public porticoed building (likely a market), and some scattered tombs that survived the encroachment of the expanding city (Emmerson 2020: 30-34).

¹⁵⁷ Po[st]umus Plotius M(arci) f(ilius) quarto, / A(ulus) Genucius A(uli) f(ilius) iter(um) duouiri, / locum dederunt compiti aedificandi.
C(aius) Cartilius C(ai) f(ilius) Poplicola, duouir VII, / cens(or) III compitum transtulit. / D(ecimus) Caecilius D(ecimorum duorum) l(ibertus) Nicia, medicus, / L(ucius) Marcius L(uci) l(ibertus) Stephanus, P(ublius) Naeuius P(ubli) l(ibertus) Heraclida, / mag(istri) uici, maceriam et columnam de suo fecerunt. / C(aius) Cartilius C(ai) l(ibertus) Hera[cleo].

Not only did the *compitum's* position place it amidst a varied and numerous traveling public, but it was also situated to take advantage of as many viewer's eyes as possible given the visibility of its placement. In Stöger's analysis of viewsheds in the city, the *compitum* stands immediately beside Ostia's 'cardinal point from which a vast visual field can be commanded, radiating in all directions and expanding over large parts of the city's public space' (2011: 224). Further, it wasn't until later in the city's 2nd Century CE building boom that other major points of visual interest were established along the roads to the west of the *bivio* (ibid.: 225), thus allowing the *compitum* to be not only highly visible but also notably visible along otherwise fairly mundane sightlines. This confluence of factors makes the shrine an ideal position for a public, urban timekeeping device; the *horologium* there convenient to routes of both daily life and cart movement, heavily trafficked, easily visually accessed, and with unobstructed sightlines to the sun.¹⁵⁸ Revisiting the categories of Lynch's (1960) analysis of urban image, the *horologium* here was a (1) landmark situated at a major (2) node along (3) major paths in the city that, finally, served explicitly to define a (4) district through its association with a *vicus*-related *compitum*.

These factors allow this timekeeping device to be very effective in the broader *vicus* level competition spurred by the Augustan reforms discussed above. The freedman *magistri vici* that endowed the shrine and *horologium* were able to announce

¹⁵⁸ If, indeed, the device was a sundial like the other *compitum* device in the city.

their gifts to the city in a prominent way. The *horologium* in particular was an act of civic munificence that could be appreciated without explicit intention by passersby; surely some traffic sought out the device in their travels to situate themselves in the time discipline of Ostian life, but many others could glance at the device and learn the time merely as an added benefit of their normal tasks. In addition to the celebrants of rites at the shrine (or Propertius-esque wanderers looking for a date), everyone that navigated this prominent intersection could see the influence of the named *magistri vici* in contributing to life in the neighborhood. The major intersections in Ostia provided places where people were likely to pass by, slow, and even stop for a while, which provided incentives for those that could shape and use the spaces surrounding those intersections (Emmerson 2020: 126-127). For a shop owner, this incentive would come in the form of potential shoppers that may either frequent an establishment because of its convenience on the route of other tasks or stop expediently upon seeing an available service. For those that installed timekeeping devices at these interchanges, though, the benefits came in the economy of sight-lines and viewers.

The unique living arrangements and road system of Ostia directly contributed to the installation of timekeeping devices at *compitum* shrines. The example at the *Piazza dei Lari* shows how the apartment style living quarters for many in the city made a *compitum* an ideal place for timekeeping. Few of the residences in the city and its surroundings could not accommodate the private timekeeping assemblages seen in

nearby sites like Pompeii. Ostia's buildings are generally taller, fewer have open gardens with access to the full arc of the sun's rays throughout the day, and many apartments were rented by their inhabitants from landowners. The *compitum* shrine provided an open space capable of supporting a sundial and enabling its function. These places were also, especially from the time of Augustus, key locales in the organization and administration of life at the *vicus* level, and thus had a natural interest in the widely used structuring device of hourly time. *Insula* dwellers that could not support a timekeeping device of their own were able to use the neighborhood device to adhere to the time discipline of their city. Finally, the provision of these devices created opportunity for conspicuous and functional beneficence by a new, albeit minor, level of civic administrators through Augustus' reformed *vicus* system.

Timekeeping devices central to a given neighborhood were not only used by that neighborhood, though. The *Compitum* of Poplicola shows the same forces, here explicitly named through surviving inscriptions, providing timekeeping to a much broader audience. This was done partially through the nature of *vicus* boundaries at Ostia, but was surely motivated by the high degree of traffic that passed through the massive intersection of the *Decumanus Maximus* and the *Via delle Foce*. Gaius Cartilius Heracleo not only gave timekeeping to his *vicus*, but also contributed to the broader temporal assemblage of Ostia by gifting a *horologium* that was easily accessed in the hustle and bustle of daily life. Later artistic depictions of Roman time discipline like the

mosaic at Antioch that shows a man learning that he was *akairos* and thus adjusting his schedule by hurrying off to dinner (discussed in detail below) show the value of this type of civic gift not only for the general function of urban life, but also in the social relations of individuals navigating that urban life. Time and timing were less precise in antiquity than the modern world, but in some ways that makes the ability to check the time even more invaluable; there were clear social expectations around hourly time, and the relative paucity of portable timekeeping devices shows that publicly accessible sundials and water clocks were essential to recalibrating oneself to the tempo of urban life. One traveling past the *Compitum* of Poplicola from the *Porta Marina* suburbs a short distance away could still benefit from this temporal reorientation, and those coming from further afield would likely have felt even further untethered from the exact time without access to timekeeping devices.

Highly accessible timekeeping devices like that at the *Compitum* of Poplicola are an essential piece of the infrastructure of hourly time, as they made the hour available to anyone that passed. Many of the Ostian devices in more typical installation contexts would have had a more limited viewership. The Baths of Neptune, for example, had a sundial of their own, and there is broad evidence that bath complexes throughout the Roman world were organized along hourly lines.¹⁵⁹ While timed bathing is a common

¹⁵⁹ It is possible that another sundial (#443) also came from a bath complex, given its reuse within the road near a bath complex. This association, however, is tenuous. While the *horologium* inscription from the *Compitum* of Poplicola was reused nearby its original location, building materials from Ostia have clearly traveled greater distances (or disappeared entirely to use in unknown locations).

feature, it is not one that operated in isolation; hours were not established for particular activities at the baths only so that those administering the baths could run on schedule, but also allowed for coordinated activity among users. Operating hours were unlikely to have been observed only at the point of arriving at the baths, with bathers ignorant of the time who would then wait for the ok from the sundial at the Baths of Neptune.

Rather, users would know the time from other places and plan their trips to and use of the baths according to the wider schedule of the city. Part of this ability to function within the flow of urban tempos was surely situational, as in knowing that around noon one would begin their midday break or start making moves toward the baths. The wide distribution of surviving timekeeping devices and the many references to hourly time in the written record, however, show that these cues did not exist wholly in isolation.

Timekeeping devices installed by the *vicus* allowed the neighborhoods to remain in sync with the wider timing of the city, and simultaneously also offered a service to the wider community by creating more points to tie into the timekeeping infrastructure of Ostia.

Leaving the City

The above examples illustrate that, even though fragmentary, the extant corpus of timekeeping devices in Ostia shows that devices were present for those entering the city and navigating it, either in the name of moving cargo through the busy transportation center or simply in the tasks of navigating the city and its tempos. These devices were just as implicated in movements out of the city. Especially in the case of

those using the river port, timekeeping devices in public space would have helped organize movement out of the city. The beginning of such a journey would be more likely to take hourly time into consideration, as mustering crew and preparing cargo could be organized before at least some of the unpredictable conditions that affected travel.¹⁶⁰ Horace's fifth satire, in addition to marking the time a barge trip completed, paints a picture of departing on canal barges similar to what would have been experienced by those leaving Ostia. The passage cited above (*Hor. Sat.* 1.5.17-22)¹⁶¹ shows that a portion of the day was noted for beginning preparations (after dinner), that the process was at least casually tracked in terms of the hour, and that the level of activity at such departure points was high. Gowers (2012:182-186) situates this book of Horace's first satire as a commentary on satire itself, with the chaotic scenes overstuffed with inconsequential action (like the loading of a barge) reflected critiques of his own craft. This commentary works, though, because there are real comparisons to be drawn; both satire and travel are hectic, hotly contested, and both walk a fine line between time-wasting and efficiency.

Hourly time was useful in the literal travel of the Roman world, but was also involved in more existential transitions at Ostia; at least one functioning sundial (#446)

¹⁶⁰ This is at least the case within given parameters of moving cargo through a river port; one may easily end up waiting for a shipment to arrive before leaving themselves (i.e. waiting for sea cargo to arrive and unload before loading onto a river vessel).

¹⁶¹ *Tum pueri nautis, pueris convicia nautae ingerere: 'huc adpelle'; 'trecentos inseris'; 'ohe, iam satis est.' dum aes exigitur, dum mula ligatur, tota abit hora.*

and two representations of dials (#435 & #436) were associated with funerary contexts. While the area outside of the walls of Ostia was in many places a diverse mix of buildings from temples to baths to housing (Emmerson 2020: 27), the area outside of the Porta Romana is predominantly known for its necropolis. The tombs outside the Porta Romana were in continuous use from the 2nd BCE to the 3rd CE (van der Ploeg 2020: 400). The rapid growth of the city saw many of these tombs destroyed, however, and replaced by commercial or residential development already by the Trajanic period (Emmerson 2020: 82). The structure that produced a white marble sundial (#446) in this funerary district was originally interpreted as a house due to the fine and luxury artifacts found there (Paschetto 1912: 434-435), but has since been reinterpreted as a tomb. Timekeeping devices among tombs are located in liminal spaces in two senses: they mark both the transition from life to death but also, and more simply, are located along passages into and out of the city, in this case along the *Via dei Sepolcri* and its associated *Porta Secondaria* just south of the major *Via Ostiense* and *Porta Romana*.

Placing a functional timekeeping device on a funerary monument in the 1st or 2nd century CE could serve a variety of functions for the person or people honored by a monument. Petronius' Trimalchio offers a possible explanation of the motivations. In describing his own funerary monument, the last feature Trimalchio describes before narrating his funerary inscription is "a sundial in the middle, so that anyone who looks

at the time will read my name whether he likes it or not" (Petron. *Sat.* 71.11).¹⁶² Veyne (1985) argues that this passage shows the sundials position as a symbol of mortality, a theme translated into the modern world through medieval beliefs, while Bonnin (2015a: 330-331) believes the sundial is merely a useful tool because it was sure to draw in viewers and thus preserve Trimalchio's name. While Trimalchio may have been motivated by the sundial's efficacy in attracting eyes, the wide-spread of functional timekeeping devices in funerary contexts suggests that there was significance for the devices beyond only seizing the attention of unwitting travelers. Of 33 such devices, 5 date from the 1st century BCE, 17 from the 1st century CE, 5 from 2nd century CE, 1 from the 3rd century CE, and 5 with unknown dates, shown below in Figure 6.5.

¹⁶² Horologium in medio, ut quisquis horas inspiciet, velit nolit, nomen meum legat.



Figure 6.5 - Functional timekeeping devices installed in funerary contexts before the rise of sundial imagery on sarcophagi, listed by century.

Bonnin (2013) has elsewhere argued that rather than serving as a *memento mori*, a symbol of the inevitability of death, sundials were generally seen as symbols of activity.

A passage from Artemidorus of Daldis, writing on the interpretation of dreams in the 2nd century CE, is explicit about this symbolic role for sundials:

A *ὥρολόγιον* signifies deeds and endeavors and movements and undertakings. For men do all things while keeping the time in mind. For this reason a clock that has fallen down or broken will be grievous and deadly, and most of all for those who are ill. And it is always better to determine that the time is before the sixth hour rather than after the sixth hour (Artem. 3.66, trans. Harris-McCoy 2012).¹⁶³

Artemidorus' interpretation of a *ὥρολόγιον* appears in the third book of his *Oenecritica*, a work on the practice of interpreting dreams. The practice of finding meaning in

¹⁶³ ὥρολόγιον πράξεις καὶ ὀρμὰς καὶ κινήσεις καὶ ἐπιβολὰς χρειῶν σημαίνει· πάντα γὰρ πρὸς τὰς ὥρας ἀποβλέποντες οἱ ἄνθρωποι πράσσουν· ὅθεν συμπίπτει ἢ κατεασόμενον πονηρὸν ἂν εἴη καὶ ὀλέθριον, μάλιστα δὲ τοῖς νοσοῦσιν. αἰεὶ δὲ τὰς πρὸ τῆς ἑκτῆς ὥρας ἀπιθμεῖν ἄμεινον ἢ τὰς μετὰ τὴν ἑκτὴν.

dreams was a longstanding tradition in antiquity, with Artemidorus offering his take on which dreams can be read for meaning and what the elements of such dreams mean.

The third book of the *Oenecritica* was written as an addendum to the first two, and as such is a meandering account of various objects and what they mean in dreams (Thonneman 2020: 16). The above passage on timekeeping devices, for example, follows his entry for the interpretation of owls. While Artemidorus applies his own methods to the interpretation of dreams, there is precedent for the meaning he presents above:

Valerius Maximus' 1st century CE account of Cicero's death begins with an ill-omen of a crow removing the gnomon from a sundial and casting it down on Cicero (Val. Max.

1.4.6).¹⁶⁴

While the interpretation of motifs on sarcophagi is difficult given the “tremendous variation” of beliefs held by the Romans (Koortbojian 1995: 14), this symbolic value for sundials fits within broader trends of decoration on funerary monuments. Early attempts to catalog Roman sarcophagi (Robert 1952) carved out a separate group for scenes of *vita humana*, human life separate from the mythological scenes often depicted in funerary contexts. Particularly in the 1st century CE, the earliest

¹⁶⁴ This passage is found in a lacuna, but two epitomists of Valerius Maximus include similar passages: 1.4.6.(Paris): M. Ciceroni mors imminens auspicio praedicta est. Cum in villa Caietana esset, corvus in conspectu eius horologii ferrum loco motum excussit et protinus ad ipsum tetendit ac laciniam togae eo usque morsu tenuit, donec servus milites ad eum occidendum venisse nuntiaret.

1.4.6. (Nepotianus): M. Tullius Cicero cum in agro Caietano proscriptus lateret insectante Antonio, corvus virgulam ferream, qua distinguebantur horae, sic conscidit rostro, ut eam excuteret, togamque Tullii apprehendit et traxit. Sub momento ad eum percussores irruerunt.

date of the funerary sundial at Ostia, the exterior decorations of tombs along Rome's roads and highways were tailored to projecting the "citizen status" and "social respectability" of those being honored (Zanker & Ewald 2012: 177). While later tomb decorations placed more emphasis on private viewership by descendants (ibid.), a sundial on the exterior of a tomb provided both a useful tool to passersby and marked the deceased as one that held to the social values of the day; users of timekeeping devices were active, as seen through Artemidorus, and timely in being so.

The *flaneur's* view of extramural tombs would include a wide variety of scenes. For the most part, a sundial on the exterior of the tomb would be encountered by those simply passing by. The busy overland route from Ostia to Rome hit a bottleneck at the *Porta Romana* just north of the tomb in question, as the 4.1m wide *Via Ostiensis* narrowed to just 2.5m, not wide enough to allow two way traffic (Laurence 2020: 137).¹⁶⁵ Whether the *Porta Secundaria* offered an alternate route into or out of the city or not, those stuck waiting in traffic likely had cause to pass the tombs of the *Via dei Sepolcri* either along their route or while waiting to access the city. Returning to Horace's account of his travels, there may have been interest in seeking out timekeeping devices simply to gauge one's wait; Horace mentions that loading his barge took an hour and others may have similarly been interested in noting the passage of time. The routes allowed to cart

¹⁶⁵ It is also worth noting here that the current width of the *Decumanus Maximus* was the result of Hadrianic reconstruction of the road that destroyed the footprint of its earlier iterations (Poehler 2017: 238). Despite the massive project to widen the street, the *Porta Romana* retained its narrow Republican form.

traffic were surely regulated, as Ulpian details the rights of *via* (the right to drive a vehicle down a road), *iter* the right to pass on foot), and *actus* (the right to walk or drive cattle or a vehicle) (Ulpian, *dig.* 8.3.1).¹⁶⁶ Ostia's wide *Decumanus Maximus* could accommodate cart traffic in both directions once through the *Porta Romana*, with carts large enough to require 6 or 8 draft animals a regular sight (Kaiser 2011: 130). Given the propensity of Roman traffic to drive on the right side of the road (see Poheler 2017: 218, which identifies multiple pieces of evidence of this practice in Ostia), if traffic was split at the eastern end of the *Decumanus Maximus* we could expect cart traffic out of the city to be routed toward the *Porta Secundaria* as it would require a right handed turn off the *Decumanus* to reach that gate.

Added to the heavy traffic in the area, and likely directly past the sundial through the management of a one-way city gate, would also be processions to individual tombs to pay respects to those interred there. From the 1st century BCE, notably related to increased ability for freedmen to achieve wealth and status, actions at tombs themselves became increasingly important and post-funerary rites increasingly drew activity to these areas outside of city walls (Emmerson 2020: 79). Not only would the construction of tombs and the interment of the dead there create movement past our

¹⁶⁶ *Servitutes rusticorum praediorum sunt hae: iter actus via aquae ductus. iter est ius eundi ambulandi homini, non etiam iumentum agendi. actus est ius agendi vel iumentum vel vehiculum: itaque qui iter habet, actum non habet, qui actum habet, et iter habet etiam sine iumento. via est ius eundi et agendi et ambulandi: nam et iter et actum in se via continet. aquae ductus est ius aquam dicendi per fundum alienum.*

sundial, but ongoing rites would keep families returning to the site of their ancestors. While the incomplete provenience for the sundial along the *Via dei Sepolcri* does not allow for a specific discussion of rites performed at its tomb, Graham (2005: 135) identifies the wider funerary landscape of Ostia as “public environments that were intended to be seen and visited by members of the local urban community and strangers alike,” open to all members of society. Ritual dining at the gravesite of one’s ancestors would take place regularly (both on the ninth day following burial and on birthdays, anniversaries, and festivals), roses would be placed on graves to celebrate the *Rosalia* in spring, the annual festival of family dead (*Parentalia*) took place in February, the *Feralia* ended with offerings of food and drink to the dead, and other rites all animated the tombs of the Roman world (ibid.). These frequent rites would bring a variety of scenes to the *Via dei Sepolcri*, from somber passage to boisterous partying. Each of these examples, further, presents opportunities for coordinated action that may benefit from the measured hour.

Over the course of the Roman empire, activity at familial tombs transitioned toward private practice, both in rites and in decoration (Zanker & Ewald 2012: 178). The Ostian sarcophagi with representations of sundials date to the 3rd century CE, corresponding with a wider trend in such representations in the 3rd and 4th centuries CE (Bonnin 2015: 328). The inclusion of sundials on sarcophagi of this period also comes about in the context of a more general rise in the inclusion of objects associated with

success and happiness in funerary reliefs (Zanker & Ewald 2012: 184). While no longer projecting the deceased's characteristics and accomplishments to all passers, these sarcophagi nevertheless used hourly time to mark the activity and productivity of those they honored. The rising association of time's passage and mortality in this later period also added to the significance of the sarcophagus reliefs.

Whether entering, navigating, or leaving ancient Ostia, timekeeping devices were present to orient people temporally and affect time discipline on them. The known examples of timekeeping devices from the city are surely incomplete, both due to devices from unknown contexts and the presence of additional objects in antiquity (made clear by the re-use of both a *horologium* inscription and a planar device in later construction). Where timekeeping devices can be contextualized in the city, though, they are sited in a variety of contexts that allowed them to function as a city-wide infrastructure of hourly time in addition to their service to more immediate communities. While the variety of contexts is on its face similar to those throughout the Roman empire (baths, shrines and temples, funerary settings, etc.), Ostia also illustrates the ways that timekeeping infrastructure could adapt to local conditions. The apartment living that came to dominate the residential portions of the city made the placement of personal dials in interior gardens impossible for many residents. In order to still provide access to hourly time, the *compitum* shrines of the city provided public access to timekeeping in the *vici* they served. Timekeeping also found its way into areas argued

to be centers of transportation through the *Quattro Tempietti* and its surrounding piazza. These devices acted alongside those in more typical locations (baths, tombs, etc.) to enable the unique layout of the city to still function temporally in ways immediately recognizable to Romans (and others) familiar with the temporal culture of the empire.

The temporal culture of ancient Ostia wasn't only experienced through direct contact with timekeeping devices, however. The infrastructure of hourly time in the city enabled time discipline in official and social capacities, as this work has discussed across the Roman world; the baths had specific opening hours, dinner guests were expected to be timely along measured hours, and so on. The excellent archaeological preservation at Ostia also allows insight into another aspect of life that is known to have been regulated according to hourly time: traffic. While Pompeii offers the best preserved road system (Poehler 2017; Kaiser 2011), Ostia's streets are among the better preserved and the city's close relationship with Rome allows comparison between the written records of the capital and the archaeological and epigraphic remains of Ostia.

Timed Movement in Ostia

The first clear evidence of traffic congestion becoming an official concern of civic authorities, and one that could not only be addressed through widening the physical infrastructure of streets, comes in the form of the *Lex Iulia Municipalis* (Poehler 2017: 235). The relevant passage here reads:

Whatever roads shall lie within the city of Rome within those areas where there shall be continuous habitation, no-one, after the Kalends of January, in the day-time, after sunrise or before the tenth hour of the day, is to lead or drive a cart on those roads, except insofar as it shall be appropriate for anything to be brought or conveyed, for the purpose of building sacred temples of the immortal gods or carrying out work (on them), or insofar as it shall be appropriate for any of those things, for which a contract shall have been let for their public demolition, to be publicly removed from the city or from those areas (mentioned above), and in those cases where it shall be lawful under this statute of specified persons for specified reasons to lead or drive carts. (*CIL* I² 593, trans. Crawford 1996)¹⁶⁷

This 1st century BCE law not only represents the official reach of the state into the regulation of urban traffic patterns, but does so along explicitly temporal and hour-based lines. Traffic is not limited only to the day or the night, periods easily defined without reference to measured hours, but explicitly allows cart traffic after the tenth hour of the day (roughly equivalent to 4pm in contemporary hours). This restriction relies on the mediation of devices of hourly timekeeping to be enforced, as the named specific time cannot be accurately or predictably observed without such an object. Poehler characterizes traffic regulations of the period as relying on “information [that was] simple and enforceable by mere observation” (2017: 240), i.e. the rules and their enforcement parameters could be understood without literacy or systems that were entirely uniform across the empire. The use of the tenth hour rather than the setting of the sun to regulate traffic, though, shows that such a uniform system and a certain type

¹⁶⁷ Quoius ante aedificium semita in loco (publico) erit, is earn semitam eo aedificio perpetuo lapidibus perpetueis integreis continentem constratam recte habeto arbitrato eius aed(ilis), quoius in ea parte h(ac) l(ege) uianim procurat(io) erit. quae uiae in u(rbem) R(omam) sunt erunt intra ea loca, ubi continenti hab(i)tab(i)tur, ne quis in ieis uieis post k(alendas) Ianuar(ias) primas plostrum inte<r>diu post solem ortum neue ante horam decimain diei ducito agito, nisi quod aedium sacrarum deorum immortalium caussa aedificandaru(m) operisue faciumdei causa adu(e)hei portari oportebit, aut quod ex urbe exue ieis loceis earum rerum, quae publice demolienda(e) loca(tae) erunt, publice exportarei oportebit, et quarum rerum caussa plostra h(ac) l(ege) certeis hominibus certeis de causeis agere ducere licebit.

of literacy were necessary; hours worked the same throughout the Roman world, despite their variability in terms of today's timekeeping, and could not be accurately known without an infrastructure of hourly time and the ability to read it. This particular form of literacy could be dispersed, being transmitted by criers rather than only the reading of timekeeping device, but the system nevertheless required that at least some participants in the system be able to access and understand the time. Further, this regulation not only allows the state to enforce policy by hourly time, but also exempts state activity from those regulations. The hour, here, is thus a tool of city administration in Rome, though the power to regulate hours also comes with the privilege to be exempt from them.

The application of this rule outside of the city of Rome is unfortunately not entirely clear in the historical record. The *Tabula Heracleensis* on which this law (and others) was recovered, however, was found at Heraclea Lucania and not in Rome. The presence of these laws in Heraclea Lucania has been interpreted to reflect that city's *municipium* status being achieved through processes established by other sections of the document (see Crawford 1996: 358-359). Since the inscription appears to be cobbled together from several existing laws rather than a comprehensive copy of a single document (ibid.), it stands to reason that other communities followed the example of Rome by similarly regulating their traffic. While Rome existed at a scale, and thus a level of congestion, unparalleled in human history to that point, the general

unpleasantness of traffic is well attested in written records as well as, seemingly, a shared complaint throughout the history of wheeled vehicles. Cart traffic was loud, dusty, dangerous, and often carried out by unsavory characters (see Kaiser 2011: 24 for a list of ancient sources on the topic), which would naturally lead to a desire to regulate its flow.

Ostia itself has significant evidence for efforts to regulate traffic flows in the city, even without an explicit statement of hourly limitations. The forum offers the clearest evidence of these efforts throughout Ostian history. First, the forum became increasingly isolated from traffic, particularly along its north-south axis, as the construction of the temple of Augustus and Roma (1st century CE) and the capitolium (circa 120 CE) blocked existing linkages into and through the forum from north and south, respectively (Stöger 2011: 210). While it appears that traffic was never completely excluded from crossing the forum east-west, as this route was the only direct connection between gates in the east and west of the city, it too was controlled through the structure of city streets. Kaiser (2011: 130-134) identifies the streets of Ostia that were clearly available to carts as well as those that bore impediments to cart traffic or were otherwise restricted to pedestrian routes (Figure 6.6).

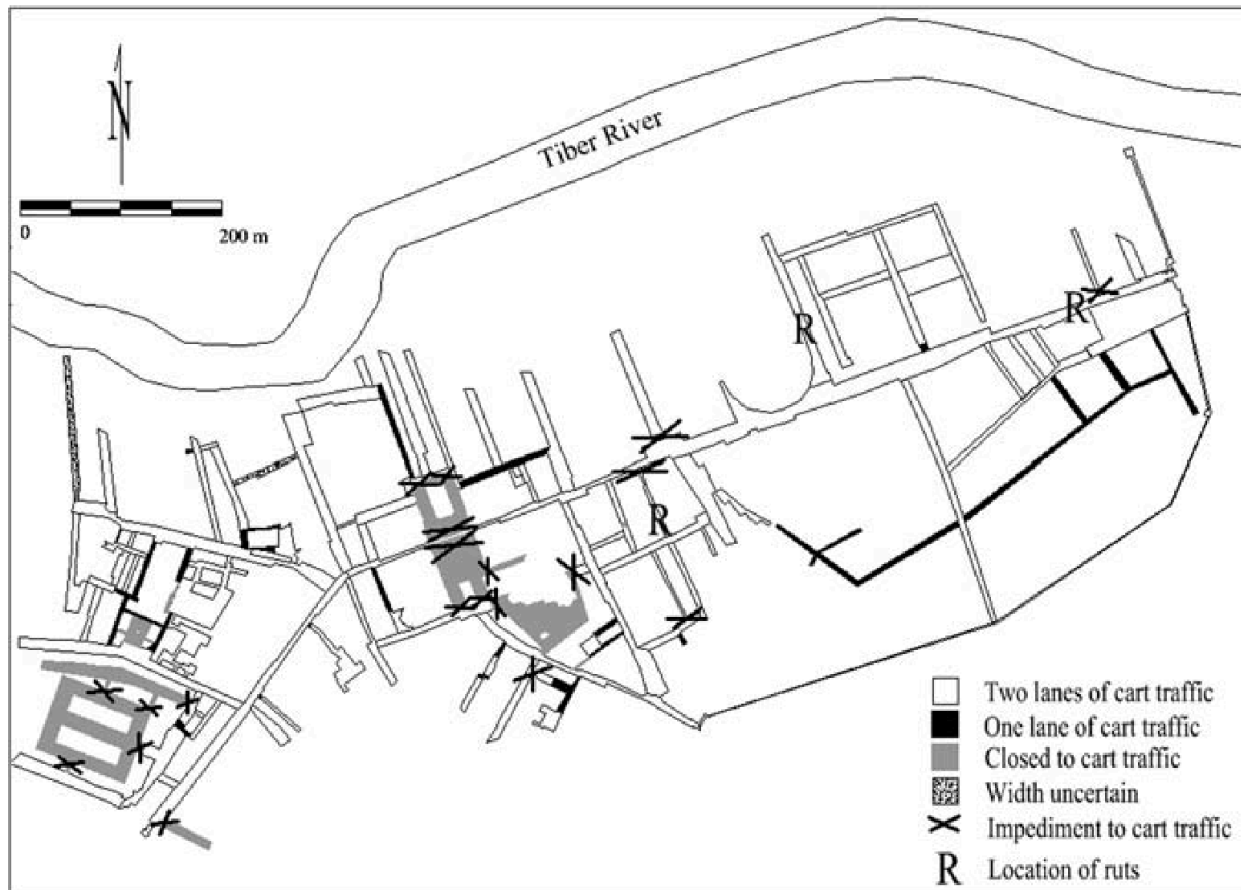


Figure 6.6 - Map of Ostian traffic patterns, from Kaiser 2011: 130.

While Ostian streets preserve significantly fewer wheel ruts than do the streets of Pompeii, likely due to Ostia's wider streets allowing for greater variability in route selection, ruts do exist in the city and show cart traffic on and along the *Decumanus* in particular (Stöger 2011: 210). The importance of cart traffic to Ostia is clear, given the city's role as a transportation hub for goods to and from Rome, though in many places the flow of carts was restricted to major roadways. Kaiser (2011: 130) also observes that cart traffic most likely avoided sharp turns and narrow streets, at least by vehicles pulled by multiple draft animals. Cart traffic was allowed, however, to pass directly through the forum along its east-west axis on the *Decumanus Maximus*. Kaiser argues

that the Ostians sought to nevertheless uphold forum's role as "a place where the dignity of civic functions required the exclusion of cart traffic" (2011: 131) by building steps along the *Decumanus* that both prevented carts from veering elsewhere in the forum and made the vehicles pass through at a lower level than pedestrians moving on the level of the steps. Preserving this passageway, though, does not necessarily mean that the dignity of civic functions and the nuisance of cart traffic had to coexist temporally as well as spatially; temporal restrictions offer a possible explanation to Ostia's willingness to allow carts through the forum. The city had previously shown its willingness to remove major cart routes, as the temple of Augustus and Roma blocked the previous cart route from the major road leading south of the city when it closed the *Cardo Maximus* at the south of the forum, showing that drastic steps to segregate the forum and prevent traffic from moving through were not out of the question. As with the gates in the Republican walls that surrounded the city, the remnant gates of the *castrum* walls also did not allow two-way traffic into the area of the forum (Laurence 2020: 137). The bottlenecks that these gates created would also have been made more manageable through timed restrictions on travel through this central area of the city.

Traffic did not only impact the area of the forum, however. The layout of the streets, and the flow of traffic they enabled, also shaped the structuring of buildings and activities throughout Ostia. Kaiser (2011: 117-121) observes that shops and bars at Ostia have a strong tendency to appear along streets with lower "street depth," or number of

turns required to be reached from either the city gates or the forum. This tendency to locate commercial activity along accessible and heavily trafficked routes makes intuitive sense, as higher traffic allows greater opportunity for both unplanned patronage and expedient use in the course of other activities. The placement of shops and bars in high traffic areas also creates a feedback loop of activity along temporal lines; shops would benefit from traffic at busy times of day and would also draw traffic at times when their customers were socially or practically drawn to use them. Laurence's (1996: 106) table of activities available in a Roman city during certain hours can thus also be read as a sort of map to traffic around those activities. For example, traffic around shops during the sixth hour, traditionally reserved for rest, would likely lessen significantly while the opening of baths at the same time would create a new center of movement for that part of the day. Enforcement along hourly lines did not only impact traffic based on official regulations, then, but also influenced centers of movement and destinations based on the temporal culture of the city. Unlike Pompeii, the residential properties at Ostia tended to be located on higher depth streets; this arrangement allowed Ostians to both limit their interactions with nonresidents and to more easily monitor those that made their way into residential spaces (Kaiser 2011: 137).

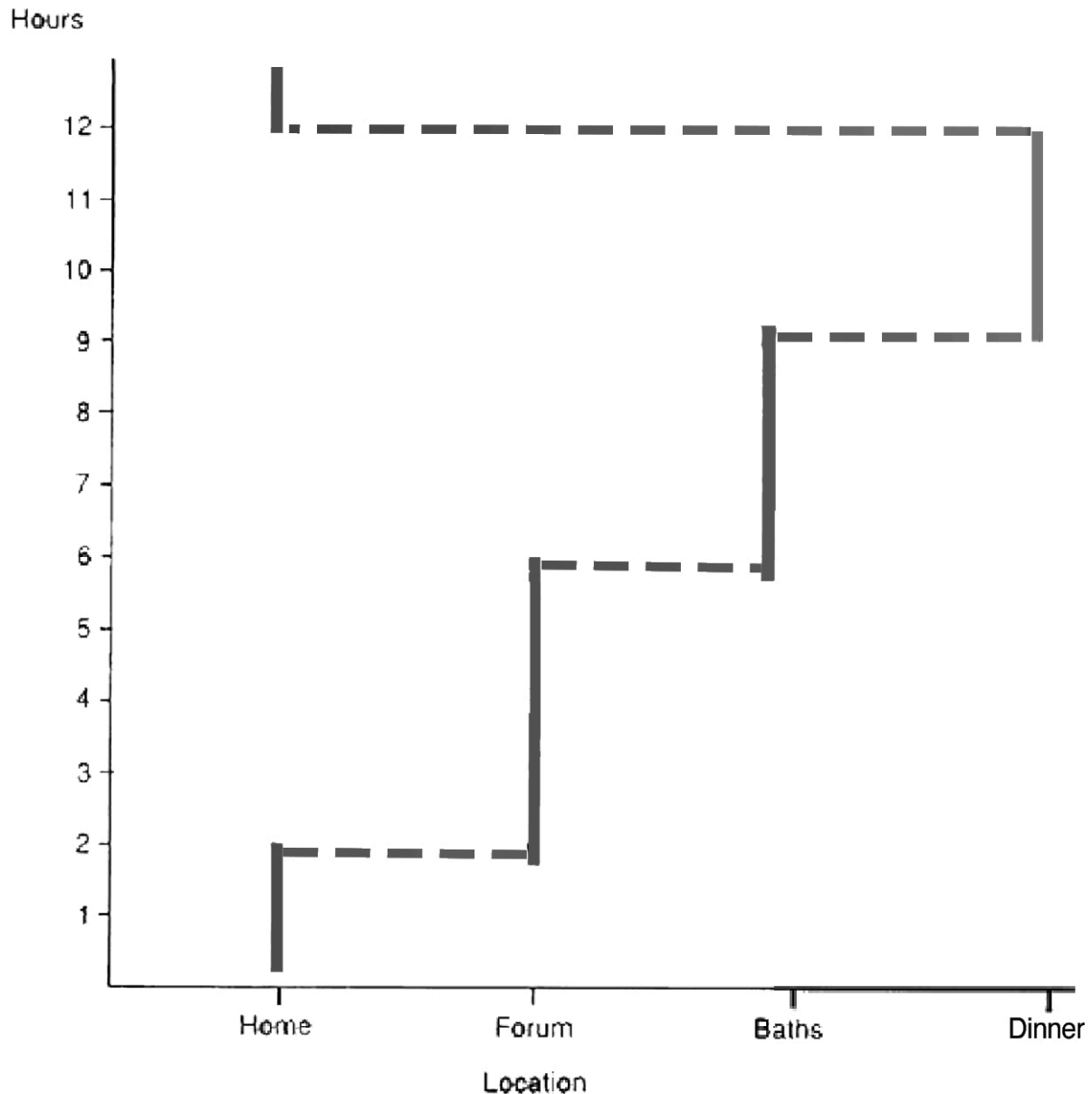


Figure 6.7 - Laurence's chart of elite daily activity (with "Dinner" added and dashed lines representing movement), modified from Laurence 1996: 109.

If we again revisit Laurence's (1996: 108-109) temporal structuring of an elite citizen's day in the Roman world (Figure 6.7), we can glimpse one potential route through the city and the various times it would interact with areas of heavy traffic. This view of the temporally structuring of a Roman day, as Laurence is careful to note, is simplified based on conventions passed down in the literary record that themselves

only address a small minority of the people that occupied ancient cities. Nevertheless, this simplified example illustrates both how the temporal culture of an elite Roman's daily life would have impacted the flow of people through a city and how hour-based regulations on traffic may have made sense in facilitating the smooth functioning of city life. Laurence describes this idealized elite day, with an accompanying route for Ostia mapped in Figure 6.8 below:

In the morning, they received their clients at their house [#1, below]; from there they went to the forum accompanied by their clients, from the forum they went to the baths, and finally they returned home... Between the second and third hours the elite migrated to the forum [#2], from all parts of the city. At the sixth hour, they went to the baths [#3], unless public business delayed them, in which case they would go to the baths later, but before the tenth hour. Given the emphasis upon display, it would seem likely that the elite need not have bathed locally near their homes, but would enjoy the display of walking to baths further away... At the ninth hour, there would have been a migration back to their houses for dinner [#4]. This regular pattern meant that the elite were seen at a certain time and place each day. The elite were mobile and visible outside their localities (Laurence 1996: 108).

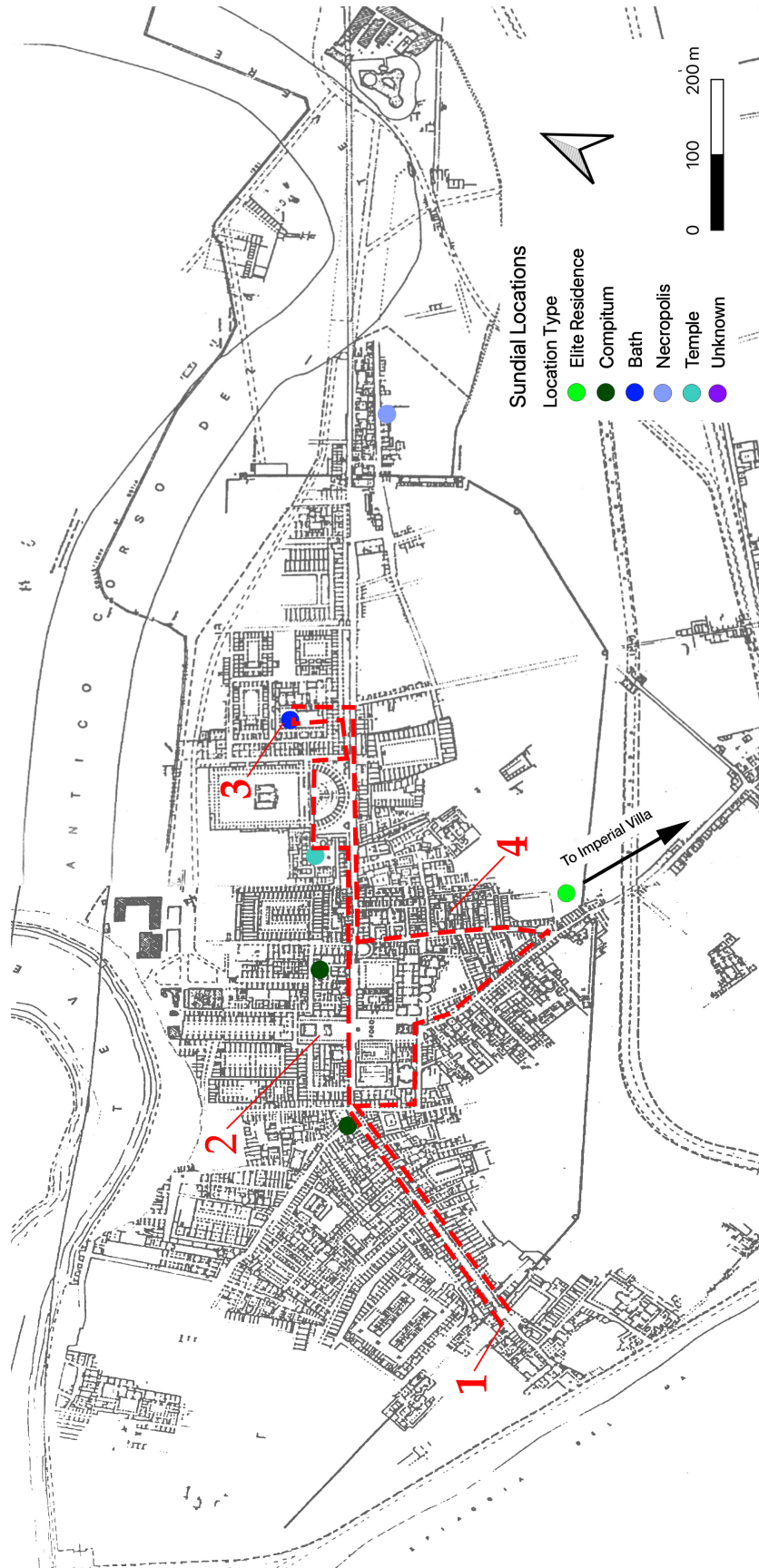


Figure 6.8 - Proposed elite route through Ostia, following chart above. Map modified from Ricciardi 1996.

For the sake of clarifying the role of hourly time in this temporal structure, we can imagine such a route passing through the areas of Ostia known to possess timekeeping devices. Such an elite citizen would be unlikely to live at the *Casegiatto di Diana* discussed above, as that insula had apartments of at most four rooms, none of which as grand as the wealthy inhabitants of the city would likely demand (DeLaine 2018: 321). A number of elite villas, however, were constructed outside the *Porta Marina* beginning in the mid-1st century CE (Emmerson 2020: 28-29), so our imagined daily round begins there. These sorts of villas have elsewhere produced timekeeping devices of their own, as seen in the observed pattern of the most elite households in Pompeii having the majority of timekeeping devices in that city (see chapter 3). The slower abandonment of Ostia could well account for such devices never entering the archaeological record, as they may have been intentionally cleared, but no matter the cast it is worth keeping the potential of a private device in mind. In any case, our temporally-idealized patron would likely begin their day with the *salutatio* of clients at their home. Laurence maps out this part of the day as lasting through the first two hours before moving to the forum for public business.

From the *Porta Marina*, the only route to the forum is along the *Decumanus Maximus*, which leads north from the gate until the *Decumanus* veers to the east near the point of the original western *castrum* wall of the city. This inflection point lies directly in

front of the *Compitum* of Poplicola, thus allowing our elite patron and their entourage to check the time at the *horologium* gifted to the *vicus* by Gaius Cartilius Heracleo. If due in the courts, our elite traveler would either preside over activities until the end of the ninth hour or participate in their own case, which would be subject to allotted times established by judges. In furtherance of the state's authority over time discussed above in relation to time limits on cart traffic, the *iudex* set time limits so that cases took only as long as he deemed necessary, not to give each case equal time (Allen 1996: 164).

Laurence's idealized elite remains at business of one sort or another in the forum until the 6th hour, at which point the opening of the baths calls them away to their next location. While it may seem intuitive that one would select a bath near, or at least on the way, to their own residence, Laurence points out that elite emphasis on display, on being seen in their movements (and timing), may have made other baths desirable targets. Again to suit the surviving evidence at Ostia, we can then imagine our guide moving to the Baths of Neptune further east along the *Decumanus*. If they had business with the shipping industry on a given day, an alternate route leading past the timekeeping device at the *Quattro Tempietti*¹⁶⁸ may have factored in to their public business. Whatever baths selected, it is likely that timekeeping devices were present

¹⁶⁸ Either as an end point, if indeed that site functioned as a meeting point prior to the construction of the Piazza delle Corporazioni or as a waypoint on the way to that Piazza after its construction. Both locations lie between the forum and the Baths of Neptune.

and the hour adhered to, given the common recovery of timekeeping devices from such locations and the regular references to the hours of the baths in the written record.

After enjoying the baths, which may or may not have included the furtherance of business and/or exercise at the attached *palaestra*, the next major stopping point would be dinner. Whether hosting or being invited elsewhere, arrival by the 9th hour appears to have been an important consideration for elite diners. The importance of timeliness in this regard even rose to the level of an ancient meme, as observed in the pair of 3rd century CE mosaics from Antioch (Figure 6.9) showing late dinner guests fretting over the time. In the first, our concerned figure looks up at a sundial atop a column with the text “ENATEΠIAPEΛΑΣEN” (“the ninth (hour) is passed”) indicating the dinner hour as the cause for his concern. In the second, a sundial marked with a “Θ” nearby to indicate the ninth hour is gestured at by a togaed man below the text “TPEXEΔIITINOS” (“run to dinner”), with the man’s tardiness also being deemed “AKAIPOS” (“ill-timed; untimely”).



Figure 6.9 - Mosaics from Daphne (left) and Antioch (right) portraying anxiety over a late arrival to dinner. Both images © Hatay Arkeoloji Müzesi.

One's dinner plans need not even be set prior to arrival at the baths, as evidenced by Martial in his scathing report of Selius, who will do anything to avoid eating at home:

If he sees the threat of having to dine at home Selius leaves no stone unturned. He'll hurry from one landmark to the next, Not just to the civic buildings and temples of Rome, but even to insalubrious bathhouses. In his desperation he bathes three times in the public baths. Still unsuccessful, he rushes back to where he started at the Portico of Europa. Perhaps there he will bump into an acquaintance who is out late. For heaven's sake, Bull of Jupiter, won't you carry Selius off to dinner? (*Mart.* 2.14, trans. Matyszak 2013).¹⁶⁹

¹⁶⁹ Nil intemptatum Selius, nil linquit inausum, cenandum quotiens iam videt esse domi currit ad Europed et te, Pauline, tuosque laudat Achilleos, sed sine fine, pedes. si nihil Europe fecit, tunc Saepta petuntur, si quid Phillyrides praestet et Aesonides. hic quoque deceptus Memphitica temple frequentat, assidet et cathedris, maesta iuvenca, tuis. inde petit centum pedentia tecta columnis, illinc Pompeia dona nemusque duplex. nec Fortunati spernit nec balnea Fausti, nec Grylli tenebras Aeoliamque Lupi: nam thermis iterumque iterumque iterumque lavatur. Omnia cum fecit, sed renuente deo, lotus ad Europes tepidae buxeta recurrit, si quis ibi serum carpat amicus iter. Per te perque tuam, vector lascive, puellam,

Selius is here constrained by the hour; the presence of a widely observed convention for dinner time limits his options beyond only finding someone that has not yet eaten.

Whether long planned, by happy circumstance, or through great effort, our elite citizen would move on from the baths prior to the ninth hour in order to arrive on time. For our imagined citizen, we can imagine having an invitation to dinner at an elite *domus* near the *Porta Laurentina* at the south of the city. With this timing also comes the end of the public activity of our idealized elite Roman citizen, as they would be unlikely to conduct further business beyond this point. Their remaining foray into the city streets would come after dinner, as the guests returned to their respective homes. This end of the elite day is one possible reason for the *Les Iulia Municipalis'* use of the tenth hour to open Rome's streets to cart traffic; elite business out and about is, for the most part, concluded and so won't be interrupted by the impediment and noise of heavy traffic (Poehler 2017: 237).

This imagined itinerary sees our elite citizen ranging widely across the city, from *suburbium* to the forum to the baths. This is notably but one possible route for even the exact series of activities presented, given the variety of possible starting locations, baths, and routes between. Though the elite citizens that were held to the proposed schedule make up a small portion of the overall population, even imagining this relatively small cohort moving throughout the city with the same schedule shows the impact of time on

ad cenam Selium tu, rogo, taure, voca.

movement patterns in the city. Their number also grows when considering the entourage of clients that would follow for part, if not all, of the day. Even explicitly controlled timed access appears to respect this schedule, as the prohibition on carts waits for the conclusion of the elite day rather than the natural barrier of nightfall. As discussed in Chapter 4, this type of schedule would also greatly influence many others in the city outside of the elite ranks, such as the slaves that opened the baths for the 6th hour or prepared dinners for the 9th. The regularized schedules of Roman cities would see ebbs and flows in movement along temporal lines, specifically the observation of hours. These schedules could be enforced, as in the case of traffic regulations administered by the state according to the hours, or by convention, in the elite fear of being labeled *akairos* or the slave's necessity to complete given tasks prior to their expected schedule.

Conclusions: Weights, Measures, and Schedules

The culture of hourly time in the Roman world can be greatly elucidated by the “view from above,” a planner's eye picture of ancient cities and timekeeping's place within them. The example of Ostia, however, also shows the importance of considering lived experience in understanding the infrastructure of timekeeping and its role in daily life. The placement of extant timekeeping devices in Ostia, on its surface, fits within broader trends in the Roman world. Sundials are placed at baths, temples, elite residences, tombs, and so on throughout the city as can be observed in most all other

Greco-Roman sites with well preserved collections timekeeping devices. The view of Ostia from the ground, however, shows that the city adapted this typical suite of timekeeping devices to the specifics of its spatial arrangement and the activities that regularly occurred there.

Rather than fitting neatly into broader patterns of timekeeping at temples, the sundial and *horologium* placed at *compitum* shrines in Ostia are adaptations to the local environment. These shrines allowed for timekeeping to remain accessible for *vici* that did not have other options for their display, either due to the lack of space or individual resources. The installation of timekeeping at these central points in neighborhoods also allowed an ascendant class, the freedmen that served as *magistri vici*, to conspicuously give to their community. Some of these individuals, namely Gaius Cartilius Heracleo from surviving records at Ostia, were also able to take advantage of the placement of their *vicus* to offer a service to the wider community and those passing through. Just as Trimalchio sought to make his name live on by drawing eyes to a sundial bearing his name, so too would Gaius Cartilius Heracleo be able to spread his name to those that consulted his *horologium*.

Beyond only this contextualization of timekeeping among the individual character of Ostia, the experience of navigating the city allows us to see the hour's role in shaping daily life. Measured time was used both explicitly through the enforcement of restrictions on traffic and movement along hourly lines and indirectly, serving as the

organizing framework of daily schedules. Tracking our imagined, timely elite citizen shows the type of ranging one might expect on a normal day in the city, and superimposing that schedule atop other citizens on a similar schedule shows where timely activity would lead to increased traffic density; foot traffic toward the forum at the third hour or away from the baths in time for dinner at the ninth hour, for example.

“In a commercial harbour town,” Berg (2020: 83) explains, “measuring was a crucially important.” Especially after the rise of Augustus, the Roman empire imposed systems of weights and measures across the Mediterranean that “facilitated interregional commerce and the calculation and payment of taxes” (ibid.). Hourly time, though it entered Roman consciousness centuries earlier, was also a component of this system of measures meant to make the Roman world function in predictable and controllable ways. This type of measure is too often omitted from scholar accounts of standardization and of measure. Ostia shows that the unit of the hour, formalized prior to the rise of the empire but increasingly relied upon as a tool of organizing life, was an important part of lived experience in Roman cities. These experiences were individual, tailored to the people and contexts involved in each interaction, while also existing within a shared temporal culture. Walking through a Roman city, either in reality or as a thought exercise in understanding Roman hours, helps us understand both the personal experiences of timekeeping and the wider structures they enabled.

CHAPTER 7: THE HOUR IN IMPERIAL ADMINISTRATION

TEMPUS VINCIT ET DIRIGIT OMNIA
(*St. Paul's College, Stony Stratford, England, 1773*)

Hourly timekeeping devices in the Roman world were both widely distributed and influential in the mediation of social relations. The previous chapters explored these aspects of timekeeping throughout the Imperial period, noting newly emergent patterns of distribution for objects that told hourly time and their increasing ability to shape behavior. The efficacies of sundials and water clocks in antiquity also extended to conceptual realms, shaping understandings both of the world itself and the empire's relationship to it. This chapter will further explore these points, with a focus on the role of hourly timekeeping in expressing and reifying the imperial ability to impose order on the world. The notion of order was a powerful component of Roman authority ever since Rome the city first began its outward expansion of influence, beginning regionally in central Italy as early as the 5th century BCE. Erskine (2010: 5-6) defines Latin *imperium* as the ability to give orders, noting that the notion of empire was associated directly with this ability to command rather than with territorial holdings until about the 1st century CE, when the idea expanded to also include territorial possession. Romans thus

exercised *imperium* before having an emperor, for example giving the title *imperator* to victorious generals for a period after their victories. The concept of *imperium*, though, evolved with the political machinations and imperialist programs from Caesar onward. Hourly timekeeping was a component of this ability to give orders, both in the literal sense of serving as an axis for social organization and more broadly in its role as an imperial way of life brought to (and perhaps forced upon) those coming under Roman influence. The use of hours in the imperial Roman project further served as an avenue for the creation and promulgation of imperial identity.

The new landscape of authority brought about by Augustus, wherein power was intensely concentrated in the emperor and his family at the expense of many in the traditional oligarchy (Roller 2001), allowed timekeeping to become a tool for elites to raise their own profile. This was accomplished by tying their names to the gift of a *horologium* to their city, but also through association with the newfound imperial influence over timekeeping practice. The particular funding structures and locations of sundials and water clocks in the Imperial period show the capability of time to establish personal identity and image, as well as trends in who pursued these tools toward those ends. In some cases these installations were funded out of attempts at building personal prestige or a general drive to euergetism for the sake of benefaction. At the same time, the very nature of these gifts was public and meant to provide the temporal structuring

of daily schedules, sometimes as a duty of one's office rather than only a desire for social prestige.

This chapter will begin with a discussion of the role of timekeeping devices in Roman cities as tools of empire and acculturation. The chapter will then move on to discuss how the emperor's hand can be seen directly intervening in the timekeeping assemblages of the Roman world following the investment in harnessing time as tool for garnering authority that begins with Augustus. Monumental hourly timekeeping devices are the most conspicuous tool for imperial imposition of time discipline, though gifts directly from an emperor of more mundane devices are more numerous and allowed influence to extend more broadly. Following a discussion of these two categories of imperial gifts, focus will shift to the practice of timekeeping devices as civic gifts *dedicated* to a sitting emperor. Such gifts continued the imperial project of extending temporal *imperium* while also enabling local elites to participate in the new constellation of authority organized around the rising emperor.

To fully understand the depth and breadth of timekeeping's role in civic munificence, the chapter will then turn its focus to surviving inscriptions that name individuals and/or offices related to the installation of timekeeping devices. A study of these offices in particular allows a view beneath the veneer of euergetism, as much civic giving was inspired by goals other than personal prestige. As Pobjoy describes, looking beyond the names of those mentioned on building or feature dedications "shifts the

focus of our attention away from the individuals who put up an inscription and toward the rules and regulations that governed the life of the community in which they lived” (2000: 78). Given the role of time and time discipline in Roman *imperium*, this motivation for funding a sundial or water clock reveals much about the spread of Roman influence. The offices associated with such gifts, at least in some cases, show how the accessibility of hourly time was a necessity for enacting Roman policies and practices.

In his study of the role of time and timekeeping in British colonialism, Nanni argues that a “culture of veneration for the authority of the clock” (2006: 194) was a key element of the production (and reproduction) of colonial subjects. In imperial Rome, the “clock” itself was less central, though both the state and individuals with local influence were nevertheless invested in timekeeping devices as tools of their authority. Timekeeping devices have and express authority in themselves, through their communication of measured times, but they are also things *of* authority. Leading figures in the community provided most of the sundials and water clocks that an average Roman would encounter, from the level of the emperor himself down to the *paterfamilias* that ran a given household. By exploring these provisions of hourly time, this chapter seeks to not only show individual motivations for such gifts but also to more thoroughly unveil the role of hourly time in the power structure of the Roman empire.

The Emperor & The Hours

Timekeeping had a longstanding series of symbolic associations in the ancient world, with devices often appearing in contexts of science and knowledge. The rise of the Roman empire added to the symbolic role of these devices through concerted efforts, beginning with Augustus, to further integrate time and the *imperium* of the individuals at the top of the newly organized systems of Roman authority. Augustus became an individual locus for time's authority through his implementation of various forms of *fasti* and the construction of his monumental *Horologium Augusti* (Ker 2009: 280). As Romans came to increasingly regulate activities by the numbered hours of technologically determined time, Augustus was able to regulate the hours themselves; he could call the hours into service in the production of spectacle through his shaping of the built environment with feats like his *horologium*. This dynamic played out across the empire alongside the concentration of authority in the person of the emperor and his proxies, in many ways at the expense of the traditional oligarchy (Roller 2001). Further, this centralization of authority was reified in the *horologia* of Roman cities throughout the empire that acknowledge the emperor's relationship to the ordering power of hours, be it as direct gifts *from* an emperor or dedication *to* them.

The most spectacular expression of this new emphasis on urban timekeeping, and that most clearly tied up with *imperium*, is found in the use of monuments to keep hourly time. The Tower of the Winds (#100), a public timepiece for the city of Athens, is

one of the most famed examples. Initially constructed around 140 BCE (Webb 2017: 26), the Tower of the Winds is situated in the broader historic moment of the rise of hourly time to prominence after about 200 BCE. The octagonal structure includes inscribed sundials on each of its 8 faces, a feat of considerable skill given the added difficulties of constructing planar sundials oriented to anything other than a cardinal direction (Evans 2015: 1593). The location of the monument also allowed it to enter into the view of a great number of people, as it lie just off the Roman Agora, a large public latrine, and the Hellenistic stoa (Webb 2017: 49). Spectacular buildings like the Tower of the Winds participate in what Smith (2015: 68) calls an “aesthetics of awe” that comprise a significant component of a state’s ability to create emotional and ideological bonds with its subjects. In creating a monumental manifestation of timekeeping, the Tower of the Winds establishes a link between the state’s ability to create things worthy of awe and its ability to exercise a sort of dominion over time (both in how time is conceived and how it is kept). That the power of Rome came to be exerted over an existing awe-inspiring, time-based monument further emphasized Rome’s ability to impose its will. Roman renovations to the tower under the Augustan program of rehabilitating monumental structures also made the tower more identifiably Roman, installing an aqueduct style water system to feed the internal water clock of the monument (Webb 2017: 49).

The Tower of the Winds is not the only spectacle of hourly time in the Roman world, with other reported, but lost, examples ranging from the roofs of pleasure ships that resembled sundials to those devices' inclusion in conspicuous places, as in the pediment of the Temple of the Muses (Rehak 2016: 68). The *Horologium Augusti* (#643) is perhaps the clearest and most discussed of Augustus' attempts to exert his influence over short time. Much of the discussion of this object, it is worth noting, is a debate on whether the device actually told short time. The device was brought to scholarly and public consciousness¹⁷⁰ by Buchner's (1976) argument that the obelisk currently standing in the Piazza Navonna in Rome had formerly served as the gnomon for a monumental sundial on the Campus Martius. Further, the shadow cast by this gnomon was said to have fallen at the entrance of the Ara Pacis on Augustus' birthday, creating a celestial spectacle that tied the time to Augustus personally. The hypothesis was also supported by a passage from Pliny, which describes the Augustan construction of a sundial with an obelisk for a gnomon:

Augustus used the obelisk in the Campus Martius in a remarkable way - namely to cast a shadow and thus mark the length of days and nights. A paved area was laid out commensurate with the height of the monolith in such a way that the shadow at noon on the shortest day might extend to the edge of the paving. As the shadow gradually grew shorter and longer again, it was measured by bronze rods fixed in the paving. This device deserves study; it was the result of a clever idea by the scientist Facundus Novius (Plin. *HN*. 36.72-73)¹⁷¹ (trans. modified from Healy 1991).

¹⁷⁰ The notion of a monumental dial had previously been raised, in a much less accurate way, by 1650 polymath Athanasius Kircher in what Heslin (2007: 2), a strong critic of Buchner's hypothesis, calls a "gorgeously sumptuous work of sheer nonsense."

¹⁷¹ Ei [obelisco], qui est in campo, divus Augustus addidit mirabilem usum ad deprendendas solis umbras dierumque ac noctium ita magnitudines, strato lapide ad longitudinem obelisci, cui par fieret

Buchner's later excavations in the Campus Martius uncovered a portion of the meridian line onto which the obelisk cast its shadow, but his idea was still vociferously opposed by some and lauded by others. Heslin offers a history of the controversy up to the mid-2000's, and notably describes how the above passage from Pliny does not actually describe a sundial, arguing that it instead "says nothing about telling time; it speaks only of the extent of the pavement in a single dimension; and it says that the purpose of the instrument was to measure the changing lengths of days and nights" (2007: 4). More recently, Haselberger (2014) republished previous articles on the debate over the nature of the device along with some additional analysis and excavations. The consensus among Buchner's critics is that the device functioned as a meridian, rather than a sundial; the device translated the sun's position into the day of the solar year rather than tracking the hours each day. The debate remains active, with new work continuing both in the field and in the analysis of the existing features of the monument.

umbra brumae confectae die sexta hora paulatimque per regulas, quae sunt ex aere inclusae, singulis diebus decresceret ac rursus augesceret, digna cognitu res, ingenio Facundi Novi mathematici.



Figure 7. 1 - Photo of excavated portion of the meridian line of the *Horologium Augusti*, now beneath the Basilica di San Lorenzo in Lucina. Photo by Rebecca Levitan.

Rüpke (2017) reviewed the Haselberger book noting the broad acceptance of the potential uses of a meridian (Figure 7. in the Campus Martius, pointing out that “precise astronomical dates are important for calibrating the reformed Julian calendar and for realigning the rhythm of intercalation.” There is broad agreement on both sides of the debate over the object that the meridian function of the *Horologium Augusti* was useful in Augustus’ program of calendrical reforms. The meridian¹⁷², however, may still have been a useful tool for hourly timekeeping even if it did not function as a sundial itself. Roman sundials typically factored in the day through their design, using day curves to mark key solar events in the year like the solstices and equinoxes. Water clocks, on the other hand, required either more complex devices or manual adjustment to correctly track the variations in seasonal hours. A highly accurate meridian at monumental scale in the capital may well have served the added benefit of creating a standard by which to calibrate the water clocks of Rome. This usage may also help clarify Pliny’s description of the device, which has been taken as both evidence of the *horologium’s* role as, in fact, a *horologium* (Hannah 2011) and as proof that the described object could not possibly have been a *horologium* (Heslin 2007). Heslin (ibid.: 4) tellingly explains the purpose of the device Pliny is here describing, saying “its purpose is to mark the progress of the solar year.” While this is surely what the device does and what

¹⁷² The presence of a meridian line is uncontested, as this is the feature that has been archaeologically recovered. No matter how one interprets the monument as a whole, the meridian function was surely part of its operation.

functioning of the device Pliny goes on to describe illustrates, Heslin fails to take Pliny at his word; the purpose of the device, according to Pliny, is “namely to cast a shadow and thus mark the length of days and nights” (Plin. *HN*. 36.72).¹⁷³ Taking an ancient author at their word is a tricky proposition, though it is noteworthy that this passage of Pliny in particular has been praised for its attention to detail on both sides of the debate around the *Horologium Augusti*: Hannah (2011: 87) argues that “the astronomical acuity of Pliny’s description is worth noting” and Heslin (2007: 3) that Pliny describes the intricacies of the device “with clarity and precision.” If the point of the object is to track the lengths of the days and nights, it stands to reason that those measures were a, if not the, primary output of the device. Pliny does not say that the device tracked the solar year, but specifically ties its purpose (rather than its function, which is at the core of the sundial versus meridian debate) to the length of days and nights. These measurements are essential information for properly calibrating the hours of a given day.

Augustus’ placement of an imported Egyptian obelisk to display time (be it throughout the year or within each day) on a massive scale shows the power of the emperor to do as he pleases with the monuments of others, and suggests a mastery over time (Rehak 2016). Interpreting the purpose of the *Horologium Augusti* as, at least in part, its ability to serve as the standard by which the lengths of day and night also suggests a deeper engagement with time. Augustus did not provide an object to tell the time each

¹⁷³ ...usum ad dependendas solis umbras dierumque ac noctium ita magnitudines...

day, but rather created a standard by which the other timekeeping devices of the capital could be set. This purpose is similar to, and could be accomplished in parallel with, the widely accepted utility of the *Horologium Augusti* in regulating the calendar and intercalation. The politics of time under, and after, Augustus established a novel relationship between the state and the passage of years, days, and hours. The Roman ritual calendar, heavily modified by Augustus, was a tool to generally define Roman power, history, and identity by arranging events and their commemoration into a meaningful sequence (Beard 1987: 1), but it also highlighted Rome's ability to control temporal framing. Hours were similarly used in both ways, to delineate the temporal frame of each day and in so doing to stake the state's claim over time itself.

The emperor can also be seen to participate in the construction of hourly timekeeping infrastructure elsewhere in the empire through the direct gifting of *horologia*. While monumental timekeeping devices with imperial connections, the most visible expression of the emperors' investment in the hour, center on large capital cities like Rome and Athens, imperial interest in establishing objects to track the hours reached much further afield. This reach is most first directly attested through a dedicatory inscription from Puteoli (#52) that identifies a timekeeping device given to the city by Emperor Tiberius: "Emperor Tiberius set up the *horologium* (...) and the city had it repaired..." (CIL IX.2324).¹⁷⁴ While the inscription does not specify the type of

¹⁷⁴ Ti(berius) Caes(ar) A(ug(ustus) horolog(ium) po[suit ---] [---] res public(a) refec(it).

timekeeping device installed, Winter (2013: 509) argues that the inscription refers to a water clock on the grounds that the object needed repair, though the known replastering or repair of sundials elsewhere shows that those objects required upkeep as well.

Puteoli also offers unique insight into both the city's layout and image through the Late Imperial souvenir flasks of the city; 2 of the 14 incised glass flasks that depict the monuments of the city include *solaria* (the Pilkington flask has a temple-like structure labeled "SOLAR" and the Prague flask a similar structure with "SOLARIV"). These depictions have been interpreted as no longer extant temples, perhaps to Sol Invictus (Popkin 2018: 440), though the former includes an odd T-shaped addition to the front of the temple like structure that evokes a sundial atop a pedestal (though at a very small, and thus not detailed, scale). Should these features be interpreted as related to the inscription above, the solarium would remain a significant component of the city's identity even into late antiquity. Whether depictions of the city include Tiberius' *horologium* or not, the above inscription strongly suggests that a timekeeping device was deemed an appropriate gift from the emperor and that the object's maintenance was a worthwhile endeavor over 100 years later.¹⁷⁵

The direct involvement of an emperor in the establishment of a timekeeping device can also be seen in the Flavian dynasty, with multiple records alluding to a

¹⁷⁵ Horstung (2001: 289) dates the repair inscription to the first half of the 2nd century CE.

device installed by Vespasian during his building program at Antioch. An inscription from the city defining the course of a Vespasian era water pipe uses the city's ὠροσκόπιον as a reference point, and further points to the connection between the practice of Roman horoscopes (calculated down to the hour) and the device that enabled that practice. The Byzantine chronicler Malalas provides another reference to the timekeeping device in the 6th century CE, crediting Vespasian with the construction of a temple of the winds at Antioch in 78 CE (the last accomplishment of the emperor the chronicler mentions before Vespasian's death)(Malalas 1986 [527]: 110). Downey (1961: 207) argues that this temple or tower of the winds is one and the same with a *horologion* at the forum of Valens, likely a water clock. Though no trace of the structure survives, the Vespasianic device may have been similar in form to the Temple of the Winds in Athens, which also contained a water clock in addition to multiple sundial faces, given their discussion in ancient sources.

Titus also directly intervened in the installation of a *horologium* at Surrentum (#702). Following the eruption of Mt. Vesuvius and the accompanying earthquake that impacted the broader region, Titus was credited with installation of a *horologium* to replace that destroyed during an earthquake in the region, likely that which occurred in 62 CE causing widespread damage prior to the eventual eruption of Mount Vesuvius in 79 CE. Titus is said to have “replaced with all its ornaments the *horologium* destroyed by

the earthquake" (AE 1902, 40).¹⁷⁶ That these inscriptions cluster temporally at the end of the Julio-Claudian and beginnings of the Flavian dynasty tracks with the new found interest in using short time as a tool of *imperium* following Augustus. Their spatial clustering in peninsular Italy, specifically shared between Rome and the broader Bay of Naples, also suggests the early stages of a spreading phenomenon of imperial investment in hours.

Rehak sums up the newly established relationship between emperor and short time by stating "the technology of the sundial was not new, but Augustus's exploitation of it was" (2006: 95).¹⁷⁷ The political implications of state directed temporal practice are not a new discovery, with scholarly focus falling on calendrical reforms in the case of the Roman Empire (Stern 2017; Rüpke 2011; Rüpke 2017). Even quips from antiquity show the power of reordering time, with Cicero reportedly remarking that the rising of a constellation in the night sky on a particular day was done by decree due to Caesar's recent calendrical reform (Plut. *Caes.* 59); though poking fun at the notion, Cicero shows that calendrical reforms were meant to show a causal relationship between the ruler's decrees and the timing of even natural events. Caesar, the target of Cicero's barb, is not the first leading Roman to be associated with the calendar, as Numa was credited with

¹⁷⁶ Imp(erator) Titus Caesar [divi] / Vespasiani f(ilius) Vespasi[anus] / Aug(ustus) pont(ifex) max(imus) tr(ibunicia) Pot(estate) I[X imp(erator) XV] / Co(n)s(ul) IIX censor p(ater) p(atriciae) horolog[ium cum suis] / ornamentis terrae motib(us) [conlapsum restituit].

¹⁷⁷ This statement implicitly takes the position that the Horologium Augusti is a sundial, though this work argues that the sentiment applies even beyond that particular monument.

creating the initial Roman calendar in the 7th century BCE that Caesar would go on to reform (Rüpke 2011). Augustus' innovation, then, was not the conscription of time to the service of an emperor (or king, or dictator), but the expansion of that notion to include the sun in the sky and thus the hours in the day.

Civic Munificence and the Hour

Through the material culture of timekeeping, time itself was “exploited by emperors, organized, tracked, manipulated, and — metaphorically at least — owned and controlled by individuals” (Lehoux 2016: 117). These capacities of timekeeping devices, their imagined efficacy to exert influence on the universe itself allowed them to contribute to the emotional and ideological bonds that the empire sought to instill Roman subjects. Augustus' temporal policy, particularly his attempts to associate himself with the administration of time and with Apollo (and, thus, the sun and its hours) (Rehak 2006), created new opportunities for the emperor to display and impose his authority. Most of the individuals associated with the devices that tracked hourly time, though, were not an emperor. The majority of surviving inscriptions suggest that the gift of sundials or water clocks was done in accordance with both longstanding practice around those objects and within the broader practices of civic munificence generally. As seen in the dedicatory inscriptions of timekeeping devices since the Hellenistic period, objects that keep hours were initially most often funded by local

elites. Beginning in the Late Republican period, though, civic authorities began to invest in timekeeping infrastructure as well.

While the previous section shows that hourly time could be invoked in honoring the emperor, it was more common for dedicated timekeeping devices to focus on local scales. Local elites are the most frequently attested donors to their own cities generally, and likely made the most important contributions to those cities (Horster 2014: 526). The givers of sundials and water clocks have generally been characterized as ordinary citizens (Houston 2015: 311), due both to the modest cost of such a gift relative to higher profile gifts, such as baths or arches, and the known status of those recorded to have given such devices. Small gifts, like a timekeeping device or a minor renovation, though, were the most common objects of civic munificence, with embellishments or refurbishments much more commonly given than the construction of entire public structures (Zuiderhoek 2009: 23). While the resources necessary to finance the largest civic gifts were only available to the very wealthiest of Romans, those giving gifts like sundials still represent a rarified portion of the overall population.

In her work on the Large Herculaneum Women statue type, Trimble argues that honorific statues “tied elites and cities together in visual, material, and spatial terms” (2011: 209); such statues contributed to “normative imperial culture and the cultural cohesion of the Empire” (ibid.) through their representation of elite ideals. Timekeeping devices, though they served scientific purposes as well as representational, did similar

work. While not literal representations of elites, the dedicatory inscriptions often included with sundials and water clocks created ties between particular individuals and the visual and material landscape of Roman cities. Further, timekeeping devices contributed to the temporal culture of Roman cities. The contribution of buildings or features that shaped the culture of a city, what Zanker (2000: 25) calls the “abstract ideals in the built environment,” are what made a place identifiably Roman. The defining aspect of the gift of timekeeping devices was the ability of hourly time to “tie elites [and, indeed, everyone] and cities together” through their enabling of particular rhythms and schedules.

Individuals sought to use timekeeping devices, and association with those devices, to shape the world around them and build personal prestige. A sundial or water clock was also useful to civic authorities, who sometimes directly funded the objects’ construction. While it appears that most Roman construction of public timekeeping devices relied on private funds (even though many of those donating such funds were themselves elected officials) (Jones 2016: 77), civic authorities became increasingly involved beginning in the Late Republican period. Zuiderhoek argues that munificence itself, while celebrated (in antiquity and now) as a practice of exemplary citizenship, also functions to “move the focus away from the Classical notion of political egalitarianism towards a glorification of hierarchy within the citizen community” (2009: 71). In giving gifts, then, one’s status was increased twofold; a donor could be seen as a

good citizen working to benefit the community while also fostering social relations in which their participation, and resources, became a functional necessity. It is important to note here that giving itself was certainly not always an underhanded attempt to reify particular relations of power; Zuiderhoek himself argues that benefactors were often sincere in their desire to give to their communities and that they “managed to endow their communities with a specific sense of corporate, collective identity” through their giving (ibid.: 73). The latter part of that statement that is most operative for this discussion; public giving established corporateness for communities, but so did the gifts themselves. Munificence on a grander scale than is represented by the installation of a timekeeping device is likely more efficacious in these regards, but nevertheless the donation of a sundial or water clock to the public was implicated in the creation of these relations. *Horologia* were often the gift of good citizens, worthy of care as both loci of community and as participants in the creation of that community.

Donation of timekeeping devices to the public domain was a common practice, and though such gifts were open to donors of more modest means that is not to imply that they were looked down upon. The gifting of timekeeping devices was not only commemorated on the devices themselves but could also live on after the death of donor through inclusion on their tombs (Hannah 2009: 134), as seen in a 1st Century CE inscription from Boutae (#124) (Talloires, France) praising the deceased’s gift of a

*horologium*¹⁷⁸. Houston notes that there are no members of senatorial rank and only one equestrian that gave sundials as an act of munificence, however the giving of objects that tracked hourly was still the purview of leading figures in a community (2015: 310). Sundials became symbols of status, not only on the grounds that they represented higher learning, but also in that they were often provided as the works of either the state itself or its elite. While sundials were present in private settings, they have only been recovered from the private collections of the elite (as illustrated in the case study of Pompeii in Chapter 3); when the average Roman saw a sundial, it was most likely thanks to either state or elite intervention.

That sundials and water clocks were ever directly funded by the state or by civic administrations is itself noteworthy, as it shows the value placed on the devices or, if nothing else, the hours they kept. Publicly financed projects in general tended to focus on the construction and maintenance of infrastructure (traditionally defined as physical infrastructure like roads, aqueducts, sewers, etc.) while private funding more often went to the construction, renovation, or decoration of other features of the built environment (Horster 2014: 531). Timekeeping devices are certainly not alone in their overlap in public and private funding, as the vast scale (both spatially and temporally) of the Roman empire included many iterations of the same types of projects involving

¹⁷⁸ Horologium cum suo aedificio et / signis omnibus et clatris / C(alus) Blaesus C(al) fil(lus) Voltinia Gratus ex HS n(ummum) X (milibus) / et eo amplius ad id horologium adminis / trandum serv(u)m HS n(ummum) IIII(milium) d(e) s(ua) p(ecunia) d(edit)

both fundings sources. Nevertheless, the overlap here is indicative of the dual role of the built environment in antiquity; it was at once infrastructure and ornamentation. Timekeeping devices were at times monumental public works and at others decorative afterthoughts. A closer look at the individuals implicated in the construction of these devices, despite this wide variation, illuminates the object's position in the spread and enforcement of Roman authority.

The Coattails of Imperial Time

Elite interest in hourly timekeeping did not only manifest itself in capital cities, but throughout the Roman empire. The association between the person of the emperor and the keeping of hours was realized in several ways, and this connection with the *imperium* of timekeeping drove other elites to seek a personal association to hours for their own benefit. Without written records, the connection between a timekeeping device and a particular individual is only possible archaeologically if the devices are found in privately owned spaces, and even then a lack of written records about the property owner leave us only without their name and much of their biography. The relationships between specific figures and timekeeping devices are less easily established in communal and civic spaces. Fortunately, many timekeeping devices from the public realm have dedicatory inscriptions that show both who was responsible for the funding of a device, as well as in whose honor it was installed. In the early Imperial period, such inscriptions implicate individuals from local elites to the emperor himself

in the introduction of hourly timekeeping to public spaces. This connection also motivated civic figures of smaller influence to donate public timekeeping devices, though their claims over the cosmological were more tenuous.

While the few *horologia* mentioned here represent only a small fraction of the gifts given in the name of the emperor, these objects are part of a trend in temporal associations sought by emperors in the late 1st BCE/early 1st CE. This association was understood and acted upon by Romans, as the gifting of timekeeping devices in the public sphere more frequently faced the opposite direction with sundials and/or water clocks given in honor of a particular emperor. Zuiderhoek (2009: 24) argues that the most elite benefactors “did not address the basic daily needs of the mass of ordinary citizens,” which may explain an aspect of the lack of appeal for timekeeping devices among the most elite givers; their connections to authority were more secure, and the gifts they were capable of giving were grander. There is also a distinct thread in giving from the Republican period in which donations were sometimes made out of obligation, rather than attempts at benefaction (Pobjoy 2000); the demands of one’s office may have included the administration of a gift from the local senate or some other obligation that would result in the officeholder’s name being prominent on an associated inscription. Further, not all gifts have surviving dedications nor had dedications at all, therefore placing “undue emphasis” on the cultivation of public esteem in giving practices (Mackie 1990: 187). Even though the authority tied up with such a device belonged to

the emperor or civic authorities more-so than the giver, the object still offered a form of participation in the broader imperial project of timekeeping. This participation, and especially the dutiful fulfillment of one's obligations, was itself a form of cultural capital that made dedicating a timekeeping device worthwhile. Rather than a reflection of the giver's generosity, even required dedications illustrate the "*probitas* , *honestas* , and *integritas* exhibited by the official who had carried out the tasks assigned him" (Pobjoy 2000: 90). While different from the roman notions of *liberalitas*, *munificentia*, and *largitio* that were the most frequent characteristics associated with givers in dedicatory inscriptions (Horster 2014: 526), the virtues of fulfilling one's obligations were still a worthwhile pursuit even among the established elite of a given city.

Timekeeping Devices Dedicated to Emperors

Dedicating a timekeeping device directly to an emperor is a rather explicit avenue for demonstrating one's dutiful participation in the ordering of Roman society. The previous section introduced the notion of timekeeping devices being created as an obligation of the duties of one's office. This obligation is clearly seen in dedications that name office holders that fulfilled the wish of local councils, but there are also examples of those authorities' obligation to higher levels of administration through the imperial documents that granted particular administrative status. Addressing the relevant inscriptions here chronologically, we see Julio-Claudian and Flavian examples predominantly focused on either giving in fulfillment of an office or simply honoring an

emperor with a gift. Later examples, though, show that the construction of timekeeping devices was sometimes undertaken out of obligation to the capital. This section will explore the underlying forces behind this latter obligation, which likely existed earlier than is visible in the inscriptions here.

Tiberius is involved in the former sort of giving, as he was with the direct gift of such a device, through being honored with the gift of a *horologium* in Nomentum, north of Rome. The fragmentary inscription (*CIL* XIV.3947)¹⁷⁹ (#414) notes the gift in honor of Tiberius from a member of the equestrian rank, the only known dedication on a timekeeping device from that rank (Houston 2015: 310). Claudius was also honored with a *horologium* at Sulci (#697) in Sardinia, given by one L. Aemilius Saturninus on behalf of the Quirinia (*CIL* X.7515).¹⁸⁰ The latter gift appears to have been given contemporaneously with the granting of *municipium* status to the city (Bonello Lai 1992), as discussed in Chapter 5), showing that the device not only served to honor the emperor but also to symbolize the city's incorporation into a new aspect of the Roman political system; not only did L. Aemilius Saturninus show his adherence to the Roman way of doing things, so too did his entire community.

¹⁷⁹ C[...] / ai(...) / Fla[...] / Prae[/ /] vigilum / Ti(berii) Caesa(ris) / procur(ator) / provinc(iae) / horologium....

¹⁸⁰ [Ti(berio) Cl]aud(io) Caesar[i] Aug(usto) Germanico / [p(ontifici) m(aximo) tr(ibunicia) po]t(estate) VIII imp(eratori) XV[I] co(n)s(uli) IIII / [horol]ogium L(ucius) Aemil[ius] / L(uci) f(ilius) Quir(ina) Saturninus / dedicavit.

Nero was also honored in the dedicatory inscription (CIL V.2035)¹⁸¹ of a timekeeping device established at Pagus Laebactium (#449). While the inscription is unclear on the type of *horologium* being dedicated, it does refer to the object as “*horilogium [sic] cum sedibus*,” a device with seating. Winter (2013: 404) follows Bassignano’s suggestion that seating implies a large water clock, the seating perhaps to hold the device’s attendant(s). The gift of a bench is hardly a rare act, however, and the example of the Pompeiian sundial at the Triangular Forum (#540) shows a nearly contemporaneous example of a sundial being gifted along with a *schola* bench. Though the device at Pagus Laebactium is made in honor of Nero, it is explicitly given to the inhabitants of Pagus Laebactium (*paganis laebactibus dederunt*).

The practice of dedicating *horologia* to emperors persisted beyond the Julio-Claudian and Flavian dynasties, with further examples dedicated to Hadrian (or Antononinus Pius) at Uchi Maius (#756), Caracalla at Aphrodisias (#48), and to Macrinus at Rigomagus (#600). The first of these, from Uchi Maius in modern day Tunisia, shows the uniquely Roman trends of both a direct dedication to the emperor and the funding of a timekeeping device from public coffers. The inscription reads:

¹⁸¹ In honorem / [[Neronis]] Claudii / Caesaris Augusti / Germanici / Sex(tus) Paeticus Q(uinti) f(ilius) / Tertius et / Sex(tus) Paeticus Sex(ti) f(ilius) / Firmus / horilogium cum sedibus / paganis laebactibus / dederunt.

According to the decision of the city council and at public expense (...) donated the horologium (...) promised to the emperor (Hadrian or Antoninus Pius) in honor of his assumption of office as *magister pagi* (AE 2000, 1730).¹⁸²

Winter (2013: 588) again argues that the device mentioned by the inscription is a water clock on the forum of the city, owing to the building and cistern found in connection with the fragmentary dedicatory inscription. The inscription here is telling of the role of the emperor and the power of Rome in local administration on a number of levels. The timekeeping device was called for and funded by the local council, situating the gift as a civic project first and foremost. The giving of the device “according to the decision” and mention of an individual’s assumption of the office of *magister pagi* show that this decision was carried out by a particular individual, though their name is lost to a lacuna in the epigraph. The inscription’s emphasis on the fulfillment of a promise to the emperor is perhaps its most notable feature, as it highlights the relationship between central authority and timekeeping throughout the empire. To understand the dynamics here, the promise of this inscription must be related back to another category of legal documents from the Roman world. Though few examples survive, the founding charters of *colonia*, *municipia*, and smaller administrative units, like the *pagus* here, betray the hand of Rome in the administration of the particulars of local life in the empire, and even of Rome before the rise of the emperors as the practice began during the Republican period. Pobjoy explains the relationship thus:

¹⁸² [...]Hadria[...] / [p]ro honorem m[agisterii] / [horol]ogi promississet, a[edem...] / cum pronao et cistern[am...] / idemq(ue) dedicavit d(ecreto) [d(ecurionum) p(ecunia) p(ublica)].

[Surviving charters] give an idea of the wide range of responsibilities allotted to officials and local bodies in such communities. This tight control of the behaviour of those in power in such towns, emanating ultimately from the capital, sought to ensure good order and an appropriate and responsible conduct of public affairs at a local level (Pobjoy 2000: 81).

The “promise” (*promitto*) to the emperor to install a timekeeping device is likely the fulfillment of conditions of the charter for the *pagus*, though the document does not survive to confirm this relationship. The previous chapter provided an example of such a document and its relationship to timekeeping through the inclusion of temporal regulations on cart traffic in the *Tabula Heracleensis* at Heraclea Lucania. While that document, though fragmentary, does not include a specific call for the installation of a timekeeping device, it does lay out the expectation for regulations based on the hours. Timekeeping infrastructure, though not explicitly required in any surviving legal documents, may have been a necessary component of efforts to participate in the Roman way of doing things. Not only that, but such participation may have been necessary to remain in good standing with the capital, particularly when seeking or having recently attained a new administrative status.

Some dedications attempt to appeal to the Emperor on a more personal note, though the fragmentary nature of the dedications may here obscure some specific factors. The sundial currently held at the Selçuk Museum and believed to have been recovered from Aphrodisias (#48) (though some believe the object came from Ephesus, see Bonnin 2015b) is dedicated to Emperor Caracalla and his mother. Most sources place the objects provenience near the Temple of Aphrodite, though the lack of clarity in the

object's findspot leaves this attestation unsure. The simple Greek inscription (BE 56, 254)¹⁸³ names the emperor and his mother as dedicatees of the device, though does not name a donor. The object is also unusual in its alphanumeric labelling for each hour of the day, with the space between hour lines filled by a single Greek character.

The device dedicated to Macrinus (#600), known from an inscription (*CIL* XIII 7800)¹⁸⁴ describing repairs undertaken circa 218 CE, was funded by Petronius Athenodorus, the prefect of the *Cohors i Flavia* stationed at the Roman fort at Rigomagus. The need for repairs worthy of a dedicatory inscription again suggests a water clock, particularly since the inscription specifically mentions the old age of the device as a reason for its disrepair. The repairs were funded by a single donor, rather than the publicly funded model seen in the examples above, though this type of individual funding is the most common in the Roman world (i.e., individual donors funding repairs or embellishments of existing structures) (Zuiderhoek 2013: 23). The dedication here does, however, situate the praefect in within the broader regional administration, pointing out his subservient position to the governor of the province in which he is stationed, *Germania Inferior*. A position within the Roman military entailed a particular relationship to hourly time, as coordinated action was highly emphasized

¹⁸³ Αὐτοκράτορι Καίσαρι Μ(άρκῳ) Αὐρ(ηλίου) Σεουήρῳ Ἀντωνείνῳ Σεβ(αστῶ) και Τουλία [Σ]ε[B]αστῇ μητρ[ι] [κάστων-----]

¹⁸⁴ ...Diadumeniano] / [[nobil[issimo Caesare]]] / sub c[ura][----] / leg(ati) Au[g(usto) n(ostrum)] pr(o) pr(aetore), agens Pe / tronius Athenodorus prae[f(ectus)] / coh(ortis) I Fl(aviae) horologium ab ho / ris intermissum et vetus / tate co(n)labsum suis inpendi(i)s / restituit [(Imp(eratore) d(ommo) n(ostro) Macrino Aug(usto) II co(n)s(ule)]]].

and military records show some of the most explicit engagements with the hour in record keeping that survive from antiquity. The added responsibility over hourly time held by the *horologiarius*, a figure responsible for keeping the time at military installations, will be discussed in the next section of this chapter.

A further association between emperors and timekeeping can be seen in the dedicatory inscription of a *horologium* at Zarai (#978) in modern-day Algeria, where the gift was said to have been made “in the flourishing age of Maximinus Augustus and Maximus Caesar” (CIL VIII 04515)¹⁸⁵ though here the reign in question serves as a temporal marker itself rather than an explicit connection between the emperor and time. The dedication is also notable in that it names two individuals, Caius Julius Saturninus Messapanus & Quintus Canneius Gemmelinus, only as “fellow citizens” of the city. Further, the two are said to have donated the timekeeping device in fulfillment of a promise. The inscription also names the sitting consuls at the time of installation, which is identified as March 26th. While the “promise” laid out at Uchi Maius can reasonably be associated with the duties of the official funding the installation, two citizens of unclear rank and position make the motivations less clear. The same logic from Uchi Maius may well apply at Zarai, wherein the city was in need of timekeeping

¹⁸⁵ Florentissimo / saeculo dd(ominorum) nn(ostrorum) Imp(eratorum) / [[[Caes(aris) Maximini]]] / Pii Felicis [et] / [[[Maximi nobil(issimi)]]] / Caes(aris) Augg(ustorum) hor(o) / (lo)gium quod sua / ex sponte C(aius) Iulius Maxi/mi filius Saturninus / Messapanus et Q(uintus) Can/neius Q(uinti) Cannei Ge/mellini filius Eme/ritus Ap(r)onianus / civibus suis vo/verant de suo / dederunt et / dedicaverunt / VI Kal(endas) April(es) Per/petuo et Corneliano cons(ulibus)

infrastructure to fulfill obligations and the donors, though their office(s) go unnamed, may have been obligated to fulfill this need. The two may also have seized on an existing need in the community as an opportunity to increase their own profile, or for the purest intentions of euergetism. In addition to these potential motivations, Chapter 5 argued that similar gifts were pursued out of a self-interested pursuit of gentrification by local elites; donors sought to embrace the cosmopolitan practices of the core and raise the standing (and value) of their city. At the very least, the inscription shows that the power structure was intimately involved in the requesting, funding, and construction of such devices. Even in far-flung Zarai, on the western edge of the province of Numidia, it remained worthwhile to explicitly connect the emperor with the gift of a timekeeping device. If the goal of these two citizens was to establish their own *munificentia*, they also thought it best (or were obligated) to use the inscription to illustrate their dutiful execution of the Caesar's and the consuls' wishes.

Finally, the emperor can be found on objects never intended for public display, as an inscribed portable sundial (#640) recovered from the environs of Rome illustrates. The object, a bronze geographic portable dial, has a separate lid that resembles a medallion coin of the emperor Commodus. The lid bears a bust of the emperor surrounded by the inscriptions "M COMMODVS ANTONINVS PIVS FELIX AVG BRIT," a string of titles that date to the period after 185 CE when Commodus adopted the title Felix. The particulars of the inscription also suggest that it is a later imitation of

a coin from Commodus' reign, as the copied image belongs to coins predating the title listed here (Talbert 2017: 28). The use of the likeness and name of an emperor not through the simple reuse or recycling of an existing medallion, but through an intentional act of imitation, further argues for the ideological connection between the emperor and the hour; a repurposed coin could be argued to have merely been an expedient base for the portable dial.

Offices Responsible for Timekeeping

Naming or copying the likeness of an emperor on a timekeeping device situated those objects within the complexities of Roman authority. The hierarchies of ancient Rome, though, included a cast of characters much wider than only the emperor and his family. Inscribed timekeeping devices give a glimpse into which individuals in Roman society were most responsible for the implementation and upkeep of hourly time infrastructures, at least in the public realm. As with most donated objects or services in the public realm, it was local elites behind the vast majority of construction projects. Winter (2013: 173-179) compiled the names and positions of individuals associated with timekeeping devices, documenting 64 such inscriptions. This work presents 74 such inscriptions, as further examples have come to light since Winter's publication. Further, however, it is possible to look more in-depth at the people involved in commissioning timekeeping devices, particularly to identify specific interests in maintaining infrastructures of hourly time among ancient donors.

The notion of identifying the powers of an office that led to the installation of a timekeeping device has been broached previously in this work, notably through a discussion of the *subpraefectus* Mapilius Mapilianus named on a calendrical clepsydra (Chapter 4) and the *magister vici* Gaius Cartilius Heracleo who donated a *horologium* to a *compitum* shrine at Ostia (Chapter 6). A more systematic investigation of the offices present among named donors allows deeper insight into the administrative interest in hourly timekeeping as well as the social relations expected to be shaped by the donation of a timekeeping device. In the above examples, Mapilius Mapilianus engaged with hourly time explicitly in the interest of water management, be it for a bath complex or wider urban system, and Gaius Cartilius Heracleo provided a service to his *vicus*, a neighborhood that may have had few other options for installations tracking hourly time. It is worth noting that Winter's work addresses this concept at a broad scale, using the changes in named offices between Hellenistic and Roman times to show a move toward civic investment in timekeeping infrastructure and even exploring the office of the *Pontifex Maximus* as a leading justification for emperors' interest in hourly time. Rather than discounting this work, the aim here is to supplement it by furthering the discussion with the pieces of new evidence that have since come to light and with increased attention to the specifics of other offices and their interest in timekeeping.

ID	Site	Century	Name	Office	Context
82	Athens	4th BCE	Ἀντιοχίδος	Phyle	Agora

470	Pergamon	3rd BCE / 2nd BCE	Ἀππελλης	Agoranomos	Agora
14	Aletrium	2nd BCE	Lucius Betilienus Luci	Censor	Macellum
160	Claros	2nd BCE	?	Agoranomos	Temple?
206	Delos	2nd BCE	Ξενομήδης Ἀριστίππου	Gymnasiarch	Gymnasion
215	Dion	2nd BCE	Titus Granius Felix	Aedile	Temple of Dionysus
335	Lefkada	2nd BCE	Ἀπολλωνίδας	?	Unknown
369	Mevania	2nd BCE	Nortinus & Aufidius	Quaestor Farrarius	Public
513	Pompeii	2nd BCE	Maras Atinius	Quaestor	Baths
555	Priene	2nd BCE	Ἀθηνοπολις Κυδίου	Priest of Dionysus	Theater
557	Prosymna	2nd BCE	Θαλεια	Priestess of Hera	Temple
633	Rome	2nd BCE	Publius Cornelius Scipio Nasica	Censor	Forum
660	Samos	2nd BCE	Ἀριστομένης Ἀριστιππου	Agoranomos	Agora
984	Bulla Regia	1st BCE	Livineius	?	Forum
168	Curubis	1st BCE	Lucius Sertorius Alexander & Lucius Vitruvius Alexander	Aedile	Forum
192	Delos	1st BCE	Νίκιας	?	Serapion
233	Ephesos	1st BCE	Τίμων Ἀρτεμιδώρου	Agoranomos	Agora
285	Igaeditani	1st BCE	Quintus Tallius Sexti	?	Forum
286	Imbros	1st BCE	Λυσαγόρας Ἡγησίνου	Phyle	Temple of Theoi Megaloi
323	Kos	1st BCE	Φίλιππος Αυτοψώντος	?	Funerary
336	Lemnos	1st BCE	Δέξιππος Παγχάρου Παιανεύς	Kosmet	Temple
360	Marruvium	1st BCE	Quintus Fadius & Quintus Munantius	Triumviri	Forum
413	Nola	1st BCE	Caius Catius	Quattuorvir	Forum
433	Oropos	1st BCE	Ίάσων Ίάσονος Ἀζηγιεύς	?	Temple

1000	Ostia	1st BCE	Gaius Cartilius Heracleo	Magister Vici	Compitum
643	Rome	1st BCE	Augustus	Caesar, Pontifex Maximus	Campus Martius
736	Tivoli	1st BCE	Titus Herennius Lucius	Triumviri	Forum
101 2	Rome	1st BCE	Quintus Pactumeius	Consul	Unknown
2	Ad Dumayr	1st CE	runs' br nln	?	Temple
19	Alife	1st CE	Caius Popillius Philodespotus	?	Forum
39	Antioch	1st CE	Vespasian	?	Agora
124	Boutae	1st CE	Caius Blaesus Gratus	Legionary	Forum
201	Delos	1st CE	Κομπεταλιασται	Compitaliasts	Agora of the Compitaliasts
380	Milos	1st CE	Σωρεϊνιανός	Archon	Agora
407	Narona	1st CE	Lucius Lusius Nic[--] & Q.Hernnius Eup[--]	?	Funerary ¹⁸⁶
409	Nemausus	1st CE	Sextus Utullius Perseus	?	Temple
100 8	Nikaia	1st CE	Αἰλιανός Ἀσκληπιόδοτος	Gnomoniko s	Unknown
414	Nomentum	1st CE	?	Procurator Provincarum & Praefectus Vigilum	Forum
449	Pagus Laebactium	1st CE	Sextus Paeticus Quinti & Sextus Paeticus Sexti	?	Public

¹⁸⁶ The inscribed sundial from Narona was recovered from the grounds of a later Christian church, leaving the exact installation context unclear. However, the church lies outside of the Narona city walls and in the area of a known ancient necropolis (Manenica 2017: 206-207). Manenica (ibid.) also suggests the device could come from an extramural *villa rustica*, though the necropolis offers the more likely option.

539	Pompeii	1st CE	Lucius Sepunius Luci & Marcus Herennius Auli	Duumviri	Temple of Apollo
540	Pompeii	1st CE	Lucius Sepunius Luci & Marcus Herennius Auli	Duumviri	Triangular Forum
552	Puteoli	1st CE	Tiberius Caesar Augustus	Caesar	Forum
646	Rome	1st CE	Titus Cocceius Ga & Titus Cocceius Patiens	Quaestor	Funerary
697	Sulci	1st CE	Lucius Aemilius Saturnius	?	Forum
702	Surrentum	1st CE	Caesar, Pontifex Maximus		Forum
709	Tarragona	1st CE	Quintus Murrius Thales	?	Forum
960	Veleia	1st CE	? son of Sabinus	Pontifex, Duumvir, Tribune	Forum
967	Vienna	1st CE	Collegium of Seviri Augustales	Seviri Augustales	Forum
48	Aphrodisias	2nd CE	to Caracalla & Julia Domna	?	Forum
999	Apulum	2nd CE	Marcus Ulpius Mucianus	Legionary, Horologarius	Temple ¹⁸⁷
110	Bad Canstatt	2nd CE	Lucinius Martinius Tacitus	?	Unknown
267	Heraclea Lyncestis	2nd CE	Lucius Marius Luci	?	Forum
331	Lambaesis	2nd CE	?	Aedile	Unknown
347	Loutra	2nd CE	Διογένης	Owner of the house	Unknown
365	Megina	2nd CE	Marcus Iucundus & Victoria	?	Forum
377	Miletus	2nd CE	Ἐλπιδοφόρος Ἀγαθίου Μοσχίων	Architect	Theater

¹⁸⁷ Winter (2013: 273) categorizes the findspot as a forum or other open space, however the inscription itself relates the donation to a Temple of Jupiter: "I(ovi) O(ptimo) M(aximo) et Iunoni Regin(ae) pro sal(ute) Imp(eratoris) M(arci) Aur(elii) Anlonini pii Aug(usti) et Iuliae Aug(ustae) matris Aug(usti) M(arcus) Ulp(ius) Mucianus mil(es) leg(ionis) XIII Gem(inae) horologiar(ium?) templum a solo de suo ex voto fecit Falcone et Claro cons(ulibus)."

412	Nikopolis	2nd CE	Σέξτος Κομείνος Σούπερβος & Κλαυδία Νευκεψορις	?	Unknown
418	Numlulis	2nd CE	Cornelius Antonius	?	Forum
478	Pergamon	2nd CE	Π. Αἴλιος Ἰνγλενους	?	Asklepion
479	Pergamon	2nd CE	Τιβ. Κλ. Νεικομήδους υἱόν Κυρεῖνα Πιον	Tribune	Forum
714	Teaum Apulum	2nd CE	Euelpistus Augusti	Dispensator	Praetorium
742	Tralles	2nd CE	Markus Sitirius Thyrsus	?	Forum
752	Tucci	2nd CE	Marcus Valerius Marcellus	Duumvir	Theater
756	Uchi Maius	2nd CE	?	Magister Pagi	Forum
989	Unknown	2nd CE	Mapilius Mapilianus	Subpraefectus Aquarum	Unknown
971	Volterra	2nd CE	Quintus Poena Aper	Quattuorvir & Aedile	Public
411	Nikaia	3rd CE	Aurelius Marcianus	Horologarius	Forum
469	Pautalia	3rd CE	Λαομέδων & Γλαυκίας	Architects	Forum
600	Rigomagus	3rd CE	Petronius Athenodorus	Praefect of the Cohort	Fort
978	Zarai	3rd CE	Caius Julius Saturninus Messapanus & Quintus Canneius Gemmelinus	Citizens	Forum
95	Athens	4th CE	Φαῖδρος Ζοῖλου	?	Unknown
723	Thessalonik i	5th CE	Βιταλιανός	Decan	Church
219	Dougga	Unkno wn	Modia Victoriana	?	Unknown
1001	Saldae	Unknow n	?	Aedile	Temple? ¹⁸⁸

¹⁸⁸ This inscription was recovered during the construction of a presbytery in the late 19th century (Baratte & Bejaoui 2004: 1144), though its use context is unclear. Bonnín (2015) believes the device to have been related to a temple.

Table 7.I - Table of timekeeping inscriptions with donor names and/or offices.

Functional devices with dedicatory inscriptions and/or inscriptions separated from functional devices comprise 71 inscriptions that retain either or both of the donors name and office or position they held (Table 7.I). This list includes 4 additional inscriptions to that produced by Winter (2013: 173-177), though of these only two provide an associated office: the *magister vici* Gaius Cartilius Heracleo from Ostia (discussed above in Chapter 6) and an *aedile* from Saldae, modern Algeria, whose name is not preserved on the fragmentary inscription. The relevant inscriptions span from a lone outlier from 4th century BCE Athens to a similar outlier in 5th century CE Thessaloniki. The practice of naming individuals and/or their offices on *horologia* increase through the 1st century CE, with a slight decline in the 2nd century CE and a significant drop after that point (Figure 7.2, below).

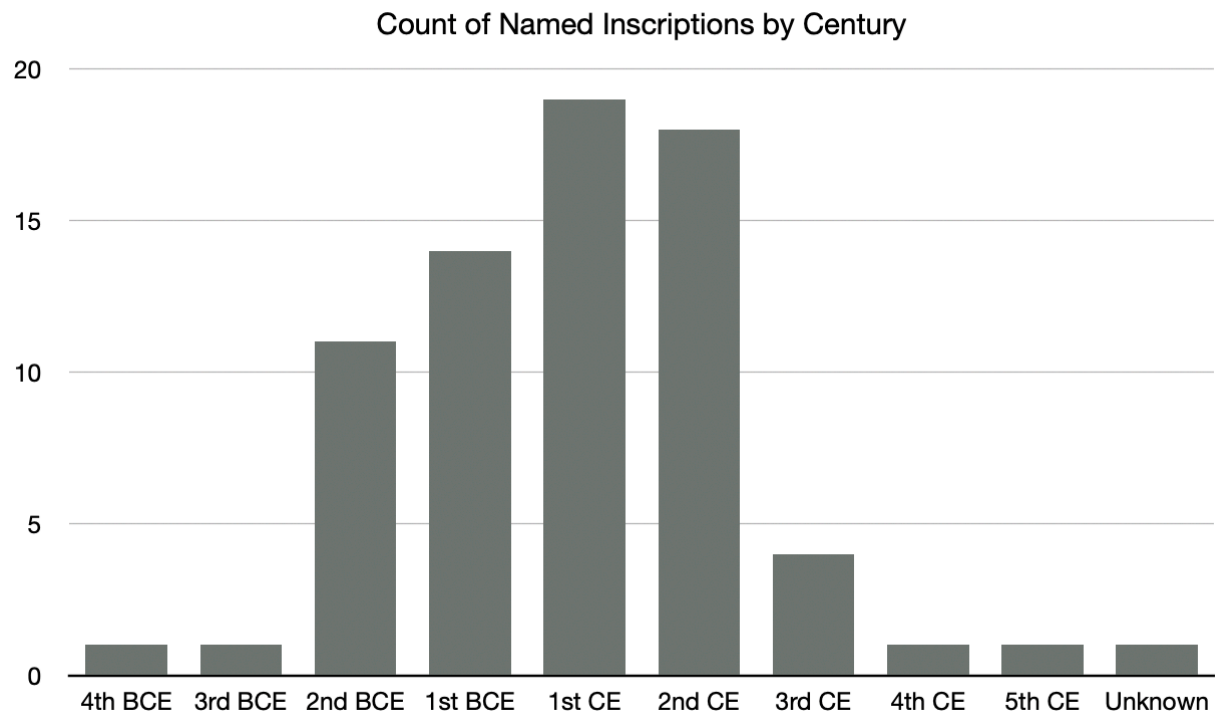


Figure 7.2 - Timekeeping inscriptions with name and/or office, by century.

The practice of naming donors and their offices generally increases under Roman domination, as the number of such inscriptions grows with imperial expansion (Figure 7.3). The Hellenistic period sees a concentration of such inscriptions in mainland Greece and on the western shores of Anatolia, with 8 examples from the 2nd century BCE or earlier, though an additional 4 inscriptions from the this period are also found in peninsular Italy. Central Italy provides the densest corpus of these inscriptions, likely at least partly influenced by preferential preservation in Rome and its environs. The area is particularly active in the 1st BCE - 1st CE, with 12 of the inscriptions between Rome and the Bay of Naples. The 1st century CE also sees the expansion of the practice to the north and east, with central Italy falling off as the site of such inscriptions by the 2nd CE. The

2nd century CE sees relevant inscriptions in both the north and south of the empire, as well as a renewed presence in Greece and Anatolia. There is a drop off in the 3rd CE, with only 3 inscriptions after the 18 dating to the previous century. Of the inscriptions listed here, only that at Saldae cannot be at least generally dated, given its exclusion from the *CIL*, lack of published images, and no known attempt to date the letterforms of the highly fragmentary inscription (Baratte & Bejaoui 2004: 1144).

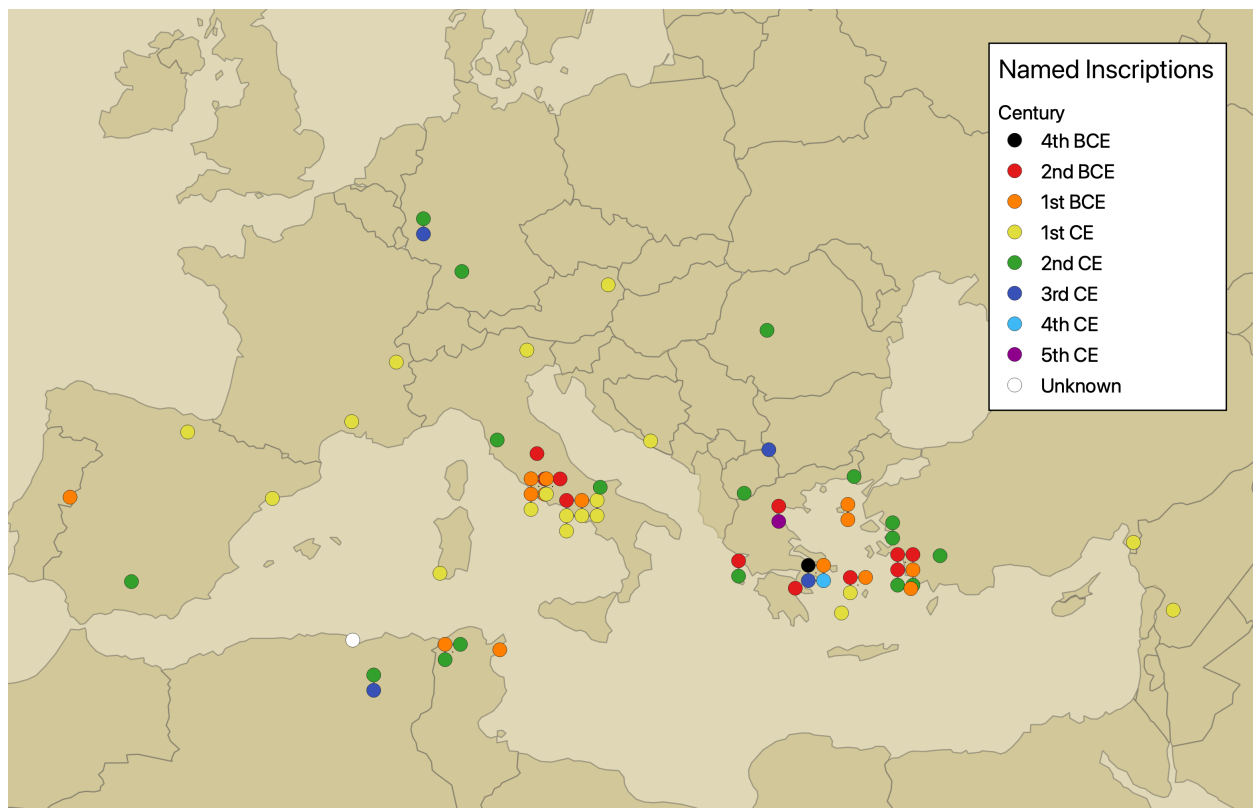


Figure 7.3 - Map of inscriptions with named individuals and/or offices, by century.

The contexts of the majority of inscriptions can be generalized to open public space (either agora, forum, or public placement in general) due to the nature of the dedications. Thirty-seven of the inscriptions fall into this broader grouping of open

space, though some of the objects do have more specific known locations (i.e., device #540 from Pompeii is known to have come from a *schola* bench in the Triangular Forum). Thirteen of the inscriptions come from religious sites, including temples, shrines, a Late Antique church, and so on. Again, some of these have specific known contexts while others come from either unattributed temples or can be associated with religious places through the text of the inscriptions.

Of the 71 inscriptions here, a total of 30 different positions or affiliations are preserved. Some of these titles occur more than once, or are present in multiple variations (i.e., *quaestor* vs. *quaestor farrarius*). Among the named positions, two are used only in reference to emperors: *Caesar* and *Pontifex Maximus*. The other named positions include: *Agoranomos*, *Gymnasiarch*, *Priest*, *Priestess*, *Kosmet*, *Aedile*, *Quaestor*, *Censor*, *Duumvir*, *Triumvir*, *Quattuorvir*, *Magister Vici*, *Legionarius*, *Procurator Provincarum*, *Tribune*, *Horologarius*, *Dispensator*, *Magister Pagi*, *Subpraefectus Aquarum*, *Praefect Cohors*, *Praefectus Vigilum*, and *Decan*. The list also includes titles that do not reflect official offices, including “Owner of the house,” architect, and “fellow citizen.” Finally, the list includes three group titles naming the affiliation of a donor or a corporate donor: *Phyle*, *Compitalist*, and *Seviri Augustales*. The remainder of this chapter will explore those positions with clear interest in the establishment of timekeeping infrastructure.

Hellenistic Offices

Hellenistic practice for the dedication of timekeeping devices differed from Roman, as before the late 2nd century BCE inscriptions on or about such devices named the lines, described how the sundials should be read, and explained that they were given as votive offerings (Schaldach 2016: 77). These practices did not disappear entirely with the rise of Roman authority across the Mediterranean, but were rather displaced as the most frequent formulations by epigraphs focused on the act of giving timekeeping devices, particularly those given for secular reasons. Timekeeping devices were increasingly reported as being the gifts of specific benefactors in order to either contribute to the public good or to honor another citizen under the Romans.

This is not to say that the office of a particular individual was of no interest in Hellenistic practices of inscribing timekeeping devices. Several figures are named in connection with the gifts they gave leading up to or in the course of their official positions in Hellenistic contexts. Claros provides an example of this Hellenistic paradigm, with an inscribed conical dial (#160) inscribed as a gift to Dionysus from an unnamed agoranomos. This inscription is unfortunately lost, only being reported in association with the dial by Akurgal (1978: 139) as “an inscription to the effect that [the sundial] was donated by the agoranomos in Hellenistic times.” Other 2nd century BCE examples from the eastern Mediterranean follow a similar pattern, such as an inscription from Priene (#555) naming one Athenopolis, a priest of Dionysus, as

consecrating a sundial in that god's name or at Prosymna (#557) where a Priestess of Hera created an unusual globe sundial to "give the hours of the sun to mortals" (SEG XI, 304).¹⁸⁹ It is worth noting, however, that though part of the inscription from Prosymna can be dated to the 2nd century BCE by letter forms, the dedication appears to have been added later (Blegen 1939: 444).

Hellenistic inscriptions for timekeeping devices were not only written to announce which god was being honored by the construction of a device, however. Perhaps the clearest, and earliest, example of the installation of a timekeeping device being related to the duties of a specific office comes from Pergamon (#470), dated to either the 3rd or 2nd century BCE. While the associated device no longer survives, an inscribed base block relates that the *agoranomos* Ἀππελῆς donated a water clock in the form of a statue of Hermes (SEG 28, 967).¹⁹⁰ The statue held a cornucopia, from which water would flow at particular times during the day. Conze (1884: 10) argues that this timed flow of water, which would make the device function as a sort of timekeeping device even if it did not fully track the hours of the day, was specifically employed to enforce regulations on activities at the market. Such regulations were the responsibility of an *agoranomos*, thus illustrating an early interest in providing timekeeping devices in

¹⁸⁹ Ἡρῆς ἱεροπόλος με θεῆς ἀνέθηκε Θαλεία ἡλιακῶν ὥρῶν ἄγγελον ἡμερίοις

¹⁹⁰ Ἀγ[ρ]ονόμο[ος δά]μου πάσαι χ[ώ]ραι τότ[ι] Ἀπελλῆς / [ἦν, ὅ]τ' ἀειμνά[σ]του, ξεῖν', ἀ[γορα]νομίας / [μάρτυρα κρηνα]ίαις με διάκτορον εἶσατο Νύμφαις / [Ἐπιμῆ]ν εὐνομίας αἰδίομ φύλακα / [τᾶς] ἔνεκ' εὐόλβου κέραος ῥύοις ἅδ' ἀγοραίοις / μανύσει τακτοῦ τέρμα χυθεῖσα ξπόνον.

furtherance of one's official duties. This type of explicit connection between the duties of an office is invaluable in exploring the trends in later timekeeping inscriptions, as the relationships are not often as explicit but a connection between role and interest in timekeeping can be inferred. As another example, though one wherein the direct purpose of the timekeeping device isn't made explicit, an inscription from Delos in the first half of the 2nd century BCE names the *γυμνασίαρχος Ξενομήδης Ἀριστίππου* as the donor of a sundial. As the head of a gymnasium, this figure would be responsible for the proper education of youths, which would certainly include the underlying sciences behind timekeeping and, perhaps more relevantly, would instill time discipline.

Financial Roles: Quaestor & Procurator Provincarum

The office of the *quaestores*, the lowest position on the *cursus honorum* that a young Roman elite would pursue on his way to becoming a senator, serves as a marker for the transition toward an even greater emphasis on position in the donation of timekeeping devices. A *quaestor's* interest in timekeeping is borne through his role in managing financial matters; rather than enforced timing being explicitly valuable to the task of managing civic funds, the *quaestor* was in the position to make the construction of a timekeeping device happen after one had been requested or demanded by other authorities. The *quaestor* Maras Atinius of Pompeii has an elevated position in the literature on Roman timekeeping, as the inscription bearing his name in Oscan script at the Stabian baths in Pompeii (#513) marks a transition in the epigraphic record of

timekeeping devices toward donation of the devices as a civic project, rather than as votive offering (Schaldach 2016: 77). The implication of a *quaestor* in this process is not surprising, as the office was charged with the implementation of building projects and the distribution of city funds. While the *quaestor* may have thus had no personal or professional stake in building the timekeeping infrastructure, it came to his office to make the decision to construct such devices by other civic authorities come to fruition. The position did, however, have a vested interest in dutifully carrying out their charges as evidence of the holder's honor.

Another early example of the involvement of *quaestores* in the construction of timekeeping devices comes from Mevania (#369). Here, an Umbrian inscription refers to the donors of the sundial as *quaestores farrarii*, or *quaestors* of the grain supply. The exact relationship of that particular role and timekeeping is again unclear, though may have served as an added honorary title for *quaestores* Nortinus & Aufidius.

The last reference to *quaestores* related to timekeeping comes from Rome, with an inscription from a grave stele (#646) listing the features of a tomb that include a *horologium*. The tomb belongs to freedmen Titus Cocceius Gaa and Titus Cocceius Patiens, both of whom served three terms as *quaestores*. In addition to the decoration of the tomb, the pair also improved the surrounding area by planting vines and fruit trees. As discussed in the previous chapter, tomb decorations at this point in Roman history were generally public facing, meaning that the *horologium* here would have been open to

public view and provided as a sort of public service. Along with the *magister vici* Gaius Cartilius Heracleo at Ostia, the pair also serve as an example of freedmen using the gift of timekeeping devices to both build their own profile and provide a service to the surrounding community, taking advantage of the new social mobility won through Augustan reforms.

A single timekeeping device was also donated by an unnamed *Procurator Provincarum* at Nomentum in the 1st century CE. The inscription (#414) is unfortunately highly fragmentary, though does mention emperor Tiberius, thus setting its date fairly firmly. The office of *procurator provincarum* was that of the lead financial officer of Roman provinces and answerable directly to the emperor. The inscription also includes a fragmentary reference to a *praefectus vigilum*, the lead position of the cohorts of fire fighters (*vigiles*) established by Augustus in 6 BCE. The *procurator* was surely under similar pressures as the *quaestores* in fulfilling charges to undertake particular construction projects, and the example of Tiberius' gift of a *horologium* to Puteoli shows that even orders directly from an emperor could lead to the construction of a timekeeping device. As was also argued earlier in this chapter, the obligation to construct a timekeeping device could have come from the necessity of hourly timekeeping infrastructure in the administration of other laws. The implication of the *praefectus vigilum* may be a hint toward that type of motivation here, with the

enforcement of hourly restrictions by the *vigiles urbani* the impetus to install a timekeeping device.

Aediles

Aediles have a particularly longstanding relationship with donated timekeeping devices, as the office credited with such gifts in the 2nd BCE (#215 - Dion), 1st BCE (#168 - Curubis), 2nd CE (#331 - Lambaesis & # 971 - Volterra), and in the lone undated inscription from Saldae (#1001). From the Republican period, *aediles* held a range of responsibilities including supervision of the streets, temples, and quarters of Rome. Their power generally grew throughout the centuries, with increasing responsibilities over time. Augustan reforms to the office more clearly outlined some of their tasks, which included the upkeep of public buildings, cleaning of the streets, policing the city, and the administration of markets and games. Cicero (*Legg.* III. 3, 7) describes the powers of the office in three main categories: as curators of the city, of the markets, and of the games. Of these roles, the *curatores urbis* present the clearest connection to an interest in timekeeping. Particularly an interest in the regulation of traffic connects to known uses of timekeeping in Roman law through the restriction of cart traffic to particular evening and night hours discussed in the previous chapter.

In addition to making possible their own enforcement of these specifically temporal regulations, installing public timekeeping devices allowed individuals to police themselves temporally. Again traffic regulations stand as an example, as the use

of the 10th hour rather than nightfall makes adherence to the law require a knowledge of the time in hours rather than only following natural signals. The start of the allowed window for cart traffic would be in some ways enforceable regardless of the public's knowledge of hour as city gates could simply bar this type of traffic from entering the city, however not all cart traffic would be originating from outside city walls.

In addition to their enforcement capacities, the other responsibilities of an *aedile* would also benefit from a populace informed of the time, especially where that populace also respected the time discipline of idealized schedules. Their role in organizing games, for example, would surely employ hourly time in some capacity despite a lack of records specifically exploring the topic. Crowds reportedly arrived at dawn or shortly after to view games (Suet. *Claud.* 34.2), which they could accomplish without measured hours, but there were other aspects of a day at the games that did use hours, such as the reported customary break at the sixth hour (Suet. *Claud.* 34.2; Dio 37.46.4). Laurence (1996: 107) has also argued that Horace's (Hor. *Epist.* 2.1.189) definition of a performance as lasting four hours allows an even more specific timetable for civic events: in order to break at the 6th hour a four hour event would begin at the 2nd hour, and after resuming following the 6th hour break would run again from the 7th to the 11th hours. Any contemporary viewer of sport or performance knows full well that arriving exactly at start time leads to a much less pleasant experience, so Suetonius' comments on dawn arrivals may simply reflect an ancient desire to "beat the crowd"

similar to what we experience today. These uses of hourly timekeeping are often obscure in the historical and archaeological record, though this type of reconstruction of schedules shows why *aediles* had a vested interest in contributing to the infrastructure of hourly time.

Duumviri, Triumviri, & Quattuorviri

While the *duumviri* in Rome were originally a political office charged with trying judicial matters, those attested among the inscriptions here clearly served as *duumviri municipales*, the highest office in civic administration in colonies and municipal communities. Similarly, the *triumviri* and *quattuorviri* attested on timekeeping devices represent civic officers charged with the administration of *municipales*. *Duumviri* in these contexts were “the colonial equivalents of consuls” (Bunson 2012). Roselaar (2016: 126) describes the responsibilities of the *duumviri* as such:

Local jurisdiction; presiding over elections and meetings of the local council and popular assembly; approving the manumission of slaves and appointing guardians; celebrating games and dramatic performances; arming and commanding the people; leasing out the collection of taxes and revenues; witnessing wills, et cetera.

This list of duties again includes several instances wherein maintaining the infrastructure of hourly time would benefit both the office holders and the activities in their remit. The celebration of games and dramatic performances was discussed above in relation to *aediles*, an overlap in duties that makes sense given the close association of *duumviri* and *aediles* given that the two pairs usually worked in tandem. The paired responsibilities of *duumviri* and *aediles* also offers an explanation for the inclusion of

quattorviri in the inscriptions under study here, as the latter term likely refers to the two pairs of these positions as a single unit (Roselaar 2016).

In addition to the benefits of hourly time for the conducting of games and dramatic performances, the inclusion of local jurisdiction and the meetings of local councils and assemblies also show clear investment in hourly time. The law courts are notably tied to hourly time both in defining their typical periods of operation and in the management of the cases brought before the court. Courts came into session beginning at the 3rd hour (*Mar.* 4.8), marking a clear starting point that, similar to hourly restrictions on traffic, was divorced from observable natural phenomena without the intervention of devices of hourly time.

The *Colloquium Harleianum*, a language guide for ancient students learning Latin, offers some example of disputes being settled at other hours, but frames such instances as remarkable. The *colloquium* begins with an exhortation from father to son to prepare for the day, and in the son's response he remarks on the unusual start of his father's day at the first hour:

προσηγορεύθη ὑπὸ τῶν	Salutatus est a	He was greeted by the
ἀρχόντων καὶ ἐπιστολὰς	magistratibus et epistulas	magistrates and he
ἔλαβεν ἀπὸ τῶν κυρίων	accepit a dominis meis	received letters from my
τῶν ἐμῶν τῶν	imperatoribus; et continuo	masters the emperors; and
αὐτοκρατόρων· καὶ	ascendit in templum et	immediately he went up to
εὐθέως προῆλθεν εἰς τὸ	immolavit pro aeterno et	the temple and made a
ἱερὸν καὶ ἔθυσεν τῷ	victoria imperatorum, et	sacrifice for the eternity
αἰωνίῳ καὶ τῇ νίκῃ τῶν	descendit. hodie autem	and victory of the
αὐτοκρατόρων, καὶ	condictiones audit ab hora	emperors, and [then] he
κατήλθεν. σήμερον δὲ	prima.	came down. But today he
διακρίσεων ἀκούει ἀπὸ		is hearing disputes from
ῥᾶς πρώτης.		the first hour.

(H. 9b-e, trans. Dickey 2015: 22)

While it is easy to imagine this discourse preparing a young Roman for life in a new province, or at least a new role for their father in the administration of justice, it remains noteworthy that a day hearing disputes would begin at a time other than the 3rd hour. There was surely also variation in practices across the temporal and spatial span of the empire, but even if hearing disputes at the first hour was normal practice for

the father in this scenario the courts relied on hourly time in other ways. The courts used clepsydrae to track speaking time allotted in judicial matters, though Allen has argued that even this usage was subservient to the constant daylight hours as tracked by sundials (1996: 164-165). Regardless of the role of water clocks within proceedings, the beginning of the day at court clearly depended on the synchronized timekeeping of sundials and public water clocks, and it was to these devices that observers and participants sent their charges to assess the current time (Cic. *Brut.* 200)¹⁹¹.

Maintaining the appropriate hours for court would have been dependent on a functioning infrastructure of hourly time, as both presiding officials and parties to the various complaints being heard would need to synchronize their actions. The special instance presented in the *Colloquium Harleianum*, rather than throwing doubt on the regular functioning of the courts, highlights the importance of hourly time in such proceedings: arriving at the first hour to hear disputes would be a waste of time if all parties were not both aware of the special temporal circumstances of the meeting and able to attend them in a timely manner. This value is even more pronounced where courts meet at an hour that doesn't correspond with the rising of the sun.

The timing of senate or council meetings, presided over by the *duumviri*, were less dependent on specific cues of hourly time. Gellius (Gell. *NA.* 14.7.8) reports that a

¹⁹¹ Videt oscitantem iudicem, loquentem cum altero, non numquam etiam circulantem, mittentem ad horas, quaesitorem ut dimittat rogantem: intellegit oratorem in ea causa non adesse qui possit animis iudicum admoveere orationem tamquam fidibus manum.

decree of such bodies was only valid if adopted between sunrise and sunset, though these could be observed without the aid of timekeeping devices. Public business in general, into which we can include senate and council meetings, generally took place in daylight. Rather than a strict hourly limitation, the beginning of the public day was dependent on the reading of auspices, which if bad could push back the start of the official day (Laurence 1996: 105). A *duumvir*'s interest in timekeeping may overlap with the communication of the current time, as surely some local office was responsible for criers or horn blowers or any other such temporal announcements made throughout the day, though this responsibility is not clearly attributable to one office or another.

Duumviri or *aediles*, in their various responsibilities for maintaining the order and functioning of a city, are strong candidates for administering this practice.

Censor

Two censors associated with timekeeping devices appear in the epigraphic record, both dating to the 2nd century BCE. The first, Publius Cornelius Scipio Nasica, gave the large water clock in Basilica Aemilia in Rome in 159 BCE (#633), and the second, Lucius Betilienus Luci, is named on an inscription from Aletrium dating between 149 -90 BCE (#14). That both of the censors associated with sundials come before the rise of Augustus makes sense, as the title was assumed by emperors who coveted its capability to appoint and purge senators. In the Republican period, however, the office was primarily associated with the census and the maintenance of the rolls of

citizens and senators. Even before Augustus, Sulla sought to strip powers from the office, though the named individuals here again predate this change.

The role of hourly time in the census is unclear, though other responsibilities of the office may have led to an interest in contributing to the hourly timekeeping infrastructure. Prior to the Augustan establishment of the *curatores aquarum* in 12 BCE, the censors were responsible for Rome's water supply. The placement of both devices, the first in the *Forum Romanum* and the second in the *macellum* of Aletrium, do not have clear connection to the administration of urban water supplies. It is perhaps noteworthy that the *Basilica Aemilia* abutted Rome's *macellum* on its rear side, and so the placement of both devices may have been intended to organize market activities. Control of city water supplies may have influenced Publius Cornelius Scipio Nasica in constructing a water clock, though a prominent water clock at city center is also not out of character for timekeeping generally and particularly so at the time. Ultimately, the prominent display of these devices in central locations may have been enough of a motivation for donating a timekeeping device, as both were at places central to the administration and functioning of their respective cities.

The inscription naming Lucius Betilienus Luci provides a rather comprehensive list of his gifts to the city, which helps further situate his gift of a *horologium*. The inscription reads:

Lucius Betilienus Luci, son of Varus, paid for the following measures, which are listed below and which were to be carried out in accordance with the decision of the city council: the paths within

the city, those portico leading to the town, the field where games are held, the horologium, the macellum, the new plastering of the basilica, seats, the bathing pools (the thermal baths), the pool at the city gate, as well as the water pipes within the city, the arches on one range of 340 feet and permanent (lead) pipes. That is why he was appointed censor twice, and the city council gave (his) son this term of service and the people's assembly had him erected a statue of honor as 'ensorious' (CILX 5807, trans. based on Winter 2013: 255).¹⁹²

This lengthy list of contributions presents another possible interest for a censor in donating a timekeeping device: building his personal profile in order to become a censor in the first place. The inscription notes that Lucius Betilienus Luci was made censor twice because of his accomplishments and gifts to the city. The *horologium* itself may have been given while holding a lower office, or simply as part of a broader program of civic beneficence in order to gain recognition and appointment to higher office. This inscription appears to announce both sets of characteristics discussed above in relation to the motivations for civic munificence; Lucius Betilienus Luci both exhibited the traits of *liberalitas* and *munificentia* of those that selflessly gave to the city, but his giving also proved his qualifications of *probitas*, *honestas*, and *integritas* for holding high office.

Military Positions

Several timekeeping devices are associated with donors that held military ranks.

These positions include a *legionarius* from 1st century CE Boutae (#124), a *legionarius*

¹⁹² L(ucius) Betilienus L(uci) f(ilius) Va{a}rus / haec quae inf{e}ra scripta / s(u)nt de senatu(s) sententia / facienda coiravit semitas / in oppido omnis porticum qua / in arcem {e}itur campum ub{e}i / ludunt horolo/gium macel(l)um / basilicam calecandam se{e}des / lacum balnearium lacum ad / portam aquam in op(p)idum ad(d)ou(centem) / arduom pedes CCCXL fornicesq(ue) / fecit fistulas soledas fecit / ob hasce res censorem fecere bis / senatus filio stipendia mereta / es(s)e ious(s)it populusque / statuam donavit Censorino

from 2nd century CE Apulum who also held the position of *horologiaris* (#999), a *dispensator* from Teanum Apulum in the 2nd century CE (#714), a *horologiaris* at Nikaia in the 3rd century CE (#414) and a *praefect* of the *Cohors Flavia* in 3rd century Rigomagus which also mentions the role of *horologiaris* (#600). The initial context for the inscription from Boutae, the device having been recovered from reuse in the foundations of a 16th century CE abbey, and Nikaia, with the inscription now lost, are unfortunately unclear. The other inscriptions, however, were all placed in military contexts: at Apulum, which was founded as a *castrum*, from the *praetorium* of Teanum Apulum, and from the *castrum* at Rigomagus.

The highly organized nature of military life provides a natural link to timekeeping devices, and the utility of hourly time for the Roman military is preserved in literature, epigraphy, and archaeology. Caesar's reflections on the nighttime hours and use of clepsydrae to track them (Caes. *BGall.* 5.13), Josephus' reports of actions timed by the hour in Titus' siege of Jerusalem (*BJ* 6.58, 68, 79, 131, 147, 157, 244, 248, 290, 294), the use of hours to time marches throughout the empire, the recovery of timekeeping devices from military contexts, and other evidence all show that hourly time was tracked and heeded throughout the history of the Roman military. There is even a reference to the hour preserved a letter written by a *praefectus* of the *cohors VIII Bataurorum* at Vindolanda named Flavius Cerialis (Bowman & Thomas 1983: 47-48). The letter, a fragmentary draft in ink on wooden writing tablets, reads:

Flavius Cerialis to ..., greetings. On the 3rd (?) day before the Kalends, brother, I have been waiting ... until the nth hour from our cohort (?) ... (*Tab. Vindol.* 236, trans. Bowman and Thomas 1994).¹⁹³

Cerialis letter (Figure 7.)is too fragmentary to know the exact nature of his reference to a specific hour, or even which hour he did something until. Nevertheless, the letter serves as an example of the infiltration of hours into the organization of the Roman military. The standardized measure of the hour can be relied upon to communicated clearly across distance, even if the latitude of Vindolanda makes the hours there different in length than elsewhere in the empire.

¹⁹³ Flavius Cerialis | [salutem] | iij K(alendas) frater u[] | in horam [] 5 exspectau[] | res mihi [] | c. 4] oñ[] | [c. 5] r[] | [] |
 |]exig[] |]sum[] |
 |]er[] |

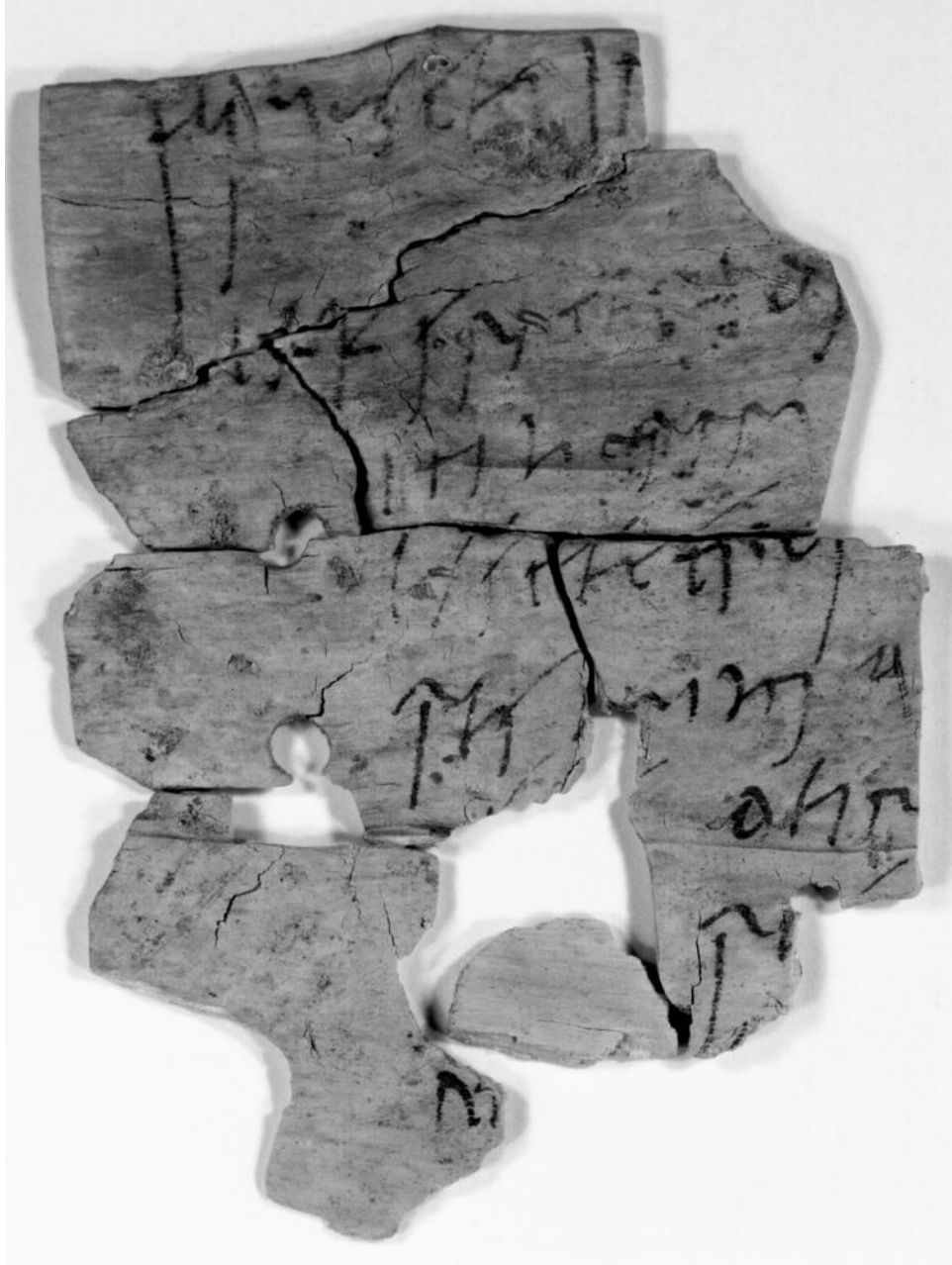


Figure 7.4 - Cerialis' fragmentary letter (*Tab. Vindol.* 236). Photo © The Trustees of the British Museum

In exploring the offices held by donors of timekeeping devices, no position is more clearly connected to an interest in the hour as the *horologarius* (Figure 7.5). In addition to the references to the position at Apulum, Nikaia, and Rigomagus, Cupcea

(2017) has argued for three other inscriptions at Rome to be connected to the position, despite having been interpreted previously as other positions. Cupcea uses the mention of “HOR LEG C” and “HOROLOG” as evidence of the specialized role of the *horologiarius*, as each is mentioned in the context of the *uigiles*, or night time watches enacted by the Roman military.

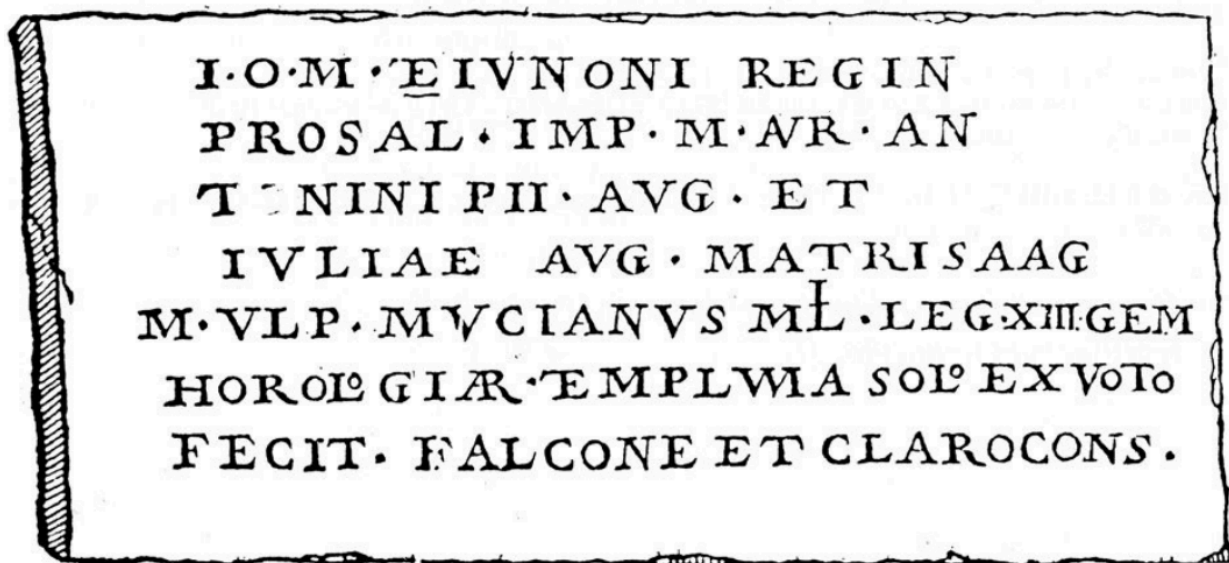


Figure 7.5 - 16th century drawing of inscription #999 from Apulum naming a *horologiarius*. The drawing is the only surviving record of the inscription (reproduced from Talbert 2017: 140).

The inscription naming Lucius Betilienus Luci above is notable for the way that the donation of a *horologium*, among other gifts, played multiple roles in associating the donor with positive attributes. In the case of a *horologiarius*, the connection to timekeeping is a much more literal feature of the position. Rather than the sort of indirect contribution argued in many cases above, such as the construction of a *horologium* to enforce hour-based restriction on traffic, the hour was the direct

responsibility for a *horologiarus*. Talbert (2017: 140) argues that the term applies rather to designers of sundials than keepers of hours, though uses only the inscription from Apulum as the basis for his discussion and not the broader analysis presented by Cupcea (2017). While there is precedent for naming the designer of a device on its inscription, such as the 1st century CE “γνωμονηκός” named on a sundial from Nikaia (#1008), the connections with the Roman military have led interpretations toward seeing the *horologiarus* as a time keeper rather than device maker. Even if the legionary *horologiarus* is claiming a specialized skill in making sundials, his employ in the Roman military presents an interesting case for the integration of hourly timekeeping. In either interpretation, a specialized practitioner in either constructing or managing timekeeping devices had a named title (or at least specialty); the *horologiarus* unites named offices with timekeeping directly.

Conclusions

The previous chapters of this work have explored the placement of timekeeping devices in Roman cities, their roles in mediating social relations, and their contribution to group identity on the empire-wide, city, and community levels. This chapter adds the role of authority into that discussion, highlighting the mechanisms by which hourly time was entangled with the spread and enactment of authority out of Rome. The ability to order the universe is perhaps the ultimate expression of Erskine’s definition of Roman *imperium*, “order” itself (2010), and this ordering was an essential component of

the city, especially after the rise of Augustus and his robust building program.

Augustus' building campaign slowly redefined cities, but did so within the familiar context of Republican architectural styles (Favro 1996: 144) and, as explored here, dedicatory regimes. The imperial deployment of hours, begun in earnest by Augustus and the emperors in his immediate aftermath, functioned similarly. Though much of the technology of timekeeping was either taken directly from or influenced by Hellenistic technological advances, the framing of timekeeping devices represented a uniquely Roman, and imperial, approach. This framing took place both literally through the patterns of distribution for such devices and their stylistic and decorative elements, and figuratively through the imperial reshaping of the meaning of time in the emperor's cosmos.

Despite these connections to the grand imperial power structure, and the enforcement of regulations based on the hours (if not the hours themselves) from the emperor directly, sundials and water clocks did most of their work within the confines of local administration. While Augustus and the emperors after him made the grandest claims over time, and thus the most significant efforts to associate themselves with it on a cosmological scale, timekeeping allowed smaller-scale and lower stakes claims to be made across the empire in a number of different ways. Hourly time in particular was valuable to those much lower in Roman hierarchies, as the devices that track the division of the day offered an affordable option for gifts to a community that also had

the ability to influence daily life in a significant way. Gifting timekeeping devices allowed individuals to emphasize their relationship to the Roman order of things, to mark significant moments in the imperial history of a given place, and to build a Roman identity for their community. The imperial utilization of hourly timekeeping devices as identifying markers is indicative of the rich role those objects played in both the symbolism and the operation of Roman empire. This work has argued that the hour was a real and respected presence in the functioning of daily life across the Roman world, inseparably tied to physical features of the built environment with influence on schedules, interactions, and relations far beyond only the academic or religious aspects of life. With that efficacy also came enforcement mechanisms, both officially laid out in the charters of various administrative units or socially in the construction and maintenance of elite persona.

Hourly timekeeping was also a desirable feature of the civic environment for its ability to impose structure and legibility on a place. Scott argues that remaining illegible, that is operating in ways unique to one's own group, was an important line of defense from outside influence (especially that from state level governance) (1998: 54); if a state could not easily understand your practices and patterns, it would be harder to gain control of them or to supplant them with its own. Hourly timekeeping practices divided the day in predictable ways across the empire, even if the definition of an hour in antiquity caused it to vary throughout space and season. More importantly, hourly

timekeeping brought with it particular time discipline. In the context of the expanding Roman Empire, this time discipline was a tool to manage new populations as well as a means of incorporating them into Roman ways of life. As Scott goes on to observe, “the city laid out according to a simple, repetitive logic will be easiest to administer and to police” (1998: 55). While his metaphor is explicitly spatial, the same applies temporally; practices arranged around the temporal logic of the state are easier to understand and influence than those shrouded by opaque, locally specific organizing principles.

The coordination of the temporal rhythms and the distribution of given activities within them is “a powerful means of cultivating social cohesion” (Johnston 2017: 47)¹⁹⁴. For imperial agents gifting those devices to a newly incorporated place, the goal was establishing cohesive temporal culture across the reaches of the empire. Temporal practices, it should be noted, can also work against imperial ambitions of legibility and control; the individuals named in association with timekeeping devices as civic gifts represent a rarified portion of the populace with vested interests in the expansion and maintenance of the Roman way of doing things. For others, both those within the communities under discussion here and those without a surviving record of Roman temporal practices, daily schedules and how to shape them may well have served as a point of contestation with imperial designs.

¹⁹⁴ Johnston (2017) discussion of time and identity does not explicitly engage with short time, but nevertheless his broader arguments about temporal structuring apply here.

CHAPTER 8: CONCLUSIONS: HOURS AND THE SOCIAL

THAT SOLAR SHADOW, AS IT MEASURES LIFE,

IT LIFE RESEMBLES TOO

(Grammar School, Rye, England, 1636)

This dissertation has sought to use the contextualized study of Roman hourly timekeeping devices to understand the role of the hour in the social interactions of the ancient Mediterranean, with a particular interest in the Roman imperial period. This work has sought an object-centered approach to the hour in antiquity, but it was admittedly focused on timekeeping devices as an assemblage. While my approach was informed by the context of its writing, with the bulk of the writing taking place during the COVID-19 pandemic, it is fitting given the nature of hourly timekeeping in the ancient world. Hours were, first, made by material objects that translated natural phenomena and forces into measured divisions of the day; the position of the sun was translated in predictable, repeatable ways that created hours and the flow of water under constant pressure measured out predetermined durations (which, in turn, were often made to match the hours of the sun). These translations, though, are only the first

of a series of effects from these devices. Marking the time in isolation from other users of a sundial or water clock has benefits in some applications, such as the measure of celestial motion in astronomy or the equitable allotment of time in a court proceeding, but does little to create or condition organized social activity. If a traveler today needed to catch a train that leaves promptly at 2pm but has no way of gauging the time themselves, they would either have to devote a portion of their day to arriving at the station early or risk missing their ride due to a faulty estimation of the time. The ancient Mediterranean clearly had fewer of these exact deadlines, or at least such deadlines were less narrow, owing to both the speed of life and the accuracy and precision of timekeeping. The Roman world was not, however, entirely without them. A Roman could be *kairos* or *akairos*, and the difference between the two was often determined by the measured hour. One could be late to dinner, grow restless from a delayed afternoon break at the games, face trouble from the authorities for taking one's cart into the city at a banned hour, and face many other problems known to us today or lost to history. On the other hand, an individual could also travel to a new province and immediately know when to expect a meal, where their peers would be active at a given point in the day, and understand the ebb and flow of daily life in a place they had never before been.

Hourly timekeeping was an important force in making these determinations of timeliness and in creating coordinated action, and it was able to be so because of its distributed and accessible nature. The timekeeping assemblages of ancient Rome, either

of a city or the empire as a whole, grew to include a greater number and variety of contexts over time. In the imperial period in particular, hourly time also came to increasingly shape both policy and administrative practice; authorities from the emperor down to the leading figures of a *vicus* saw the benefit of the hour and used it in the administration of their duties. These consistent efforts to create hourly timekeeping devices and place them in locations where they could be broadly accessed transformed the hour and the devices that made it into vital infrastructure. As with many aspects of the hour in antiquity, this infrastructure was both physical, the constructed assemblage of material features that made possible the movement of people and ideas, and was itself social infrastructure that shaped the way people interacted. This dissertation has provided many examples of writers in the ancient world thinking with numbered hours; noting the hour at which they arrived or departed, measuring the length of an event by the hours, discussing the expectations of their behavior at particular hours of the day or night, and so on. These sources have a bias toward elites whose writings were preserved over the centuries, but those elites relied on the same infrastructure to track the hours as did other members of society. The network of timekeeping devices the ancient world was both public and private and had effects on the daily schedules of rich and poor. Some of these impacts were direct, the immediate obligation to keep the hour, and some indirect, such as demands to tend to the schedule of a patron or master. Hours were able to undergird these behaviors despite being synchronized to a different

standard than is used today given the limitations on accuracy and communication at the time.

In order to elucidate the capabilities of timekeeping devices and their roles in antiquity, this project engaged predominantly with existing catalogs of the relevant objects. The work was able to make some contributions through additions to the catalog itself, thanks both to the discovery of new relevant objects after the publication of other catalogs and to the new recognition of previously known objects as relevant to the topic. The interests of this project also allowed for the merging of aspects of ancient timekeeping into a single database where they had previously been treated separately. Gibbs (1976), for example, was explicitly interested in extant sundials with the aim of deriving their design parameters. The BSDP database (Graßhoff et al. 2016) treats each individual sundial face as a unique object, again with an interest in their design but now using updated methods from those of Gibbs. Winter (2013) introduced water clocks and relevant inscriptions to the mix, and Bonnín (2015) was the first to also include representations of devices. The catalog here seeks to include all of the objects above, with each treated as a material and contextualized object; a single object with multiple sundial faces counts here as a single object, as all the faces were contiguous and were experienced together. The catalog for this dissertation includes 827 timekeeping devices, greater than the 264 of Gibbs, 475 of Winter, 594 of Bonnín, and 782 sundial faces of the BSDP. Unfortunately, a small number of these objects are likely to be duplicates as

existing records lacked sufficient information to fully disentangle overlaps between existing catalogs. Nevertheless, this dissertation does have finds location data at least to the site level for 880 objects (including representations and inscriptions), the largest contextualized collection of such objects. Depictions of timekeeping devices elucidate the concepts and ideologies of ancient hourly time, but do so as material things again situated in particular contexts. Not all objects can be situated in their proper contexts due to the conditions of their finding, the practices of early archaeologists (and in some cases treasure hunters), the loss of data over the years, and any other number of factors. Neither could this work address in detail all of the known contexts for devices, given the limitations on time, space, and ability of its single author.

The dissertation was able to add important information and analysis to the issue of ancient timekeeping, which despite being regularly addressed in scholarship remains conceived of in a diminished capacity from its actual role in antiquity. Part of the draw of this topic was the regularity with which hourly time was dismissed by those that study it; sundials were “practical objects, and that was enough” devoid of consistent symbolic meaning (Houston 2015: 307), “in private life, hours were seldom invoked” (Jones 2016: 28), and so on. One of the key contributions of this work is to challenge these notions by illustrating a broader engagement with hourly timekeeping than is attested only in the written record. The reach of hours into daily life was greater than it seems on the surface, and that reach extended to more members of society than the

elites who had dinner plans at the 9th hour. Some of this impact was indirect, as many members of society had to attend to the schedules of elites in ways that also tethered them to hourly time. This dissertation also shows a greater role for hours in civic and imperial administration than has been studied together previously; hours regulated access to resources, traffic flows, the operation of civic features like baths, and other aspects of official practice. Perhaps the largest lacuna in most discussions of hours in antiquity, which this work again sought to address, is the impact of these regulations on social relations. While it is true that the hourly administration of access to water is an administrative policy, for example, that policy conditions social relations among the users of a water system. These regulations create relationships of control and enforcement, establish hours as the baselines for complaint and defense, enable particular social interactions at particular times and explicitly prohibit them at others, and many other secondary effects beyond only allowing access to a water system. To discount “private life” as beyond the reach of administrative policy and the scheduling conventions of the elite is to miss the sociality of everyday life, the inherent social interaction in going about business and leisure.

One of the more telling pieces of evidence in this study is the Antioch mosaic depicting a toga-wearing man pointing up at a sundial at the ninth hour (Figure 6.9). The mosaic instructs the figure “run to dinner!” with another figure appearing from out of the frame, labeled “AKAIPOΣ” or untimely, holding the protagonist back by the

fabric of his toga. The late Roman is also himself disheveled, with one of his sandals lying on the ground beside him. While the scene depicts the most widely acknowledged use of hourly time in the ancient Mediterranean, the 9th hour dinner date, it also conveys the place of the hour in the imperial Roman mind. The mosaic is clearly meant to be tongue-in-cheek, it betrays a social investment in keeping to the measured time of the hour. The hour is the signpost of one's proper adherence to the rhythm of daily. The figure critiquing the protagonist's lateness emerging from out of frame implies not only a social pressure to keep the hours, but a moral one; outside forces judge a Roman who arrives late. Even the dial itself, placed atop a column in abstract space, speaks to the realities of accessing time in the ancient world; the abstract space in which the scene is placed could depict either the protagonist's own peristyle garden or a walk through the forum, but the lateness calls to mind a chance encounter; his scheduling not going to plan, the man learns of his lateness only through the intervention of a material device that translates the position of the sun to a measured hour.¹⁹⁵ A key contribution of this project has been to uncover the details of this mindset by exploring its history, its breadth, and the role of the built environment in making it come to pass.

¹⁹⁵ Remember here that the 9th hour of the Roman day equates to the 9th seasonal hour of the day's sunlight, not something akin to 9pm by modern reckoning. On the equinox, for example, the 9th hour of the Roman day would fall at roughly 3pm modern time; elite dinners began in daylight, but likely carried on well into the night.

Another contribution of this work comes from its application of theories and models of archaeological inquiry that center the efficacy of objects and assemblages to hourly timekeeping. The immaterial nature of time, this work notes, is supported by the material infrastructure that creates time measurement systems. Building the catalog of timekeeping devices will always rely largely on good fortune, as one can't target a specific class of object for excavation. Nor are the installations of timekeeping sufficiently distinct from other features in the built environment to be directly targeted for excavation, even where sites are partially exposed. Applying new frameworks that recognize the distributed nature of hourly timekeeping do, however, metaphorically excavate new information about the operation of the hour in antiquity. This contribution is of particular importance for understanding ancient time, as the different levels of precision and accuracy than are found in systems of time measurement obscure the ancient ability to organize around measured units of time. Even with the timezones of short time today, it is easy to synchronize activity globally and to immediately and intuitively understand the time in other places around the globe. In antiquity, these activities were much more difficult or impossible entirely; not only were the hours of Pergamon and those of Londinium separated longitudinal in the way that creates modern timezones, but so too were the separated latitudinally, with hours of different lengths on any given day. The differing lengths of hours also challenge our notions of equal hours in the modern world; no corporation in modern western capitalism would

accept paying the same hourly rate for the greatly reduced length of winter hours versus summer, for example. Understanding the infrastructure of ancient timekeeping, though, allows a more nuanced understanding of the uses and limitations of ancient timekeeping. The timekeeping infrastructure of antiquity relied on the application of consistent rules, rather than the creation of universally measured hours. Hourly time in the Roman empire was at once local and distributed; while a given set of hours would only be applied in a single community, it was synchronized within that community. This synchronization looked different than it does today, with less precise units and a broader understanding of what it meant to track them accurately. Nevertheless, these units were consistently relied on in policy, practice, and ideology.

Future Directions

This dissertation engaged with the contextualized objects of hourly timekeeping in the ancient world, particularly those from the Roman Imperial period. While it was able to add substantially to the knowledge base and debate about the contexts and roles of those devices, circumstance greatly impacted the approach applied here. Despite this dissertation's interest in context and material objects, I was largely unable to address those two key factors directly. Travel to the case study sites of this dissertation was cancelled in the summer of 2020 by the COVID-19 pandemic. While I was fortunate to have access to the rich scholarship that has long been produced for the sites I had planned to visit and many others, initial plans to experience the known contexts of

timekeeping devices directly were quashed. Rather than only a hindrance, however, this circumstance offers exciting opportunities for future work. Any such visit to the sites of timekeeping devices in the future would certainly be better informed and planned after the process of writing this dissertation, and the questions being asked of such visits would be more nuanced. Visiting Pompeii, for example, would be more productive as a future project given the clarification of device locations I was able to piece together from existing scholarship. Future work would also take a greater interest in the non-visual aspects of ancient timekeeping, which are especially difficult to access remotely; the soundscape of an archaeological site, though of course different from what was faced in antiquity, may still be highly informative of timekeeping through criers and announcements, for example. My own experience with the Pompeii Archaeological Research Project: Porta Stabia (PARP:PS) has shown me how sounds can carry in ancient cities thanks to the singing tour guides of the odeon, but what of locations where timekeeping devices were known to be sited? Issues of movement would also greatly benefit from direct access to the contexts of hourly timekeeping; the conditions of access and experience of a device are more richly explored first hand, and the ability to work on a very small scale in this regard would benefit future work on the social aspects of timekeeping.

In addition to its impacts on site access, the global pandemic also significantly shaped the library and archival work this project was able to engage in. There are

certainly more timekeeping devices, and more contextual information for known devices, to be found in site storerooms, museums, and archives. So, too, is there surely more information for many objects and sites further removed from easy accessibility, the reach of large museums, and the attentions of scholars publishing in languages accessible to this author. While the case studies I was able to draw on demonstrated the claims this dissertation makes, my options were limited to sites that had been broadly and accessibly published. This latter point in particular was an issue given the pandemic's limitations on even local travel and the full functioning of libraries; even widely available published works were sometimes difficult or impossible to access for most or all of the writing process.

The most promising opportunity going forward is the application of this project's findings to non-elite Romans through targeted, and predominantly archaeological, inquiry. The epigraphic record is highly informative of the roles of civic officials in the creation of timekeeping infrastructure, for example, but it is only through the material evidence of non-elite quarters and communities that the participation of the majority of Romans in hourly time can be fully tracked. Again largely informed by my work with PARP:PS, I envision looking in-depth at a non-elite portion of an ancient city and the movement patterns around it to more directly assess the accessibility of timekeeping devices in daily life and the interactions with institutions and practices known to rely on hourly time. The map of an elite Ostian's travels through the city in Chapter 6 is an

example of this sort of work, but it could be extended through application to individuals in the past who are not present in the written record. This task is more reliant on direct interaction with sites and objects, and so was attempted to a lesser degree in the current iteration of the project. The enslaved members of the household at Pompeii's House of the Menander in Chapter 4 serve as a brief proof of concept, though further similar work is surely possible.

Finally, I hope to increasingly turn to questions of power and its application going forward with the theme of short timekeeping in the ancient Mediterranean. I have striven to uncover the motivations for and extent of investments in timekeeping infrastructure at city, province, and empire-wide scales. Rather than being the end of this line of inquiry, though, the new ideas produced here about the creation of this infrastructure can further inform the discussion on timekeeping's role in spreading empire, particularly across cultural differences on its territorial periphery. While sites at the core of the Roman empire, namely those in peninsular Italy, have provided some of the richest artifactual collections with which to engage, it is the construction of timekeeping infrastructure further afield that is most telling of the cultural conflict around imperial timekeeping practice and those with other traditions of organizing.

Abbreviations for Epigraphic Sources

<i>AE</i>	<i>L'Année Épigraphique</i>
<i>BE</i>	<i>Bulletin épigraphique, pub. in Revue des études grecques</i>
<i>CIL</i>	<i>Corpus Inscriptionum Latinarum</i>
<i>Eph. Epigr.</i>	<i>Ephemeris Epigraphica, Corporis Inscriptionum Latinarum Supplementum</i>
<i>IG</i>	<i>Inscriptiones Graecae</i>
<i>REG</i>	<i>Revue des études grecques</i>
<i>SEG</i>	<i>Supplementum epigraphicum Graecum</i>

Abbreviations for Ancient Sources

Artem.	_____	Artemidorus Daldianus
August.	_____	Augustine
Conf.		<i>Confessions</i>
C.	_____	<i>Colloquium Celtis</i>
Caes.	_____	Caesar
BGall.		<i>Bellum Gallicum</i>
Cato	_____	Cato
Agr.		<i>De agricultura or De re rustica</i>
Cic.	_____	Cicero
Brut.		<i>Brutus or De Claris Oratoribus</i>
Fam.		<i>Epistulae ad familiares</i>
Leg. agr.		<i>De lege agraria</i>
Quint.		<i>Epistulae ad Quintum fratrem</i>
Columella	_____	Columella
Rust.		<i>De re rustica</i>
Dig.	_____	<i>Digesta</i>
H.	_____	<i>Colloquium Harleianum</i>
Frontin.	_____	Frontinus
Aq.		<i>De aquae ductu urbis Romae</i>
Gell.	_____	Gellius
Hdn.	_____	Herodianus
Hp.	_____	Hippocrates
Praec.		<i>Praeceptiones</i>
Hor.	_____	Horace
Sat.		<i>Satirae</i>
Juv.	_____	Juvenal
Liv.	_____	Livy
Luc.	_____	Lucian

<i>Hip.</i>	<i>Hippias</i>
Mart. _____	Martial
Mp. _____	<i>Colloquium Montepessulanum</i>
Petron. _____	Petronius
<i>Sat.</i>	<i>Satyrica</i>
Plin. _____	Pliny the Elder
<i>HN</i>	<i>Naturalis historia</i>
Plin. _____	Pliny the Younger
<i>Ep.</i>	<i>Epistulae</i>
Plut. _____	Plutarch
<i>Caes.</i>	<i>Caesar</i>
Prop. _____	Propertius
Sen. _____	Seneca (the Younger)
<i>Apocol.</i>	<i>Apocolocyntosis</i>
<i>Ep.</i>	<i>Epistulae</i>
<i>Tranq.</i>	<i>De tranquillitate animi</i>
Tab. Vindol. _____	<i>Tabulae Vindolandenses</i>
Tac. _____	Tacitus
<i>Agr.</i>	<i>Agricola</i>
Ulp. _____	Ulpianus
Val. Max. _____	Valerius Maximus
Var. _____	Varro
<i>Ling.</i>	<i>De lingua Latina</i>
Vitr. _____	Vitruvius
<i>De arch.</i>	<i>De architectura</i>
Verg. _____	Virgil
<i>G.</i>	<i>Georgics</i>

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APPENDIX I
Object Catalog

1 Abu Mina

Type	Cone	Gibbs	
Location	Forum	Bonnin	A_491
Date	4th century CE	Winter	Abu Mina 1
Findspot	Entrance to Xenodocheion	Berlin	dialface-429
Inscription		Translation	

2 Ad Dumayr

Type	Sphere	Gibbs	1066G
Location	Temple	Bonnin	A_469
Date	94 CE	Winter	Dmeir 1
Findspot	Unknown	Berlin	dialface-67
Inscription		Translation	Nabatean dedicatory inscription for an altar into which a sundial was later carved

3 Agen

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_253
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-745
Inscription	LIBR / AEQV	Translation	

4 Agen

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-746
Inscription		Translation	

5 Agios Mamas

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Well	Berlin	dialface-724
Inscription		Translation	

6 Agrigento

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_506
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-681
Inscription		Translation	

7 Ai Khanoum

Type	Plane	Gibbs	
Location	Palaestra / Gymnasion	Bonnin	A_584
Date	300-150 BCE	Winter	
Findspot	Described as from the same building as dialface-418	Berlin	dialface-419
Inscription		Translation	

8 Ai Khanoum

Type	Sphere	Gibbs	
Location	Palaestra / Gymnasion	Bonnin	A_583
Date	300-150 BCE	Winter	Ai Khanoum 1
Findspot	northeast corner of the courtyard, from a layer of destruction	Berlin	dialface-418
Inscription		Translation	

9 Ain Draham

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_274
Date	1st century BCE	Winter	
Findspot	Unknown	Berlin	dialface-565
Inscription		Translation	

10 Ain Kahloulia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-835
Inscription		Translation	

11 Aisepos

Type	Unknown	Gibbs	
Location	Temple	Bonnin	
Date	2nd century BCE	Winter	Aisepos 1
Findspot	Temple of Artemis Thermaia	Berlin	dialface-533
Inscription		Translation	
ισημερία τροπει θερινη			

12 Aix-les-Bains

Type	Cone	Gibbs	3097
Location	Baths	Bonnin	A_221
Date	2nd or 3rd CE	Winter	Bettwiller 1
Findspot	Bath complex	Berlin	dialface-199
Inscription		Translation	

13 Alcácer do Sal

Type	Cone	Gibbs	
Location	Villa Rustica	Bonnin	A_303
Date	2nd century CE	Winter	Salacia Imperatoria 1
Findspot	Villa Santa Catarina de Sitimos	Berlin	dialface-499
Inscription	Translation		

14 Aletrium

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_001
Date	149-90 BCE	Winter	Aletrium 1
Findspot	Alatri, Church of St. Mary as a house stone	Berlin	
Inscription	Translation		

L(ucius) Betilienus L(uci) f(ilius) Va{a}rus / haec quae inf{e}ra scripta / s(u)nt de senatu(s) sententia / facienda coiravit semitas / in oppido omnis porticum qua / in arcem {e}itur campum ub{e}i / ludunt horolo/gium macel(l)um / basilicam calecandam se{e}des / lacum balnearium lacum ad / portam aquam in op(p)idum ad(d)ou(centem) / arduom pedes CCCXL fornicesq(ue) / fecit fistulas soledas fecit / ob hasce res censorem fecere bis / senatus filio stipendia mereta / es(s)e ious(s)it populusque / statuam donavit Censorino

Lucius Betilienus Varus, son of Lucius, paid for the following measures, which are listed below and which were to be carried out in accordance with the decision of the city council: the paths within the city, those portico leading to the castle (up), the field where games are held, the horologium, the macellum, the new plastering of the basilica, seats, the bathing pools (the thermal baths), the pool at the city gate, as well as the water pipes within the city, the arches on one Range of 340 feet and permanent (lead) pipes. That is why he was appointed censor twice, and the city council gave (his) son this term of service and the people's assembly had him erected a statue of honor as 'censorious.'

15 Alexandria

Type	Unknown	Gibbs	
Location	Residence	Bonnin	
Date	Hadrianic (117-138)	Winter	
Findspot	House of the Birds, Kôm el-Dikka	Berlin	dialface-790
Inscription	Translation		

16 Alexandria

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	3rd century BCE	Winter	Alexandria 1
Findspot	Lake of Mairut	Berlin	dialface-637
Inscription	Translation		
διὰ περιφερειῶν τῶν ἐφε[ξ]ῆς / τῶν διατεινουσῶν ἀπ' ἀνατολῶν ἐπὶ δύσεις / ἀπὸ τῆς ἐτέρας ἐπὶ τὴν ἐτέραν / μεθίσταται τὸ ἄκρον τῆς σκιάς / 5 ἐν ἡμέραις τριάκοντα. ἀπὸ χειμερινῶν δὲ τροπῶν / ἐπὶ θερινὰς τροπὰς μεθιστάμενον / τὸ ἄκρον τῆς σκιάς δι' οὗ ἂν φέρεται / τῶν πρὸ μεσημβρίας Ζωδίων / 10 ἐν τούτῳ τῷ Ζωδίῳ / σημαίνει τὸν ἥλιον εἶναι. / ἐπὶ τῶν ἰῶτα φερόμενον / σημαίνει ζεφύρου πνοήν. / ἀπὸ θερινῶν δὲ τροπῶν / 15 [ἐπ]ὶ χειμερινὰς τροπὰς μεθιστάμενον / τὸ ἄκρον τῆς σκιάς δι' οὗ ἂν φέρεται / τῶν ἐκ μεσημβρίας Ζωδίων / ἐν τούτῳ τῷ Ζωδίῳ / σημαίνει τὸν ἥλιον εἶναι. / 20 ἐπὶ τῶν ἰῶτα φερόμενον / σημαίνει Πλειάδος δύσιν. / ἐκάστης δὲ ἡμέρας / τὸ ἄκρον τῆς σκιάς			

17 Alexandria

Type	Cone	Gibbs	
Location	Funerary	Bonnin	A_495
Date	Ptolemaic	Winter	Alexandria 2
Findspot	Outside of Alexandria	Berlin	dialface-448
Inscription	Translation		

18 Alexandria

Type	Cone	Gibbs	3086G
Location	Forum	Bonnin	A_489
Date	332 BCE-395 CE	Winter	Alexandria 4
Findspot	Cleopatra's Needle	Berlin	dialface-187
Inscription	Translation		
Γ Δ Ε Ζ Η Ι	Greek alphanumeric digits between the hour lines, of which the 3rd to 9th hours have been preserved		

19

Alife

Type	Inscription	Gibbs	
Location	Forum	Bonnin	
Date	1st century CE	Winter	Allifae 1
Findspot	Modern construction at Castello d'Alife	Berlin	
Inscription	C(aius) Popillius Philodespotus Iovi d(ono) d(edit) mensam e lhorolog(ium)		
	Translation Caius Popillius Philodespotus donated a mensa ponderaria and a horologium to Jupiter		

20

Salona

Type	Sphere	Gibbs	2016G
Location	Unknown	Bonnin	A_332
Date	2nd century CE	Winter	Salona 1
Findspot	Unknown	Berlin	dialface-92
Inscription	Translation		

21

Altino

Type	Plane	Gibbs	5011G
Location	Funerary	Bonnin	A_136
Date	1st century CE	Winter	Altinum 1
Findspot	Necropolis on Via Claudia Augusta	Berlin	dialface-260
Inscription	Translation		

22 Altino

Type	Sphere	Gibbs	
Location	Funerary	Bonnin	A_040
Date	1st century CE	Winter	Altinum 2
Findspot	Outside of Altino	Berlin	dialface-559
Inscription		Translation	

23 Altino

Type	Sphere	Gibbs	2001G
Location	Funerary	Bonnin	A_067
Date	2nd century CE	Winter	Altinum 3
Findspot	Quarto d'Altino	Berlin	dialface-1
Inscription		Translation	

24 Altino

Type	Cone	Gibbs	3083G
Location	Funerary	Bonnin	A_117
Date	1st century CE	Winter	Altinum 4
Findspot	Unknown	Berlin	dialface-184
Inscription		Translation	

25 Amastra

Type	Unknown	Gibbs	8001
Location	Unknown	Bonnin	A_572
Date	2nd century BCE	Winter	Amastris 1
Findspot	Spolia in a wall in Amastra	Berlin	dialface-306
Inscription	ο προς ορθας... προς την εν... όντα θ προς... η μέγιστη ημέρα... δυειν πεντετεκα ιδεκα... ετηρ η θ η εν τ...		
	Translation Explains the function of the sundial		

26 Amathonte

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_439
Date	Unknown	Winter	
Findspot	Backfill pile	Berlin	dialface-618
Inscription	Translation		

27 Amorium

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Late Antique	Winter	
Findspot	Unknown	Berlin	dialface-645
Inscription	Translation		

28 Anacapri

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_063
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-416
Inscription		Translation	

29 Ancient Corinth

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Found while repairing carriage road near Hagia Anna, 1902	Berlin	dialface-845
Inscription		Translation	

30 Ancient Corinth

Type	Cone	Gibbs	3016G
Location	Unknown	Bonnin	A_368
Date	Late 1st century BCE	Winter	Korinth 1
Findspot	In a modern wall near the Odeon	Berlin	dialface-116
Inscription		Translation	

31 Ancient Corinth

Type	Cone	Gibbs	3018G
Location	Unknown	Bonnin	A_370
Date	1st century CE	Winter	Korinth 2
Findspot	Unknown	Berlin	dialface-118
Inscription	Translation		

32 Ancient Corinth

Type	Cone	Gibbs	3017G
Location	Unknown	Bonnin	A_369
Date	1st century CE	Winter	Korinth 3
Findspot	In excavations during 1928	Berlin	dialface-117
Inscription	Translation		

33 Ancient Corinth

Type	Plane	Gibbs	5004G
Location	Theater	Bonnin	A_383
Date	2nd century CE	Winter	Korinth 4
Findspot	Corinth Odeon	Berlin	dialface-253
Inscription	Translation		

34 Ancona

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-608
Inscription		Translation	

35 Andilly-en-Bassigny

Type	Unknown	Gibbs	
Location	Villa Rustica	Bonnin	A_244
Date	Unknown	Winter	
Findspot	Villa Courtyard, Charge d'Eau	Berlin	dialface-774
Inscription		Translation	

36 Annonay

Type	Sphere	Gibbs	
Location	Other	Bonnin	A_216
Date	2nd CE	Winter	
Findspot	1.3m deep in a vat used to mix clay in antiquity	Berlin	dialface-451
Inscription		Translation	

37 Antikythera

Type	Portable	Gibbs	
Location	Handheld	Bonnin	
Date	120 BCE	Winter	Antikythera 1
Findspot	Sponge diver	Berlin	
Inscription		Translation	

38 Antioch

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_112
Date	3rd century CE	Winter	
Findspot	House of the Sundial	Berlin	
Inscription		Translation	

39 Antioch

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	
Date	73 CE	Winter	Antiocheia am Orontes 1
Findspot	Unknown	Berlin	
Inscription	Translation		
Σελ[ε]ύκου μή(κος) πο(δών) ν1/2, Ὀροσκοπίον μή(κος) πο(δών)			
[-]			

40 Antioch of Pisidia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-840
Inscription		Translation	

41 Antioch of Pisidia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-844
Inscription		Translation	

42 Anzio

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_121
Date	Agustan	Winter	
Findspot	Ancient port of Anzio	Berlin	
Inscription		Translation	

43 Aphrodisias

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	3rd century CE	Winter	
Findspot	Unknown	Berlin	dialface-383
Inscription		Translation	

44 Aphrodisias

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-385
Inscription		Translation	

45 Aphrodisias

Type	Unknown	Gibbs	
Location	Other	Bonnin	
Date	3rd CE	Winter	
Findspot	Bouleuterion	Berlin	dialface-675
Inscription		Translation	

46 Aphrodisias

Type	Unknown	Gibbs	
Location	Theater	Bonnin	
Date	1st century CE - 2nd century CE	Winter	Aphrodisias 1
Findspot	Tetrastoon, east colonnade	Berlin	dialface-408
Inscription	Translation Fragmentary letters		

47 Aphrodisias

Type	Cone	Gibbs	3050G
Location	Unknown	Bonnin	A_413
Date	Unknown	Winter	Aphrodisias 2
Findspot	Urban area of Aphrodisias	Berlin	dialface-151
Inscription	Translation ἰ[σ]ημερινή θερ[ινή] Equator Summer		

48 Aphrodisias

Type	Sphere	Gibbs	1055G
Location	Forum	Bonnin	A_402
Date	2nd century CE	Winter	Aphrodisias 3
Findspot	Unknown	Berlin	dialface-56
Inscription	Translation Αὐτοκράτορι Καίσαρι Μ(άρκῳ) Αὐρ(ηλίῳ) Σεουήρῳ Ἀντωνεῖνῳ Σεβ(αστῶ) καὶ Ἰουλίᾳ [Σ]ε[Β]αστῇ μητρ[ὶ] [κάστρων-----] To the venerable Imperator Caesar Marcus Aurelius Antoninus and the venerable Julia his mother...		

49 Aphrodisias

Type	Cone	Gibbs	
Location	Agora	Bonnin	A_422
Date	2nd century CE - 3rd century CE	Winter	Aphrodisias 4
Findspot	Spoil dump east of the Agora Gate	Berlin	dialface-407
Inscription			
Κλ(αύδιος) Δ[]		Translation	Claudius D...

50 Aphrodisias

Type	Unknown	Gibbs	
Location	Theater	Bonnin	
Date	1st century CE - 3rd century CE	Winter	Aphrodisias 5
Findspot	Theater	Berlin	dialface-410
Inscription			
		Translation	Fragmentary letters

51 Aphrodisias

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_427
Date	4th century CE	Winter	Aphrodisias 6
Findspot	Early Byzantine housing complex	Berlin	dialface-693
Inscription			
		Translation	place names and latitudes

52 Aphrodisias

Type	Plane	Gibbs	
Location	Theater	Bonnin	A_426
Date	5th century CE - 6th century CE	Winter	Aphrodisias 7
Findspot	Near the Tetrastoon	Berlin	dialface-386
Inscription	Translation		
	χψεϱινή ίσημερινή θεϱ[ι]νή winter equator summer		

53 Apollonia-Arsuf

Type	Plane	Gibbs	
Location	Handheld	Bonnin	
Date	Byzantine	Winter	
Findspot	Unknown	Berlin	dialface-534
Inscription	Translation		

54 Apt

Type	Unknown	Gibbs	
Location	Funerary	Bonnin	
Date	Unknown	Winter	
Findspot	Necropolis west of Apt	Berlin	dialface-775
Inscription	Translation		

55 Aquae Mattiacorum

Type	Plane	Gibbs	4014G
Location	Baths	Bonnin	A_314
Date	Late 1st century CE	Winter	
Findspot	1867 near the Schtitzenhof spring	Berlin	dialface-237
Inscription		Translation	

56 Aquae Thiblitanae

Type	Unknown	Gibbs	
Location	Baths	Bonnin	A_281
Date	Unknown	Winter	
Findspot	Hammam Maskhoutine	Berlin	dialface-793
Inscription		Translation	

57 Aquileia

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_175
Date	Mid-2nd century CE	Winter	Aquileia 12
Findspot	Unknown	Berlin	
Inscription		Translation	Place names and months

58 Aquileia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-784
Inscription		Translation	

59 Aquileia

Type	Sphere	Gibbs	2011G
Location	Funerary	Bonnin	A_077
Date	1st century CE	Winter	Aquileia 1
Findspot	Grave complex	Berlin	dialface-87
Inscription		Translation	

60 Aquileia

Type	Plane	Gibbs	4003G
Location	Unknown	Bonnin	A_158
Date	2nd century CE	Winter	Aquileia 10
Findspot	Unknown	Berlin	dialface-226
Inscription		Translation	

61 Aquileia

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_177
Date	Mid-2nd century CE	Winter	Aquileia 11
Findspot	Private collection near Aquileia	Berlin	
Inscription	Translation Place names and months		

62 Aquileia

Type	Sphere	Gibbs	2007G
Location	Residence	Bonnin	A_073
Date	1st century CE	Winter	Aquileia 13
Findspot	Unknown	Berlin	dialface-83
Inscription	Translation		

63 Aquileia

Type	Plane	Gibbs	4002G
Location	Theater	Bonnin	A_157
Date	Republic or Early Empire	Winter	Aquileia 14
Findspot	Street near the Circus	Berlin	dialface-225
Inscription	Translation Eurus / Auster / Africus / Faonius / Aquilo / Septentrio / Boreas / Desolinus / M(arcus) Antistius Euporus fecit Names of the 8 winds and the device creator, M. Antistius Euporus		

64 Aquileia

Type	Sphere	Gibbs	2005G
Location	Unknown	Bonnin	A_071
Date	1st century CE	Winter	Aquileia 15
Findspot	Unknown	Berlin	dialface-81
Inscription	Translation		

65 Aquileia

Type	Sphere	Gibbs	2002G
Location	Funerary	Bonnin	A_068
Date	Late 2nd - Early 3rd CE	Winter	Aquileia 16
Findspot	In situ along Via Sacra	Berlin	dialface-78
Inscription	Translation		

66 Aquileia

Type	Sphere	Gibbs	1007G
Location	Unknown	Bonnin	A_003
Date	1st century CE	Winter	Aquileia 2
Findspot	Unknown	Berlin	dialface-8
Inscription	Translation		

67 Aquileia

Type	Sphere	Gibbs	2004G
Location	Funerary	Bonnin	A_070
Date	1st century CE	Winter	Aquileia 3
Findspot	Grave complex	Berlin	dialface-80
Inscription	Translation		

68 Aquileia

Type	Sphere	Gibbs	2006G
Location	Funerary	Bonnin	A_072
Date	1st century CE	Winter	Aquileia 4
Findspot	As spolia, but Gibbs connected to a pedestal at a grave	Berlin	dialface-82
Inscription	Translation		

69 Aquileia

Type	Sphere	Gibbs	1008G
Location	Unknown	Bonnin	A_004
Date	1st century CE	Winter	Aquileia 5
Findspot	Unknown	Berlin	dialface-9
Inscription	Translation		

70 Aquileia

Type	Sphere	Gibbs	2003G
Location	Funerary	Bonnin	A_069
Date	Unknown	Winter	Aquileia 6
Findspot	Monastero	Berlin	dialface-79
Inscription	Translation		

71 Aquileia

Type	Sphere	Gibbs	2008G
Location	Unknown	Bonnin	A_074
Date	1st century CE	Winter	Aquileia 7
Findspot	Unknown	Berlin	dialface-84
Inscription	Translation		

72 Aquileia

Type	Sphere	Gibbs	2009G
Location	Unknown	Bonnin	A_075
Date	1st century CE	Winter	Aquileia 8
Findspot	Unknown	Berlin	dialface-85
Inscription	Translation		

73 Aquileia

Type	Sphere	Gibbs	2010G
Location	Funerary	Bonnin	A_076
Date	1st century CE	Winter	Aquileia 9
Findspot	Unknown, but morphologically matched to Aquileiaian grave devices by Winter	Berlin	dialface-86
Inscription		Translation	

74 Aquino

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_186
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-564
Inscription		Translation	

75 Aquinum

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century CE - 3rd century CE	Winter	Aquinum 1
Findspot	Unknown	Berlin	dialface-392
Inscription		Translation	

76 Argilliers

Type	Sphere	Gibbs	1045
Location	Villa Rustica	Bonnin	A_210
Date	Unknown	Winter	
Findspot	Villa	Berlin	dialface-46
Inscription		Translation	

77 Arles

Type	Unknown	Gibbs	
Location	Theater	Bonnin	
Date	1st century CE	Winter	
Findspot	Ancient theater of Arles, according to Topoi (no citation)	Berlin	dialface-460
Inscription		Translation	

78 Aroeira

Type	Unknown	Gibbs	
Location	Villa Rustica	Bonnin	
Date	Unknown	Winter	
Findspot	Villa Romana	Berlin	dialface-814
Inscription		Translation	

79 Arsinoites Nomos

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	A_580
Date	2nd / 1st century BCE	Winter	Arsinoites 1
Findspot	Purchased at antiquities market, early 20th century	Berlin	dialface-660
Inscription	Ἐλεάζαρος Νικολάου ἡγεμῶν ὑπὲρ ἑαυτοῦ καὶ Εἰρήνης τῆς γυναι- κὸς τὸ ὥρολόγιον καὶ τὸ φρέαρ.		
	Translation Eleazaros Nikolaos, Hegem, and his wife Eirene gave the horologion and the water tank		

80 Aspira

Type	Cone	Gibbs	3060G
Location	Unknown	Bonnin	A_420
Date	2nd century CE	Winter	Aspira 1
Findspot	Unknown	Berlin	dialface-161
Inscription	χιψερινή ἰσημερινή θερ[ι]νὴ		
	Translation winter equator summer		

81 Athens

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-692
Inscription	Translation		

82 Athens

Type	Clepsydra	Gibbs	
Location	Agora	Bonnin	A_557
Date	4th century BCE	Winter	Athen 1
Findspot	Recovered from a well in the Athenian agora	Berlin	
Inscription	Ἀντίοχος(ιδος) XX	Translation	Name (Phyle Antiochus) and capacity (XX)

83 Athens

Type	Cone	Gibbs	3001G
Location	Unknown	Bonnin	A_354
Date	1st century CE	Winter	Athen 10
Findspot	Theater of Dionysus, but out of context	Berlin	dialface-100
Inscription		Translation	

84 Athens

Type	Cone	Gibbs	3007
Location	Unknown	Bonnin	A_360
Date	Unknown	Winter	Athen 11
Findspot	Supposedly near the Academy	Berlin	dialface-106
Inscription		Translation	

85 Athens

Type	Cone	Gibbs	3013G
Location	Unknown	Bonnin	A_365
Date	Imperial	Winter	Athen 12
Findspot	Spoil heap in the Greek agora	Berlin	dialface-113
Inscription	Translation		

86 Athens

Type	Cone	Gibbs	3014G
Location	Unknown	Bonnin	A_366
Date	Imperial	Winter	Athen 13
Findspot	Spoil heap in the Greek agora	Berlin	dialface-114
Inscription	Translation		

87 Athens

Type	Cone	Gibbs	3002G
Location	Unknown	Bonnin	A_355
Date	Imperial	Winter	Athen 14
Findspot	Spoil heap in the Greek agora	Berlin	dialface-101
Inscription	Translation		

88 Athens

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_376
Date	Imperial	Winter	Athen 15
Findspot	Stray find near Hadrian's Library	Berlin	dialface-213
Inscription		Translation	

89 Athens

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_377
Date	Imperial	Winter	Athen 16
Findspot	Spoil heap at Hadrian's Library	Berlin	dialface-214
Inscription		Translation	

90 Athens

Type	Cone	Gibbs	3003G
Location	Unknown	Bonnin	A_356
Date	Imperial	Winter	Athen 17
Findspot	Unknown	Berlin	dialface-102
Inscription		Translation	

91 Athens

Type	Cone	Gibbs	3004G
Location	Unknown	Bonnin	A_357
Date	High Imperial	Winter	Athen 18
Findspot	Unknown	Berlin	dialface-103
Inscription	Translation Σεβαστώ Ανθεστηριος Anthesterios (offered this dial) for Augustus.		

92 Athens

Type	Cone	Gibbs	3009G
Location	Unknown	Bonnin	A_361
Date	High Imperial	Winter	Athen 19
Findspot	Stray find in Greek agora	Berlin	dialface-108
Inscription	Translation		

93 Athens

Type	Clepsydra	Gibbs	
Location	Agora	Bonnin	
Date	4th century BCE	Winter	Athen 2
Findspot	Northwest corner of the Heliaia	Berlin	
Inscription	Translation		

94 Athens

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_348
Date	2nd century CE	Winter	Athen 20
Findspot	Unknown	Berlin	dialface-220
Inscription	Translation		

95 Athens

Type	Plane	Gibbs	5002G
Location	Unknown	Bonnin	A_387
Date	ca. 300 CE (archon Phaidros, son of Zoilos)	Winter	Athen 21
Findspot	Unknown	Berlin	dialface-248 & dialface-249 & dialface-250 & dialface-251
Inscription	Translation		
Φαιδρος Ζοιλου Παιανιευς εποιη	Phaedrus, Son of Zoilos, from the Demos Paiania, donated it		

96 Athens

Type	Cone	Gibbs	3012G
Location	Unknown	Bonnin	A_364
Date	Late Antique	Winter	Athen 22
Findspot	Spoil heap in the Greek agora	Berlin	dialface-112
Inscription	Translation		

97 Athens

Type	Plane	Gibbs	5003G
Location	Unknown	Bonnin	A_382
Date	Late Antique	Winter	Athen 23
Findspot	Greek agora, not in situ	Berlin	dialface-252
Inscription	Translation Greek Alphanumerics		

98 Athens

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_384
Date	Late Antique	Winter	Athen 24
Findspot	Unknown	Berlin	dialface-302
Inscription	Translation		

99 Athens

Type	Cone	Gibbs	3008G
Location	Theater	Bonnin	A_532
Date	4th century BCE	Winter	Athen 3
Findspot	Theater of Dionysus	Berlin	dialface-107
Inscription	Translation		

100 Athens

Type	Planar & Clepsydra	Gibbs	5001
Location	Forum	Bonnin	
Date	1st century BCE	Winter	Athen 4
Findspot	Tower of the Winds	Berlin	dialface-239 & dialface-240 & dialface-241 & dialface-242 & dialface-243 & dialface-244 &
Inscription		Translation	Names of the winds

101 Athens

Type	Cone	Gibbs	
Location	Theater	Bonnin	A_349
Date	Hellenistic	Winter	Athen 5
Findspot	Theater of Dionysus	Berlin	dialface-219
Inscription		Translation	

102 Athens

Type	Cone	Gibbs	3011G
Location	Residence	Bonnin	A_363
Date	Augustan	Winter	Athen 6
Findspot	Roman house on the Greek agora	Berlin	dialface-110
Inscription		Translation	

103 Athens

Type	Cone	Gibbs	3015G
Location	Theater	Bonnin	A_367
Date	1st century CE	Winter	Athen 7
Findspot	Theater of Dionysus	Berlin	dialface-115
Inscription		Translation	

104 Athens

Type	Cone	Gibbs	3010G
Location	Unknown	Bonnin	A_362
Date	Early 1st CE	Winter	Athen 8
Findspot	Well in the Greek agora	Berlin	dialface-109
Inscription		Translation	

105 Athens

Type	Cone	Gibbs	3005G
Location	Theater	Bonnin	A_358
Date	1st century CE	Winter	Athen 9
Findspot	Theater of Dionysus	Berlin	dialface-104
Inscription		Translation	

106 Athens

Type	Cone	Gibbs	3006G
Location	Unknown	Bonnin	A_359
Date	Late Hellenistic Period	Winter	Fundort Unbekannt 5
Findspot	Unkown	Berlin	dialface-105
Inscription	Translation		

107 Augusta Emerita

Type	Sphere	Gibbs	1043
Location	Theater	Bonnin	A_304
Date	1st century BCE	Winter	Augusta Emerita 1
Findspot	Frons Scenae of the theater	Berlin	dialface-44
Inscription	Translation		

108 Aventicum

Type	Cone	Gibbs	3100G
Location	Unknown	Bonnin	A_312
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-202
Inscription	Translation		

109 Awans-Bierset

Type	Plane	Gibbs	4013
Location	Unknown	Bonnin	A_322
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-236
Inscription	Translation		

110 Bad Canstatt

Type	Sphere	Gibbs	1067G
Location	Unknown	Bonnin	A_317
Date	2nd century CE	Winter	Cannstatt 1
Findspot	Unknown	Berlin	dialface-68
Inscription	Translation		
Lici]ius Ta[rentinus (?) or [L(ucius) Mart]inius Ta[citus]		Lucinius Martinius Tacitus	

111 Badalona

Type	Sphere	Gibbs	
Location	Funerary	Bonnin	A_517
Date	Unknown	Winter	
Findspot	Cau Peixau	Berlin	dialface-649
Inscription	Translation		

112 Baelo Claudia

Type	Sphere	Gibbs	2020
Location	Residence	Bonnin	A_307
Date	Early 1st century CE	Winter	Baelo Claudia 1
Findspot	Kitchen of a villa	Berlin	dialface-96
Inscription		Translation	

113 Barcelona

Type	Representation	Gibbs	
Location	Residence	Bonnin	
Date	3rd century CE	Winter	
Findspot	Carrer de la Comtessa de Sobradíel	Berlin	
Inscription		Translation	

114 Basa

Type	Cone	Gibbs	3089
Location	Temple	Bonnin	A_499
Date	3rd century CE	Winter	
Findspot	Immediately outside temple at Basa	Berlin	dialface-190
Inscription		Translation	

115 Bavay

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-461
Inscription		Translation	

116 Bavay

Type	Portable	Gibbs	
Location	Handheld	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-462
Inscription		Translation	

117 Baza

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_310
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-495
Inscription		Translation	

118 Bettviller

Type	Sphere	Gibbs	1049
Location	Unknown	Bonnin	A_236
Date	2nd century CE	Winter	Bettwiller 2
Findspot	Found in private collection	Berlin	dialface-50
Inscription	Translation		

119 Halicarnassus

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-493
Inscription	Translation		

120 Bois-de-Vaux

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_320
Date	2nd century CE	Winter	
Findspot	Unknown	Berlin	dialface-682
Inscription	Translation		

121 Bonn

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_323
Date	1st to 2nd century CE	Winter	
Findspot	Well in a military camp	Berlin	dialface-632
Inscription		Translation	

122 Boscoreale

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_065
Date	1st century BCE	Winter	
Findspot	Villa Rustica N. Popidi Flori	Berlin	dialface-754
Inscription		Translation	

123 Bosquet

Type	Cone	Gibbs	
Location	Villa Rustica	Bonnin	A_518
Date	early 2nd century BCE - end of 1st century CE	Winter	Bosquet 1
Findspot	Fossa 9	Berlin	dialface-570
Inscription		Translation	

124 Boutae

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_041
Date	1st century CE	Winter	Boutae 1
Findspot	Talloires near Annecy, in the 16th century used in the foundations of the Benedictine abbey	Berlin	
Inscription	Horologium cum suo aedificio et / signis omnibus et clatris / C (alus) Blaesius C(al) fil(lus) Voltinia Gratus ex HS n(ummum) X (milibus) / et eo amplius ad id horologium adminls / trandum serv (u)m HS n(ummum) IIII(milium) d(e) s(ua) p(ecunia) d(edil)		
	Translation Caius Blaesius Gratus, son of Gaius from the Tribus Voltinla donated this horologium with the associated building and its statues and enclosures for a sum of 10,000 sesterces and, in addition, a slave for 4,000 sesterces to run the clock		

125 Bovino

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_057
Date	3rd century CE	Winter	Vibium 1
Findspot	Industrial portion of a rustic villa	Berlin	dialface-399
Inscription	Translation		

126 Brading

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_113
Date	Late 3rd century CE	Winter	
Findspot	Brading Villa	Berlin	
Inscription	Translation		

127 Brigantium

Type	Sphere	Gibbs	
Location	Temple	Bonnin	
Date	late 2nd - early 3rd century CE	Winter	Brigantium 1
Findspot	Room M of the "basilica" of Brigantium	Berlin	dialface-571
Inscription		Translation	

128 Budva

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_328
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-776
Inscription		Translation	

129 Burdur

Type	Cylinder	Gibbs	
Location	Other	Bonnin	
Date	1st century CE	Winter	
Findspot	Found in front of the NW Heroon	Berlin	dialface-670
Inscription		Translation	

130 Caesaraugusta

Type	Sphere	Gibbs	
Location	Theater	Bonnin	A_293
Date	1st century CE	Winter	Caesaraugusta 1
Findspot	Theater of Caesaraugusta	Berlin	dialface-494
Inscription		Translation	

131 Cagliari

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_45
Date	260-280 CE	Winter	
Findspot	Chapel of San Lucino	Berlin	
Inscription		Translation	

132 Calceus Herculis

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-848
Inscription		Translation	

133 Carthago Nova

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_514
Date	Unknown	Winter	
Findspot	Near Murcia airport	Berlin	dialface-810
Inscription		Translation	

134 Carthago Nova

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_515
Date	Unknown	Winter	
Findspot	Recessed into the wall of a country house near Cartagena.	Berlin	dialface-811
Inscription		Translation	

135 Carthage

Type	Representation	Gibbs	
Location	Residence	Bonnin	
Date	2nd half of 4th century CE	Winter	
Findspot	House of the Chariot Race	Berlin	
Inscription		Translation	

136 Carthage

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_265
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-634
Inscription		Translation	

137 Carthage

Type	Unknown	Gibbs	
Location	Temple	Bonnin	A_268
Date	Byzantine	Winter	
Findspot	Basilica Damous al-Karita	Berlin	dialface-806
Inscription		Translation	

138 Carthage

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	1st century CE - 2nd century CE	Winter	Karthago 1
Findspot	Purchased at auction	Berlin	dialface-366
Inscription		Translation	Greek abbreviations of latin month names

139 Carthage

Type	Plane	Gibbs	5021
Location	Funerary	Bonnin	A_270
Date	1st century CE	Winter	Karthago 2
Findspot	Facade of a grave complex	Berlin	dialface-270
Inscription	Translation Month names		

140 Carthage

Type	Cone	Gibbs	3088
Location	Unknown	Bonnin	A_266
Date	Imperial	Winter	Karthago 3
Findspot	Urban area of Carthage	Berlin	dialface-189
Inscription	Translation		

141 Castelnuovo della Daunia

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_056
Date	2nd century CE	Winter	Casalnuovo della Daunia 1
Findspot	Unknown	Berlin	dialface-398
Inscription	Translation		

142 Mazarracín

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_297
Date	Unknown	Winter	
Findspot	Found in a gravel pit	Berlin	dialface-490
Inscription		Translation	

143 Castoreale

Type	Sphere	Gibbs	1006G
Location	Villa Rustica	Bonnin	A_002
Date	Unknown	Winter	
Findspot	Among the ruins of the villa rustica at Castoreale	Berlin	dialface-7
Inscription		Translation	

144 Cerveteri

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_120
Date	Unknown	Winter	
Findspot	Caere	Berlin	dialface-436
Inscription		Translation	

145 Chalkidiki

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	3rd century	Winter	
Findspot	Unknown	Berlin	dialface-732
Inscription		Translation	

146 Chellalet-el-Adhaoura

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-865
Inscription		Translation	

147 Caesarea Mauretaniae

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_286
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-831
Inscription		Translation	

149 Cherchell

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-833
Inscription		Translation	

150 Cherchell

Type	Sphere	Gibbs	1059
Location	Funerary	Bonnin	A_282
Date	1st century CE	Winter	Cherchel 1
Findspot	Near Cherchell, Algeria	Berlin	dialface-60
Inscription		Translation	

151 Chios

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_423
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-685
Inscription		Translation	

152 Chios

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_586
Date	1st century BCE	Winter	
Findspot	Recovered from a well	Berlin	dialface-686
Inscription		Translation	

153 Chios

Type	Plane	Gibbs	
Location	Temple	Bonnin	
Date	1st century BCE	Winter	Chios 1
Findspot	Winter suspects the device was installed at an extra-urban sanctuary near springs.	Berlin	
Inscription		Translation	Dates, zodiac

154 Chios

Type	Cone	Gibbs	3041
Location	Unknown	Bonnin	A_412
Date	2nd century CE	Winter	Chios 2
Findspot	Found, likely reinstalled, in a Byzantine basilica	Berlin	dialface-141
Inscription		Translation	

155 Chlef			
Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-867
Inscription		Translation	

156 Chryse			
Type	Sphere	Gibbs	
Location	Temple	Bonnin	
Date	Imperial	Winter	
Findspot	Smintheon water tank fill, near the Temple of Apollo	Berlin	dialface-667
Inscription		Translation	

157 Chusclan			
Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_220
Date	Gallo-roman	Winter	
Findspot	Unknown	Berlin	dialface-566
Inscription		Translation	

158 Cingoli

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-359
Inscription		Translation	

159 Citta Lavinia

Type	Sphere	Gibbs	1017G
Location	Residence	Bonnin	A_012
Date	1st century CE	Winter	Lanuvium 1
Findspot	Citta Lavinia in 1891	Berlin	dialface-18
Inscription		Translation	

160 Claros

Type	Cone	Gibbs	3051G
Location	Temple	Bonnin	A_567
Date	2nd century BCE	Winter	Klaros 1
Findspot	Temple of Apollo, north of the altar	Berlin	dialface-152
Inscription		Translation	Foundation dedication to Dionysus

161 Concordia Sagittaria

Type	Sphere	Gibbs	
Location	Funerary	Bonnin	A_088
Date	2nd CE	Winter	Concordia Sagittaria 1
Findspot	Speculation by Winter that it was recovered from a necropolis	Berlin	dialface-480
Inscription		Translation	

162 Conflans

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-459
Inscription		Translation	

163 Constanta

Type	Sphere	Gibbs	1065
Location	Funerary	Bonnin	A_473
Date	Unknown	Winter	Tomis 1
Findspot	Stray find within the necropolis of Tomis	Berlin	dialface-66
Inscription		Translation	

164 Constantine

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-862
Inscription		Translation	

165 Constantine

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-863
Inscription		Translation	

166 Conza della Campania

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_038
Date	Late 1st CE	Winter	Compsa 1
Findspot	Villa rustica on the left bank of the Ofanto River	Berlin	dialface-438
Inscription	P(ublius) Maius M(arci) filius P(ublius) Allius M(arci) f(ilius) praef(ecti) solar(ium) f(aciendum) c(uraverunt)		
	Translation	Publius Maius, son of Marcus, Publius Allius, son of Marcus, prefects, took care to raise a sundial	

167 Cruseilles

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_78
Date	1st BCE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

168 Curubis

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_026
Date	20 BCE	Winter	Curubis 1
Findspot	Unknown	Berlin	

Inscription

M (arco) Appuleio / P (ublio) Silio Co (n) s (ulibus). / Cn (eio) Domitio / Malchione / duo vir (o) quin (quennali) / L (ucius) Sertorius Alexan (der) / L (ucius) Vitruvius Alexan (der) / aed (islands) / pluteum perpetuum / scholas III? / horologiu (m) / (via) m mun (iendam) (?) / ... P...

Translation

Under the consulate of Marcus Appuleius and Publius Silius, and under the Quinquennial duumvirate of Cneus Domitius Malchione, Lucius Sertorius Alexander and Lucius Vitruvius Alexander, city councilors, had a masonry awning installed, three public seats (or three rooms?), a clock, and paved the way (...).

169 Darro

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	1st half 1st century BCE	Winter	Darro 1
Findspot	Darro, Zone 0, House 3	Berlin	
Inscription		Translation	

170 Delos	
Type	Plane
Location	Temple
Date	Beginning of 1st century BCE
Findspot	Temple of Apollo
Inscription	

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_594
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_531
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-646
Inscription		Translation	

173 Delos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-647
Inscription		Translation	

174 Delos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_551
Date	88-69 BCE	Winter	
Findspot	Unknown	Berlin	dialface-653
Inscription		Translation	

175 Delos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	ca. 100 BCE	Winter	
Findspot	Unknown	Berlin	dialface-654
Inscription		Translation	

176 Delos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	before 88 BCE	Winter	
Findspot	Unknown	Berlin	dialface-656
Inscription		Translation	

177 Delos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	before 66 BC	Winter	
Findspot	Unknown	Berlin	dialface-657
Inscription		Translation	

178 Delos

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_559
Date	2nd century BCE	Winter	
Findspot	Private house	Berlin	dialface-708
Inscription		Translation	

179 Delos

Type	Unknown	Gibbs	
Location	Residence	Bonnin	
Date	2nd century BCE	Winter	
Findspot	Private house	Berlin	dialface-726
Inscription		Translation	

180 Delos

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	313-302 BCE	Winter	Delos 1
Findspot	Temple of Apollo	Berlin	
Inscription	... Αμύντα ανάθημα [β]οός προτομή, Αμύντα ανάθημα κλεψύδρα...		
		Translation	

181 Delos

Type	Sphere	Gibbs	1064
Location	Agora	Bonnin	A_530
Date	Unknown	Winter	Delos 10
Findspot	Agora of the Italians, southern side	Berlin	dialface-65
Inscription		Translation	

182 Delos

Type	Plane	Gibbs	5008G
Location	Residence	Bonnin	A_547
Date	2nd century BCE	Winter	Delos 11
Findspot	South of the Oikos of Dionysos	Berlin	dialface-257 & dialface-320
Inscription	Translation		

183 Delos

Type	Cone	Gibbs	3030G
Location	Agora	Bonnin	A_539
Date	After 126 BCE	Winter	Delos 12
Findspot	Agora of Theophrastos	Berlin	dialface-130
Inscription	Translation		

184 Delos

Type	Sphere	Gibbs	1002G
Location	Unknown	Bonnin	A_529
Date	Unknown	Winter	Delos 13
Findspot	Unknown	Berlin	dialface-3
Inscription	Translation		

185 Delos

Type	Cone	Gibbs	3029G
Location	Unknown	Bonnin	A_538
Date	Unknown	Winter	Delos 14
Findspot	Unknown	Berlin	dialface-129
Inscription	Translation		

186 Delos

Type	Cone	Gibbs	3032
Location	Unknown	Bonnin	A_541
Date	Unknown	Winter	Delos 15
Findspot	Unknown	Berlin	dialface-132
Inscription	Translation		

187 Delos

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_560
Date	2nd century BCE	Winter	Delos 16
Findspot	Residence east of the Reservoir of Inopos	Berlin	dialface-502
Inscription	Translation		

188 Delos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century BCE	Winter	Delos 17
Findspot	Unknown	Berlin	dialface-501
Inscription		Translation	

189 Delos

Type	Cone	Gibbs	3028G
Location	Temple	Bonnin	A_537
Date	Unknown	Winter	Delos 18
Findspot	Northwest of the Oikos of Dionysos	Berlin	dialface-128
Inscription		Translation	

190 Delos

Type	Plane	Gibbs	4001G
Location	Residence	Bonnin	A_550
Date	2nd or 1st century BCE	Winter	Delos 19
Findspot	Hellenistic Peristyle	Berlin	dialface-224
Inscription		Translation	

που χρόνος πάσης ημερας παρήκει
 που χρόνος πάσης ημεραςλοιπός
 τροπαι θ[ερι]ναι
 ισομερια
 τροπ[α]ι χ[ε]ι[με]ριναι

191 Delos

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	
Date	3rd century BCE	Winter	Delos 2
Findspot	Unknown	Berlin	
Inscription	Translation		
...όλική· ἑκατὸν πεντήκοντα τρεῖς· κλεψύδρα <ῆ>ς όλικῇ τετταράκοντα πέντε· κυμβί<ον> Μενύλλου ἀνάθημα...			

192 Delos

Type	Unknown	Gibbs	
Location	Temple	Bonnin	E_088
Date	Beginning of 1st century BCE	Winter	Delos 20
Findspot	Serapeion C	Berlin	
Inscription	Translation		
[ὁ δεῖνα Νικίου] / [— — — ρεὺς μελα]- [v]ηφόρος ὑπὲρ ἑαυτοῦ / καὶ τῆς [γυναικὸς Πατρο]- φίλας κ[αὶ τῶν τέκνων] / Νικίου κ[αὶ Ἀπολλωνίας] καὶ τοῦ οἴκε[ίου] Κλέωνος / τοῦ Κλέων[ο]ς, τοὺς βω- μοὺς καὶ τὸ λιθόστρωτο[v] / καὶ τὰς σφίγγας καὶ τ[ὸ] ὥρολόγιον Σαράπιδι, [Ἴσι]- / δι, Ἀνούβιδι, Ἀρποχράτ[ει], Υδρείῳ ἀνέθηκ[εν] ἐκ τῶν ἰδίων, ἐπὶ ἱερέως Ἀρτ[εμιδῶ]-ρου τοῦ Ἀπολλοδώρ[ου] / [Λ]αμπτρέ[ως, κα]νηφοροῦ- σης Θεοφίλ[ης] τῆς Ἀρ- / τεμιδώρου Λαμπτρέως θυγατρὸς, ζακορεύντος Εὐόδου.		..., son of Nikias [...], dressed in black, dedicated, at his own expense, for himself, for his wife Patrophila, for his children Nikias and Apollonia and for his (familiar) friend Kléon, son of Kleon, the altars, the paving, the sphinxes and the clock, in honor of Serapis, Anubis, Harpocrates and Hydreios, Artemidoros, son of Apollodore, of the deme of Lamptres , being high priest and Euodos being subordinate priest	

193 Delos

Type	Plane	Gibbs	5010
Location	Temple	Bonnin	A_549
Date	1st century BCE	Winter	Delos 21
Findspot	Near Apollo Temple	Berlin	dialface-259
Inscription	Translation		

194 Delos

Type	Cone	Gibbs	3024G
Location	Residence	Bonnin	A_375
Date	1st century BCE	Winter	Delos 22
Findspot	Sacred Lake	Berlin	dialface-124
Inscription		Translation	

195 Delos

Type	Cone	Gibbs	3027G
Location	Agora	Bonnin	A_536
Date	After 126 BCE	Winter	Delos 23
Findspot	North of Agora of Theophrastos	Berlin	dialface-127
Inscription		Translation	

196 Delos

Type	Sphere	Gibbs	1070G
Location	Unknown	Bonnin	A_554
Date	Unknown	Winter	Delos 24
Findspot	Unknown	Berlin	dialface-72
Inscription		Translation	

197 Delos

Type	Cone	Gibbs	3025G
Location	Unknown	Bonnin	A_534
Date	1st century BCE	Winter	Delos 25
Findspot	Sold from Mykonos to Delos in the 20th century, Winter believes it originated in Delos	Berlin	dialface-125
Inscription	ΙΗΝΩ ΝΩΝΙ ΗΡΟΙ	Translation	

198 Delos

Type	Cone	Gibbs	3026G
Location	Unknown	Bonnin	A_098
Date	After 126 BCE	Winter	Delos 26
Findspot	Unknown	Berlin	dialface-126
Inscription		Translation	

199 Delos

Type	Cone	Gibbs	
Location	Residence	Bonnin	A_558
Date	1st century BCE	Winter	Delos 27
Findspot	Peristyle of "the synagogue"	Berlin	dialface-503
Inscription		Translation	

200 Delos

Type	Sphere	Gibbs	
Location	Residence	Bonnin	
Date	1st century BCE	Winter	Delos 28
Findspot	Peristyle of "the synagogue"	Berlin	
Inscription		Translation	

201 Delos

Type	Unknown	Gibbs	
Location	Agora	Bonnin	E_087
Date	1st BCE - 1st CE	Winter	Delos 29
Findspot	Modern wall; likely from Agora of the Competaliasts	Berlin	
Inscription		Translation	

[Κο]μπεταλια[σται γενό]-
 [μ]ενοι Δία Ἐλ[ευθέριον καὶ]
 [Δι]όνυσον ἀν[έθηκαν]
 καὶ καθειέρωσ[αν, οἱ τον]
 [να]όν? καὶ το ὥρ[ολόγιον]
 [καὶ] τον βωμόν.
 ΓΟΝΑ

... Once named Competaliastes, they dedicated and consecrated the temple, the clock and the altar in honor of Zeus Eleuthérios and Dionysos

202 Delos

Type	Inscription	Gibbs	
Location	Temple	Bonnin	E_089
Date	c. 250 BCE	Winter	Delos 3
Findspot	Temple of Apollo	Berlin	
Inscription		Translation	

... Θεοδήμῳ τὸ περίφραγμα ποιήσαντι τοῦ ἡλιοτρο[π]ίου μισθοῦ
 Δ·
 φάλαγγες πύξιναι ...bΔΔ· καὶ οὗ αἱ Γραφαί· κυπαρίσσινα ξύλα II
 καὶ δρυῖνων παράτομα II. τὰ δρυῖνα κατεχρήσθη εἰς τὸ
 ἡλιοτρόπιον. Κτησίαι τῷ ἐργωνήσαντι...

To Théodèmos who made the balustrade for the sundial, remuneration ...
 20 pieces of boxwood, and where are the inscriptions (?) 5 pieces of cypress wood and 5 oak inclusions. The oak parts were used for the dial.

203 Delos

Type	Cone	Gibbs	3031G
Location	Unknown	Bonnin	A_540
Date	Unknown	Winter	Delos 30
Findspot	Unknown	Berlin	dialface-131
Inscription	Translation		

204 Delos

Type	Plane	Gibbs	5009
Location	Residence	Bonnin	A_548
Date	Late Antique	Winter	Delos 31
Findspot	Residence south of Sacred Lake	Berlin	dialface-258
Inscription	Translation		

205 Delos

Type	Sphere	Gibbs	1071G
Location	Unknown	Bonnin	A_555
Date	Early 2nd century BCE	Winter	Delos 4
Findspot	West of the excavation house	Berlin	dialface-73
Inscription	Translation		

206 Delos

Type	Sphere	Gibbs	1072G
Location	Palaestra / Gymnasion	Bonnin	A_553
Date	1st half of 2nd BCE	Winter	Delos 5
Findspot	Gymnasion	Berlin	dialface-74 & -324

Inscription

Side A, column 1, lines 75-76: (...).
 'Εν τῷ οἰκίῳ [τι ἀ] πέναντι εἰσιόντων· ὥρολόγιον ἐπὶ βάσεως·
 κλιμάκιον λίθινον
 πεντάβασμον· βωμὸν ξύλινον· πίνακα παλαιόν (...)

Face A, column 1, lines 140-141 (...). 'Εν τῇ σφαιριστρᾷ ἐπὶ τοῦ
 ὥρολογίου· τριτωνίσκο <v> μικρὸν (...)

Face A, column 1, lines 149-150: (...). 'Ιn τοῖς ἐξεδρίοις καὶ
 συγγωνίῃς· ὥρολόγιον ἐπὶ κιονίου (...)

Translation

Xenomedes Aristodemus (donated this) when he was head of the
 gymnasion...Side A, column 1, line 75-76: "(...). In the room facing the
 entrance: a marble sundial on a base; ; a five-degree scale; a wooden
 altar; an old painting (...). "Side A, column 1, lines 140-141:" (...). In
 the sphairistra, on the clock, a small triton (...). "Side A, column 1,
 lines 149-150:" (...). In the exedra and the corner rooms: a clock on a
 small column (...). "

207 Delos

Type	Inscription	Gibbs	
Location	Palaestra / Gymnasion	Bonnin	E_083
Date	before 155 BCE	Winter	Delos 6
Findspot	Gymnasion	Berlin	

Inscription

1. (...) 'Εν τῇ σ] φαιρίστ [ραι ἐπὶ το] ὃ ὥρολόγιον [τριτωνίσκο <v>
 μικρὸν] (...)
2. [' Εν τοῖς ἱεδρίοις καὶ οἱ ξεδρίοις καὶ οἱ ξεδρίοις καὶ οἱ ξεδρίοις
 καὶ οἱ ξεδρίοις κιονίου (...)

Translation

(...), two small lights; Foundation of Diotimos, son of Serenike, and
 Eumenos: In the Sphairistra at the Horologion: a little Triton and (...)
 In the exedra and the neighboring: A horologion on a column (...)

208 Delos

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	before 146 BCE	Winter	Delos 7
Findspot	Temple of Isis	Berlin	

Inscription

Translation

What Poseidonios donated from Rhamnous: a horologion made of
 clay, images of all kinds, weighing 148: a phial with the inscription
 "The Sanctuary of Serapis",

209 Delos

Type	Cone	Gibbs	3033
Location	Temple	Bonnin	A_542
Date	2nd century BCE	Winter	Delos 8
Findspot	Temple of Artemis	Berlin	dialface-133
Inscription	Translation		

210 Delos

Type	Sphere	Gibbs	1001
Location	Agora	Bonnin	A_528
Date	3rd century BCE	Winter	Delos 9
Findspot	Agora of the Delians, at the north end near the Tetragon	Berlin	dialface-2
Inscription	Translation		
[ιση]με[ρία] έψα έπι[τολή] [τρ]οπαι θε[ρ]ιναι			

211 Didyma

Type	Sphere	Gibbs	8002
Location	Temple	Bonnin	A_565
Date	early 2nd century BCE	Winter	Didyma 1
Findspot	East side of the Temple of Apollo	Berlin	dialface-307
Inscription	Translation		
[κα] ι πα [ρεδρευσας ε] ν τωι ιερω [ι] / Ἀπολλ[ωνι] Διδυει		And after having served in the temple of Apollo Didyma	

212 Diluntum

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_329
Date	3rd cent CE	Winter	Diluntum 1
Findspot	Mounted atop a pillar in the urban area, but no specific location survives	Berlin	dialface-573
Inscription		Translation	

213 Dimale

Type	Plane, Sphere, & Unknown	Gibbs	
Location	Agora	Bonnin	A_575
Date	2nd century BCE	Winter	Dimale 1
Findspot	Agora	Berlin	dialface-390 & dialface-391 & dialface-765 & dialface-821
Inscription	[.....] Ταραντινος ἐποίησ [εν]	Translation	(...) from Taranto, built this sundial.

214 Diocletianopolis

Type	Sphere	Gibbs	
Location	Baths	Bonnin	
Date	Late Antique	Winter	Diocletianopolis 1
Findspot	Unclear	Berlin	dialface-415
Inscription		Translation	

215 Dion

Type	Sphere	Gibbs	
Location	Temple	Bonnin	A_392
Date	169 BCE	Winter	Dion 1
Findspot	Temple of Dionysus	Berlin	dialface-216
Inscription	Translation T (itus) Granius Fe (lix) / Aed (ilis) Lib (ero) Patri and / Thiaso d [e] s [uis] f [aciendum] c [uravit] Titus Granius Felix, as an aedile, and his Thiasos did this at their own expense for the Liber Pater (= Dionysus)		

216 Djemila

Type	Plane	Gibbs	
Location	Temple	Bonnin	A_587
Date	Unknown	Winter	
Findspot	Christian basilica	Berlin	dialface-855 & dialface-856 & dialface-857 & dialface-858
Inscription	Translation		

217 Douar ech Chott

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Immediate surroundings of Douar ech-Chott station, in a wall	Berlin	dialface-778
Inscription	[S]oltsitium; / [ae]quinoci [ujernum; / a[equi]noci a[utu]mnale; / [bj]rumale. Translation (Summer) solstice; spring equinox; autumn equinox; winter (solstice)		

218 Dougga

Type	Cone	Gibbs	
Location	Villa Rustica	Bonnin	
Date	Late Antique	Winter	
Findspot	Byzantine farm	Berlin	dialface-710
Inscription		Translation	

219 Dougga

Type	Unknown	Gibbs	
Location	Temple	Bonnin	
Date	Unknown	Winter	
Findspot	Area of temple of Tellus	Berlin	dialface-777
Inscription	Modia Victorianfa] / u(otum) s(oluit) l(ibens).		
		Translation	Modia Victoriana has fulfilled her vow willingly

220 Durostorum

Type	Sphere	Gibbs	1054G
Location	Funerary	Bonnin	A_471
Date	3rd century CE	Winter	Durostorum1
Findspot	Durostorum	Berlin	dialface-55
Inscription		Translation	

221 Durres

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-761
Inscription		Translation	

222 Durres

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-762
Inscription		Translation	

223 Eckum

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Late Antique	Winter	
Findspot	Unknown	Berlin	dialface-404
Inscription		Translation	

224 Empuries

Type	Inscription	Gibbs	
Location	Temple	Bonnin	E_034
Date	1st century CE	Winter	Empurias 1
Findspot	Unknown	Berlin	
Inscription			
	] horolo [gium? / cum s] edib [us		
	Translation		
		...] a clock with public seats.	

225 Enserune

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	1st century CE	Winter	Enserune 1
Findspot	Urban area of Enserune	Berlin	
Inscription			
	OFBLICA		
	Translation		
		OFBILICA [producton stamp]	

226 Enserune

Type	Sphere	Gibbs	1047
Location	Villa Rustica	Bonnin	A_212
Date	3rd century CE - 4th century CE	Winter	Enserune 2
Findspot	Roman Villa les Curaties 31	Berlin	dialface-48
Inscription			
	Translation		

227 Ephesos

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_107
Date	Augustan	Winter	
Findspot	Dump near the Heroon of Ephesus	Berlin	
Inscription		Translation	

228 Ephesos

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_115
Date	Unknown	Winter	
Findspot	Terrace House 2, SR 29	Berlin	
Inscription		Translation	

229 Ephesos

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-412
Inscription		Translation	

230 Ephesos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	4th-1st century BCE	Winter	
Findspot	Unknown	Berlin	dialface-694
Inscription		Translation	

231 Ephesos

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Roman (Tabak 2010)	Winter	
Findspot	Unknown	Berlin	dialface-841
Inscription		Translation	

232 Ephesos

Type	Cone	Gibbs	3058G
Location	Unknown	Bonnin	A_418
Date	2nd century BCE	Winter	Ephesos 1
Findspot	Uncovered in 1907, possibly from within the agora	Berlin	dialface-159
Inscription	χψερινή ίσημερινή θεο[ι]νή	Translation	

233 Ephesos

Type	Inscription	Gibbs	
Location	Agora	Bonnin	E_051
Date	66 BCE	Winter	Ephesos 2
Findspot	Center of the agora	Berlin	
Inscription	Τίμων Ἀρτεμ[ι] / δώρου Νεώτε / ρος ἀγορανομῶν / ἐν τῷ ἐπὶ πρυτᾶ / νεῶς Μανδρ[ύ]λου / ἐνιαυτῷ τὸ στρώ / μα τὸ μετὰ τὸ μέ / σον τῆς ἀγορᾶς / ἐν ᾧ τόπω τὸ ὥρο / λόγιον ἔστηκε [ε]ν / καὶ τὴν π[α]ραστᾶ / δα Ἀρτέμιδι [καὶ] / τῷ δήμῳ ἀνέ / θηκεν.		
Translation	Timon Artemidorou, the younger of the Agoranomen, donated the pavement beyond the center of the Agora - where the Horologion is - as well as the vestibule of Artemis and the Demos under the Prytany of Mandylos.		

234 Ephesos

Type	Clepsydra	Gibbs	
Location	Agora	Bonnin	
Date	1st century BCE	Winter	Ephesos 3
Findspot	Inside the Monopteros	Berlin	
Inscription	Translation		

235 Ephesos

Type	Cone	Gibbs	
Location	Residence	Bonnin	A_570
Date	Before late 4th century CE	Winter	Ephesos 4
Findspot	Terrace House I Room B	Berlin	dialface-402
Inscription	Translation		

236 Ephesos

Type	Clepsydra	Gibbs	
Location	Agora	Bonnin	
Date	1st century CE	Winter	Ephesos 5
Findspot	West of the center of the agora	Berlin	
Inscription		Translation	

237 Ephesos

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	Imperial	Winter	Ephesos 6
Findspot	Recovered from Augustan fill west of the Tetragons agora	Berlin	
Inscription	Egyptian hieroglyphs	Translation	Speaking a word (sic. The temple is surrendered to its master in ht-ntr ... Recognizing the hours through Thoth, when the sky is covered with clouds, (the) Lord of Hermoupolis, first...

238 Ephesos

Type	Cone	Gibbs	3056G
Location	Residence	Bonnin	A_416
Date	1st century CE	Winter	Ephesos 7
Findspot	Slopes of the hill on which the Basilica of St. Johannes is built.	Berlin	dialface-157
Inscription		Translation	

239 Ephesos

Type	Cone	Gibbs	3057G
Location	Funerary	Bonnin	A_417
Date	1st century CE	Winter	Ephesos 8
Findspot	Uncovered during excavations for the Tusan Motel outside of Ephesus	Berlin	dialface-158
Inscription	Translation		

240 Eretria

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_381
Date	Imperial	Winter	Eretria 1
Findspot	Spolia in a modern home	Berlin	dialface-513
Inscription	Translation		

241 Erythrai

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	1st century BCE	Winter	Erythrai 1
Findspot	Urban area of Erythrai	Berlin	dialface-574
Inscription	Translation		
	Greek inscriptions above datelines		

242 Este

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_174
Date	50-100CE	Winter	Ateste 1
Findspot	Tomb of the Physician	Berlin	
Inscription	Translation Abbreviated Latin month names, the months July and August are missing		

243 Evelette

Type	Plane	Gibbs	4012
Location	Villa Rustica	Bonnin	A_321
Date	1st century CE	Winter	Evelette 1
Findspot	Roman villa at Evelette	Berlin	dialface-235
Inscription	Translation		

244 Falerio Picenus

Type	Cone	Gibbs	
Location	Other	Bonnin	
Date	Imperial	Winter	Falerio Picenus 1
Findspot	200m west of the amphitheater	Berlin	
Inscription	Translation		

245 Fayoum

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_108
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

246 Fermo

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_047
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-469
Inscription		Translation	

247 Florence

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_48
Date	End 3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

248 Florești

Type	Sphere	Gibbs	
Location	Other	Bonnin	A_487
Date	Unknown	Winter	
Findspot	Roman camp on upper terrace of the Somes	Berlin	dialface-753
Inscription		Translation	

249 Florești

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-773
Inscription		Translation	

250 Gafsa

Type	Representation	Gibbs	
Location	Unknown	Bonnin	
Date	5th-6th century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

251 Guajac

Type	Unknown	Gibbs	
Location	Baths	Bonnin	A_219
Date	1st - 3rd CE	Winter	
Findspot	Baths at Oppidum	Berlin	dialface-740
Inscription		Translation	

252 Genoa

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_12
Date	End 3rd-Early 4th	Winter	
Findspot	Built into wall of Cathedral of San Lorenzo, Genoa	Berlin	
Inscription		Translation	

253 Gerunda

Type	Representation	Gibbs	
Location	Residence	Bonnin	
Date	4th century CE	Winter	
Findspot	Bell-Lloc	Berlin	
Inscription		Translation	

254 Gommersheim

Type	Unknown	Gibbs	
Location	Villa Rustica	Bonnin	A_512
Date	3rd century CE	Winter	
Findspot	Villa rustica site	Berlin	dialface-522
Inscription		Translation	

255 Grand

Type	Representation	Gibbs	
Location	Temple	Bonnin	
Date	2nd century CE	Winter	
Findspot	Basilica	Berlin	
Inscription		Translation	

256 Grand

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	2nd century CE	Winter	Grand 1
Findspot	Gallo-Roman sanctuary in Grand	Berlin	
Inscription		Translation	

257 Gratianopolis

Type	Sphere	Gibbs	1046
Location	Unknown	Bonnin	A_211
Date	before 3rd century AD	Winter	
Findspot	Reused in Vienna Gate of Gratianopolis	Berlin	dialface-47
Inscription		Translation	

258 Guidonia Montecelio

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_141
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-482
Inscription		Translation	

259 Guimerà

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_295
Date	2nd century CE	Winter	Guimera 1
Findspot	Roman villa excavations in 1976	Berlin	dialface-488
Inscription		Translation	

260 Guissona

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_301
Date	3rd century CE	Winter	Guissona 1
Findspot	Villa romana La Malesa in Florejacs, near the Roman settlement of Iesso	Berlin	dialface-489
Inscription		Translation	

261 Halicarnassus

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_424
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-668
Inscription		Translation	

262 Hebron

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_441
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-447
Inscription		Translation	

263 Hegra

Type	Sphere	Gibbs	3095
Location	Unknown	Bonnin	A_403
Date	1st century CE	Winter	Hegra 1
Findspot	Madain Salih urban area	Berlin	dialface-197
Inscription	Translation		
mns' br ntn slm	Menasche, son of Natan Shalom		

264 Helvia Ricina

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_134
Date	2nd century CE	Winter	
Findspot	Villa Potenza	Berlin	dialface-623
Inscription	Translation		

265 Helvia Ricina

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_133
Date	2nd century CE	Winter	Helvia Ricina 1
Findspot	Villa Potenza	Berlin	dialface-363
Inscription	Translation		
Isidi Rici (nensi) horolog (ium) / [...] Q / AR-I [...] lem and font (em)	To Isis Ricinensis, a clock and [...] and a fountain.		

266 Heraclea Lyncestis

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_388
Date	3rd century CE	Winter	
Findspot	Unknown	Berlin	dialface-797
Inscription		Translation	

267 Heraclea Lyncestis

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_067
Date	157 CE	Winter	Herakleia Lyncestis 1
Findspot	Found in a private residence in Rome, inscription tells original location	Berlin	
Inscription	C(aio) Iunio Silano P(ublio) Dolabell(l)a co(n)s(ulibus) anno CLVII I L(ucius) Marius L(uci) f(ilius) Ter(entina tribu) holrologium d(e) p(ecunia) s(ua) f(aciendum) c(uravit).	Translation	Under the consulate of Caius Iunius Silanus and Publius Dolabella of the province in 157, Lucius Marius, son of Lucius, from the Terentina tribe built the Horologium at his own expense.

268 Herculaneum

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_117
Date	Before 79 CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

269 Herculaneum

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Late 1st century BCE	Winter	
Findspot	Unknown	Berlin	dialface-348
Inscription		Translation	

270 Herculaneum

Type	Cylinder & Sphere	Gibbs	7004G
Location	Residence	Bonnin	A_182
Date	Late 1st century BCE	Winter	Herculaneum 1
Findspot	Villa di Scipio	Berlin	dialface-289
Inscription		Translation	

271 Herculaneum

Type	Portable	Gibbs	
Location	Villa Rustica	Bonnin	A_173
Date	27 BCE - 79 CE	Winter	Herculaneum 2
Findspot	House of the Papyri	Berlin	dialface-544
Inscription		Translation	Month names in shorthand

272 Herculaneum

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	Before 79 CE	Winter	Herculaneum 3
Findspot	Specific findspot not named in Winter	Berlin	dialface-755
Inscription	Εξ ωραι μοχθοις ικανωταται αι δε μετ αυτας γραμμασι δεικνυμεναι ΖΗΘΙ λεγουσι βροτοις		
	Translation Six hours of work are enough, the rest of the hours in the day call to mortals with clear writing "Live!"		

273 Herculaneum

Type	Sphere	Gibbs	1031G
Location	Residence	Bonnin	A_026
Date	Before 79 CE	Winter	Herculaneum 4
Findspot	Casa Dell'Atrio A Mosaico	Berlin	dialface-32
Inscription	Translation		

274 Herculaneum

Type	Cone	Gibbs	3074G
Location	Residence	Bonnin	A_109
Date	Before 79 CE	Winter	Herculaneum 5
Findspot	Casa Della Gemma	Berlin	dialface-175
Inscription	Translation		

275 Herdade da Oliva

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_302
Date	3rd century CE	Winter	Herdade da Oliva 1
Findspot	Villa site near Augusta Emerita	Berlin	dialface-498
Inscription		Translation	

276 Herdonia

Type	Sphere	Gibbs	
Location	Funerary	Bonnin	A_054
Date	Late 1st century CE	Winter	Herdonia 1
Findspot	Near the north east gate	Berlin	dialface-387
Inscription		Translation	

277 Hierapolis

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century CE - 3rd century CE	Winter	
Findspot	Unknown	Berlin	dialface-314
Inscription		Translation	

278 Hierapolis

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Mid 1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-839
Inscription		Translation	

279 Diocletianopolis

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_486
Date	Late Antique	Winter	
Findspot	Diocletianopolis	Berlin	dialface-377
Inscription		Translation	

280 Histria

Type	Sphere	Gibbs	1044
Location	Unknown	Bonnin	A_581
Date	3rd century BCE	Winter	Istros 1
Findspot	Istros urban area	Berlin	dialface-45
Inscription	[—]ος χρό[νος]	Translation	... chronos

281 Ialysos

Type	Cone	Gibbs	
Location	Temple	Bonnin	
Date	1st century BCE	Winter	Ialysos 1
Findspot	In situ at the corner of the Temple of Athena	Berlin	dialface-575
Inscription		Translation	

282 Ialysos

Type	Sphere	Gibbs	
Location	Temple	Bonnin	
Date	1st century BCE?	Winter	Ialysos 2
Findspot	Filerimos find 13.11.1976, found near Doric fountain house	Berlin	dialface-576
Inscription		Translation	

283 Iasos

Type	Unknown	Gibbs	
Location	Theater	Bonnin	
Date	Unknown	Winter	
Findspot	Labeled as having come from the theater, though without specifics	Berlin	dialface-780
Inscription		Translation	

284 Iasos

Type	Clepsydra
Location	Agora
Date	330-325 BCE
Findspot	Found in a modern house, but inscription indicates installation in the agora of Iasos
Inscription	Long inscription, see REG 114, 2001, 160-189

Gibbs	
Bonnin	
Winter	Iasos 1
Berlin	
Translation	From Hannah 2009: 102: At Iasos in south-west Turkey in the third century bc a decree was passed which, among other things, established that a clay-pot of fixed size (a metre ³ by volume) should be set up high enough for everyone to see it, and made to have its water run out from sunrise. Citizens who failed to get to Assembly before the water had run out then forfeited their attendance fee.

285 Igaeditani

Type	Inscription
Location	Forum
Date	16 BCE
Findspot	Idanha-a-Velha, Portugal
Inscription	Q (uintus). Iallius Sex (ti) f (ilius) Papi (ria tribu) / Augu (sta?) Orarium donavit / Igaeditanis l (ibens) a (nimo) f (ecit) per mag (isterium?) Toutoni Arci f (ilii) / Malgeini Manli f (ilii) / Celti Arantoni f (ilii) / Ammini Ati f (ilii) / Domitio Aenobarbo / P. Cornelio Scipione co (n) [s (ulibus)]

Gibbs	
Bonnin	E_038
Winter	Igaeditani 1
Berlin	
Translation	Q. Iallius, son of Sextus, of the Papiria tribe, from Emerita Augusta, donated a clock to the Igaeditani. It was willingly and with a good heart that he accomplished it through the intermediary of the magistrates Tutonius, son of Arcius, Malgeinius, son of Manlius, of Celtius, son of Arantionius, Amminius, son of Atius, under the consulates of L. Domitius Ahenobarbus and P. Cornelius Scipio.

286 Imbros

Type	Cone
Location	Temple
Date	2nd century BCE - 1st century BCE
Findspot	Based on the Megaloi Theoi mentioned in its inscription and its calculated location,
Inscription	Gibbs suggests Imbros Λυσάγορας Πραξίνου Φυλάσιος Θεοῖς Μεγάλοις

Gibbs	3044G
Bonnin	A_352
Winter	Imbros 1
Berlin	dialface-144
Translation	Lysagoras, son of Hegesinos, Phylasios (donates this) the Theois Megalois

287 Interamna Lirenas

Type	Unknown	Gibbs	
Location	Theater	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-804
Inscription		Translation	

288 Istanbul

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_69
Date	1st century BCE	Winter	
Findspot	Near Beyazt Mosque	Berlin	
Inscription		Translation	Theodotus

289 Istanbul

Type	Sphere	Gibbs	1051G
Location	Unknown	Bonnin	
Date	2nd century BCE	Winter	
Findspot	Unknown	Berlin	dialface-52 & dialface-879
Inscription		Translation	

290 Istanbul

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	6th century CE	Winter	Konstantiopel 1
Findspot	Unknown	Berlin	
Inscription		Translation	

291 Isthmia

Type	Cone	Gibbs	3019G
Location	Temple	Bonnin	A_371
Date	1st century CE	Winter	Isthmia 1
Findspot	Imperial layers east of the Poseidon Sanctuary	Berlin	dialface-119
Inscription		Translation	

292 Isthmia

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_351
Date	Late Antique	Winter	Isthmia 2
Findspot	Rubble deposit near Palaimonion	Berlin	dialface-221
Inscription		Translation	

293 Iuvavum

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	A_335
Date	2nd century CE	Winter	Iuvavum 1
Findspot	Likely from a grave robbery at the necropolis of Kapuzinberg	Berlin	
Inscription		Translation	List of zodiac

294 Izmit

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_68
Date	2nd century BCE	Winter	
Findspot	Izmit, site of a paper mill	Berlin	
Inscription		Translation	

295 Jerusalem

Type	Representation	Gibbs	
Location	Temple	Bonnin	
Date	550 CE	Winter	
Findspot	Tomb of Georgia and Theodosia	Berlin	
Inscription		Translation	Georgia and Theodosia

296 Jerusalem

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_444
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-455
Inscription		Translation	

297 Jerusalem

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-456
Inscription		Translation	

298 Jerusalem

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_459
Date	1st century CE	Winter	
Findspot	Hill of Ophel	Berlin	dialface-465
Inscription		Translation	

299 Jerusalem

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-616
Inscription		Translation	

300 Jerusalem

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_454
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-617
Inscription		Translation	

301 Jerusalem

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_460
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-748
Inscription		Translation	

302 Jerusalem

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_461
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-749
Inscription		Translation	

303 Jerusalem

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_458
Date	before 70 CE	Winter	Jerusalem 1
Findspot	House of Herodes	Berlin	dialface-432
Inscription		Translation	

304 Jerusalem

Type	Cone	Gibbs	3092
Location	Unknown	Bonnin	A_450
Date	1st century BCE	Winter	Jerusalem 2
Findspot	Spolia in a Herodian context in the wall of the Temple Mount	Berlin	dialface-194
Inscription		Translation	

305 Jerusalem

Type	Cone	Gibbs	3093
Location	Unknown	Bonnin	A_451
Date	1st century BCE	Winter	Jerusalem 3
Findspot	Spolia in a Herodian canal	Berlin	dialface-195
Inscription	Translation		

306 Kabyle

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_482
Date	2nd century CE	Winter	Kabyle 1
Findspot	Unknown	Berlin	dialface-379
Inscription	Translation		

307 Kale Akte

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Late Hellenistic	Winter	
Findspot	Spolia in a modern agricultural wall	Berlin	dialface-652
Inscription	Translation		

308 Kallipolis

Type	Cone	Gibbs	
Location	Baths	Bonnin	A_379
Date	Late Antique	Winter	Kallipolis 1
Findspot	Late Roman bath complex	Berlin	dialface-215
Inscription		Translation	

309 Kamen Bryag

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_478
Date	2nd-3rd century CE	Winter	Kamen Bryag 1
Findspot	Valev 1990 claims two devices came from a Roman fort near Kamen Bryag	Berlin	dialface-739
Inscription		Translation	

310 Kamen Bryag

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_479
Date	2nd-3rd century CE	Winter	Kamen Bryag 2
Findspot	Valev 1990 claims two devices came from a Roman fort near Kamen Bryag	Berlin	
Inscription		Translation	

311 Kea

Type	Sphere	Gibbs	1073
Location	Unknown	Bonnin	A_385
Date	2nd century BCE	Winter	Ioulis 1
Findspot	Along a street in Ioulis	Berlin	dialface-75 & dialface-323
Inscription	Translation		
[τροπή χειμερινή]. ισημερία[α]. [— — εκφ]ανής. [τρο]πή θερι[νή]. B.1 [τροπή χειμερινή]. ισημερία. [— — εκφ]ανής. [τρο]πή [θ]εριν[ή].			

312 Kefalos

Type	Cone	Gibbs	3045
Location	Temple	Bonnin	A_353
Date	2nd century CE	Winter	Kephalos 1
Findspot	Early Christian basilica	Berlin	dialface-145
Inscription	Translation		

313 Keramos

Type	Inscription	Gibbs	
Location	Funerary	Bonnin	
Date	Hellenistic (reused in Imperial)	Winter	Keramos 1
Findspot	Stray find in the necropolis of Keramos	Berlin	
Inscription	Translation		

314 Keramos

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century CE	Winter	Keramos 2
Findspot	Found in modern Ortes	Berlin	
Inscription	Translation		
[...] ΙΥΜΙ κίονα καί τό ἐπ'αύτου ὠρολόγιον τῶι δήμῳ[ι] Θεοῖς Κεραμειτ[αῖς μεγαλοῖς]			

315 Kissamos

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	early 2nd century CE	Winter	Kisamos 1
Findspot	Rubble layer in a Roman villa	Berlin	dialface-579
Inscription	Translation		

316 Knidos

Type	Cone	Gibbs	3052
Location	Temple	Bonnin	A_414
Date	1st century CE	Winter	Knidos 1
Findspot	Found at the eastern foot of the Corinthian temple of Dionysus at Knidos	Berlin	dialface-153
Inscription	Translation		

317 Knossos

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_49
Date	1st century CE	Winter	
Findspot	Reused as animal trough	Berlin	
Inscription		Translation	

318 Kos

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-695
Inscription		Translation	

319 Kos

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-733
Inscription		Translation	

320 Kos

Type	Cone	Gibbs	3038G
Location	Unknown	Bonnin	A_409
Date	2nd century BCE	Winter	Kos 1
Findspot	Unknown	Berlin	dialface-138
Inscription	Translation		

321 Kos

Type	Cone	Gibbs	3039G
Location	Unknown	Bonnin	A_410
Date	2nd century BCE	Winter	Kos 2
Findspot	Unknown	Berlin	dialface-139
Inscription	Translation		

322 Kos

Type	Cone	Gibbs	3040G
Location	Unknown	Bonnin	A_411
Date	Unknown	Winter	Kos 3
Findspot	Unknown	Berlin	dialface-140
Inscription	Translation		

323 Kos

Type Unknown
Location Funerary
Date 1st century BCE
Findspot Found in a modern private home

Gibbs 8003
Bonnin E_069
Winter Kos 4
Berlin dialface-308

Inscription

[Φί] λιππος Αὐτοφώντο [ς]
 τὸ ὥρολόγιον Τύχαι
 Ἀγαθαὶ καὶ Ἀγαθῶι
 Δαίμονι καὶ τῷ δάμωι

Translation

Philippos Autophontos (donates) the horologion for happiness and salvation to Agathos and Daimon the demons

324 Kourion

Type Cone
Location Agora
Date 200 BCE
Findspot Agora of Kourion

Gibbs
Bonnin A_437
Winter Kourion 1
Berlin dialface-428

Inscription

Translation

325 Kyrene

Type Inscription
Location Agora
Date Mid 2nd century BCE
Findspot Unknown

Gibbs
Bonnin
Winter Kyrene 1
Berlin

Inscription

ἔφοροι οἱ ἐ[φ' ἱαρεὺς {?τοῦ δεῖνος}]²
 Φιλόξηνη[ος —————]
 Τελεσικρά[της —————]
 Δαμάνθης —————
 Φιλόξηνης —————
 Σῶσις Πο —————
 Φιλύτας —————
 Ἀγησίστρατο[ς —————]
 τὸ ὥροσκόπιον[ν ἀνέθηκαν (?)].

Translation

326 Kytaion

Type	Unknown	Gibbs	
Location	Temple	Bonnin	
Date	142 CE	Winter	
Findspot	Original installation unclear, but the device was recovered from a temple.	Berlin	dialface-422
Inscription		Translation	

327 Lafitte-sur-Lot

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_256
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-744
Inscription		Translation	

328 Lambaesis

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Found in a modern villa	Berlin	dialface-851
Inscription		Translation	

329 Lambaesis

Type	Plane	Gibbs	
Location	Forum	Bonnin	
Date	1st/2nd century CE	Winter	Lambaesis 1
Findspot	Carved into the surface of the forum	Berlin	dialface-580
Inscription	Translation		

330 Lambaesis

Type	Sphere	Gibbs	1058G
Location	Unknown	Bonnin	A_273
Date	2nd century CE	Winter	Lambaesis 3
Findspot	Found in a modern villa	Berlin	dialface-59
Inscription	Translation		

331 Lambaesis

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_032
Date	2nd century CE	Winter	Lambaesis 2
Findspot	Northwest of the amphitheater of Lambaesis	Berlin	
Inscription	Translation		
[C]ertus q(uin)q(uennalis) aedil(is) I[---] mensuras I [--- cu]m exagio II et ho[rologium ---] I ricu[-		... quinquennial magistrate , edile [...] measures [...] with weights [...] and a clock [...]	

332 Larino

Type	Sphere	Gibbs	1015
Location	Unknown	Bonnin	A_010
Date	1st century CE	Winter	Larium 1
Findspot	Unknown	Berlin	dialface-16
Inscription	Translation		

333 Latmos

Type	Cone	Gibbs	3049G
Location	Agora	Bonnin	A_543
Date	3rd century BCE	Winter	Herakleia am Latmos 1
Findspot	Found during 1873 excavations in the agora	Berlin	dialface-149 & dialface-150
Inscription	Translation		
Βασιλεῖ Πτολεμαίῳ Ἀπολλώνιος Ἀπολλοδοστου θεμισταγόρας Μενίσκου Ἀλεξανδρεὺς ἐποίηι.		To King Ptolemy, Apollonius, son of Apollodotos. Hemistagoras, son of Meniscos, of Alexandria, made this.	

334 Lavarigo

Type	Unknown	Gibbs	
Location	Villa Rustica	Bonnin	
Date	Find context: 1. century CE (dating based on coins and bricks)	Winter	
Findspot	Unknown	Berlin	dialface-869
Inscription	Translation		

335 Lefkada

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	A_396
Date	2./3. century BCE	Winter	
Findspot	Unknown	Berlin	dialface-690
Inscription	Ἀπολλωνίδα[ς] scaphe τὸ σκαφ[ί]νιογ δῶ[ρον].		
	Translation Apollonída[s] scaphe τὸ σκαφ[iron]		

336 Lemnos

Type	Inscription	Gibbs	8004
Location	Temple	Bonnin	E_091
Date	1st century BCE	Winter	Limnos 1
Findspot	Kabirion	Berlin	dialface-309
Inscription	Δέξιππος / Παγχάρου / Παιανιεύς / γενόμενος / κοσμητῆς / [Θε]οῖς Μεγάλοις / τὸ ὀρολόγιον / [ἀνέθηκεν].		
	Translation Dexippos Pancharouaus Paiania donated this timepiece as a cosmetic to the Theois Megalois		

337 Leontopolis

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	4th century BCE	Winter	Leontopolis 1
Findspot	Tell Yahudia	Berlin	
Inscription	Translation		

338 Leontopolis

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	4th century BCE	Winter	Leontopolis 2
Findspot	Tell Yahudia	Berlin	
Inscription	Translation		

339 Leptis Magna

Type	Sphere	Gibbs	1041
Location	Unknown	Bonnin	
Date	1st century CE	Winter	Leptis Magna 1
Findspot	Unknown	Berlin	dialface-42
Inscription	Translation		
'YDH 'RSM BN B'LSK I HBN' BTS"TM BTM TI IPN/T ST		RSM, son of B'LSK built this sundial and paid its costs	

340 Leptis Magna

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	1st century CE	Winter	Leptis Magna 2
Findspot	Urban area of Leptis Magna	Berlin	dialface-563
Inscription	Translation		

341 Leptis Magna

Type	Sphere	Gibbs	
Location	Theater	Bonnin	
Date	late 1st/early 2nd century CE	Winter	Leptis Magna 3
Findspot	Leptis Magna Theater	Berlin	dialface-581
Inscription		Translation	

342 Les Bolards

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_248
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-743
Inscription		Translation	

343 Linares

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_308
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-414
Inscription		Translation	

344 Lindos

Type	Sphere	Gibbs	
Location	Temple	Bonnin	
Date	Hellenistic	Winter	Lindos 1
Findspot	Temple of Athena Lindaia, Lindos	Berlin	dialface-583
Inscription		Translation	

345 Lisbon

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-813
Inscription		Translation	

346 Lleida

Type	Cone	Gibbs	
Location	Villa Rustica	Bonnin	A_519
Date	2nd century CE	Winter	Obachs 1
Findspot	Found at villa rustic	Berlin	dialface-589
Inscription		Translation	

347 Loutra

Type Sphere
Location Unknown
Date Imperial
Findspot Found in a modern house

Gibbs 1004
Bonnin A_484
Winter Traianopolis 1
Berlin dialface-5

Inscription

Πάσας ὥρας Διογένης ταις, ἐννέα Μούσαις. ᾧ τὸν ἡμέριον,
 Νεικομήδης, κάμνες Ἀρήτη, φίλων, φίλε,
 ἐβίσκοπον εὐγνώμονά / μ' ἡοῦς / εἴσηο Δις / ονιαιο Δις /
 ονιαιο Δις / ονισκοπον εὐγνώμονά / μ' ἡοῦς / εἴστο Δις /
 ονιαιο Δις / ονιαιο Διο / ονιαιο Διο / ονισκοπον
 εὐγνώμονά / μ' ἡοῦς / εἴσηο Δις / ἐονιαιο Διο / ονιαιο Διο]

Translation

Diogenes [dedicated] every hour to the nine Muses. This clock, it is you, Nicomedes, who made it thanks to your skill, oh friend among friends. I, prudent guardian of the dawn, it is Diogenes who placed me in his home

348 Luco dei Marsi

Type Cone
Location Unknown
Date Unknown
Findspot Unknown

Gibbs
Bonnin A_128
Winter
Berlin dialface-466

Inscription

Translation

349 Lugdunum Convenarum

Type Cone
Location Unknown
Date Unknown
Findspot Found in a street

Gibbs 3103
Bonnin A_255
Winter
Berlin dialface-205

Inscription

Translation

350 Lunel-Viel

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_215
Date	50-150 CE	Winter	Lunel-Viel 1
Findspot	Secondary deposition in the underfloor of a street	Berlin	dialface-440
Inscription		Translation	

351 Lykao Savatra

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	2nd BCE	Winter	Lykao Savatra 1
Findspot	Unknown	Berlin	dialface-313 & dialface-330 & dialface-331
Inscription		Translation	

352 Lyon

Type	Representation	Gibbs	
Location	Unknown	Bonnin	
Date	End of 2nd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

353 Maale Adummim

Type	Sphere	Gibbs	
Location	Temple	Bonnin	
Date	6th century CE	Winter	
Findspot	Martirius Monastery	Berlin	dialface-453
Inscription		Translation	

354 Madaba

Type	Representation	Gibbs	
Location	Temple	Bonnin	
Date	6th century CE	Winter	
Findspot	St. George's Church	Berlin	
Inscription		Translation	

355 Magnesia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	43-45 CE	Winter	
Findspot	Unknown	Berlin	dialface-526
Inscription		Translation	

356 Mamphis

Type	Cone	Gibbs	
Location	Temple	Bonnin	A_452
Date	Late 4th century CE	Winter	Mamphis 1
Findspot	East Church	Berlin	dialface-431
Inscription		Translation	

357 Mandeure

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_239
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-741
Inscription		Translation	

358 Mardimago

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_039
Date	Unknown	Winter	
Findspot	In the area of modern Villadose	Berlin	dialface-479
Inscription		Translation	

359 Maroneia

Type	Sphere	Gibbs	
Location	Residence	Bonnin	
Date	2nd century BCE	Winter	Maroneia 1
Findspot	Within the paleochora of Maroneia, 1972	Berlin	dialface-584
Inscription		Translation	

360 Marruvium

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_019
Date	Mid-1st century BCE	Winter	Marruvium 1
Findspot	Forum of Marruvium	Berlin	
Inscription	Q (uintus) Fadius T (iti) f (ilius) Q (uintus) Munatius N (umerii) f (ilius) Marssus (sic) (quattuor) vir (i) iur (e) d (icundo) / horologium de sua pecunia fac (iendum) coer (averunt).		
	Translation Quintus Fadius son of Titus and Quintus Munatius Marssus, son of Numerus, quattuorvirs responsible for justice, took care to raise a clock at their expense.		

361 Martberg

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_318
Date	2nd century CE	Winter	
Findspot	Unknown	Berlin	dialface-382
Inscription		Translation	

362 Maryut

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century BCE	Winter	Alexandria 3
Findspot	Unknown	Berlin	dialface-525
Inscription		Translation	

363 Matilica Matilicatis

Type	Globe	Gibbs	
Location	Forum	Bonnin	A_188
Date	1st century BCE	Winter	Matilica Matilicatis 1
Findspot	Foundation of Palazzo Pretorio, in the area of the Roman forum	Berlin	dialface-423 & dialface-485
Inscription		Translation	
τ(ροπαί) χ(ειμερῖναι) / αἰγ[ό]κερε(ω)ς / υδ[ο]οχ(οός) τεξότ(ης) / ι[χ]θ[ύ](ες) [σ]κορ(πιος) / κ[ο]ιός / ταύρο(ς) παρθ(ένος) / διδυ (μοι) λέ[ω]ν / καρκίν[ο](ς) / τ(ροπαί) [θ(ε)ρῖναι]			

364 Megara

Type	Cone	Gibbs	3020G
Location	Unknown	Bonnin	A_372
Date	1st century BCE	Winter	Megara 1
Findspot	Unknown	Berlin	dialface-120
Inscription		Translation	

365 Megina

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_044
Date	2nd century CE	Winter	Mayen 1
Findspot	Found in modern construction in Mayen, Germany	Berlin	
Inscription	In h (onorem) d (omus) [d (ivinae) ---] / horologium pecunia s] ua / et aed [em cum ornamentis? am] / omn [ibus and signis Marcus] / Iucun [dus and Bictoria Restituta] / [relatives and] / Iuc [undinus filius? d (ono) d (ederunt)]		
	Translation	In honor of the divine imperial family, Marcus (?) Lucundus and Bictoria (?) Restituta and Lucundinus the son donated a horologium and a building with his jewelry and statues from their own funds	

366 Memphis

Type	Cone	Gibbs	3087
Location	Funerary	Bonnin	A_490
Date	1st century CE - 2nd century CE	Winter	Memphis 1
Findspot	Hawara, Roman cemetery of Memphis	Berlin	dialface-188
Inscription	Translation		

367 Memphis

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_493
Date	4th century CE	Winter	Memphis 2
Findspot	Memphis metropolis	Berlin	
Inscription	Translation		

368 Metz

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_241
Date	2nd century CE	Winter	Metz 1
Findspot	A tomb in Mount Herapel near Forbach, south-west of Saarbrücken	Berlin	
Inscription	IVL IAN	Translation	July, January

369 Mevania

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_046
Date	2nd century BCE	Winter	Mevania 1
Findspot	Unknown	Berlin	dialface-376
Inscription	P (ubilii?) (Filius) Nortinus, la(ntus) T (iti) (filius) Aufidius quaestores far(r)arii	Translation	Norinus and Iantus Aufidius, Quaestores Farrarii

370 Mevania

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	2nd-1st century BCE	Winter	
Findspot	Modern construction	Berlin	dialface-539
Inscription		Translation	

371 Milano

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_13
Date	3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

372 Milano

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_045
Date	3rd century CE	Winter	
Findspot	Unknown	Berlin	dialface-467
Inscription		Translation	

373 Miletus

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_522
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-635
Inscription		Translation	

374 Miletus

Type	Cone	Gibbs	
Location	Agora	Bonnin	
Date	100 BC - 100 CE	Winter	Milet 1
Findspot	South market	Berlin	dialface-312
Inscription		Translation	

375 Miletus

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	1st century CE	Winter	Milet 2
Findspot	Unknown	Berlin	dialface-585
Inscription		Translation	

376 Miletus

Type	Cone	Gibbs	
Location	Funerary	Bonnin	
Date	1st century CE	Winter	Milet 3
Findspot	Heroon B	Berlin	dialface-591
Inscription		Translation	

377 Miletus

Type	Cone	Gibbs	3055G
Location	Theater	Bonnin	A_415
Date	2nd century CE	Winter	Milet 4
Findspot	Theater	Berlin	dialface-156
Inscription	Translation		

378 Miletus

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_054
Date	Imperial	Winter	Milet 5
Findspot	Modern House	Berlin	
Inscription	Translation		
[E] λπιδηφορος Ἀγαθίου Μοσχίων [-----] των τὸ ὥροσκόπιον		Elpidephoros Moschiôn, son of Agathios, architect (?) Made this sundial.	

379 Milos

Type	Cone	Gibbs	3043
Location	Unknown	Bonnin	A_397
Date	2nd century BCE	Winter	Melos 1
Findspot	Unknown	Berlin	dialface-143
Inscription	Translation		

380 Milos

Type	Inscription	Gibbs	
Location	Agora	Bonnin	E_070
Date	1st century CE	Winter	Melos 2
Findspot	In modern construction	Berlin	
Inscription	-----ιος Σωρεινιανός / [.] ω [...] τος ἀρχων Μηλίων τὸ γ' / ἐκ τῶν ἰδίων ἐν τῷ ἰδίῳ τόπῳ τὸ ὥρο / λόγιον νέρο / λόγιονενθηε		
	Translation --ios Sorinianos, son of ---, when he was Archon of Melians for the third time, set up the Horologion at this point.		

381 Milos

Type	Cone	Gibbs	3042
Location	Unknown	Bonnin	A_398
Date	1st century CE	Winter	Melos 3
Findspot	Unknown	Berlin	dialface-142
Inscription	Translation		

382 Modena

Type	Cone	Gibbs	
Location	Villa Rustica	Bonnin	A_127
Date	1st century CE	Winter	Modena 1
Findspot	Roman villa at Scartazza	Berlin	dialface-471
Inscription	Translation		

383 Modena

Type	Plane	Gibbs	
Location	Residence	Bonnin	
Date	1st century CE	Winter	Modena 2
Findspot	Castelfranco Emiglia	Berlin	
Inscription		Translation	

384 Mogontiacum

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_316
Date	3 or 4th century CE	Winter	Mogontiacum
Findspot	Mainz	Berlin	
Inscription		Translation	Latin abbreviations of the names of the months of the Julian calendar along the hole

385 Mons Claudianus

Type	Plane	Gibbs	4015
Location	Other	Bonnin	A_492
Date	1/2nd century CE	Winter	Mons Claudianus
Findspot	Carved on a boulder in an ancient Quarry	Berlin	dialface-238
Inscription		Translation	

386 Montagnana

Type	Cone	Gibbs	3082
Location	Unknown	Bonnin	A_116
Date	Imperial	Winter	Montagana 1
Findspot	Unknown	Berlin	dialface-183
Inscription	Translation		

387 Montana (Mihajlovgrad)

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_475
Date	2nd century CE - 3rd century CE, numismatic taq 378 AD	Winter	Montanesium 1
Findspot	Room with a coin hoard	Berlin	dialface-371
Inscription	Translation		

388 Montefiore d'Aso

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_48
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-446
Inscription	Translation		

389 Montegrotto Terme

Type	Plane	Gibbs	
Location	Villa Rustica	Bonnin	
Date	Imperial	Winter	
Findspot	Roman villa at Via Neroniana	Berlin	dialface-512
Inscription		Translation	

390 Montilla

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_309
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-401
Inscription		Translation	

391 Montirone

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	1st century CE - 3rd century CE	Winter	
Findspot	Unknown	Berlin	dialface-426
Inscription		Translation	

392 Morgantina

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-820
Inscription		Translation	

393 Morgantina

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-834
Inscription		Translation	

394 Murcia

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_05
Date	Last third of 3rd century CE	Winter	
Findspot	Cathedral	Berlin	
Inscription		Translation	

395 Mylasa

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	6. century CE	Winter	Mylasa 1
Findspot	Unknown	Berlin	dialface-680
Inscription	Translation		
	erutum in agro Veliterno		
	Excavated in a field in Veliterno		

396 Myrina

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_104
Date	Probably imperial	Winter	
Findspot	Necropolis of Myrina	Berlin	
Inscription	Translation		

397 Myrina

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_105
Date	Probably imperial	Winter	
Findspot	Necropolis of Myrina	Berlin	
Inscription	Translation		

398 Mytilene

Type	Unknown	Gibbs	
Location	Residence	Bonnin	
Date	3rd or 4th century CE	Winter	
Findspot	Found 1986 by H. Williams (Canadian School) when excavating a Roman villa	Berlin	dialface-659
Inscription		Translation	

399 Mytilene

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_524
Date	2nd century BCE	Winter	Mytiline 1
Findspot	Unknown	Berlin	dialface-588
Inscription		Translation	

400 Nafpaktos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-711
Inscription		Translation	

401 Naga

Type	Cone & Plane	Gibbs	
Location	Temple	Bonnin	A_498
Date	1st century CE	Winter	Naga 1
Findspot	Amun Temple	Berlin	dialface-192 & dialface-329
Inscription		Translation	

402 Naples

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-472
Inscription		Translation	

403 Naples

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_125
Date	Imperial	Winter	Fundort Unbekannt 7
Findspot	Unknown	Berlin	dialface-606
Inscription		Translation	

404 Narbo Martius

Type	Plane	Gibbs	5020
Location	Funerary	Bonnin	A_222
Date	2nd Cenury CE	Winter	Narbo Martius 1
Findspot	1869 excavations in the necropolis	Berlin	dialface-269 & dialface-321
Inscription	Translation		

405 Narni

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Via Cappucini Nuovi	Berlin	dialface-816
Inscription	Translation		

406 Narona

Type	Cone	Gibbs	
Location	Funerary	Bonnin	A_326
Date	1st century BCE	Winter	
Findspot	Outside the city walls in a necropolis	Berlin	dialface-403
Inscription	Translation		

407 Narona

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Under the Our Lady of the Snows Church	Berlin	dialface-794

Inscription

L(ucius) Lusius C(ai) f (ilius) Nic[--]
or
Nig[---]Q(uintus) Herennius Eup[----] f(aciendum) c(uraverunt)

Translation

Lucius Lusius Nic[--] or Nig[--], son of Gaius and Q.Hernnius Eup[--]
or Eud[---] commissioned the making of the dial

408 Naukratis

Type	Sphere	Gibbs	1040G
Location	Unknown	Bonnin	A_494
Date	2nd century BCE	Winter	Naukratis 1
Findspot	Unknown	Berlin	dialface-41

Inscription

Faded alphanumerics between hour lines.

Translation

409 Nemausus

Type	Inscription	Gibbs	
Location	Temple	Bonnin	E_039
Date	1st century CE	Winter	Nemausus 1
Findspot	Unknown	Berlin	

Inscription

Deo Nem[auso] [Se]x(tus) Utullius Perseus horologium et cerulas II
argenteas t(estamento) p(osuit)

Translation

Sex(tus) Utullius Perseus dedicates a horologium and two silver
candlesticks to the god of Nemausus in his will

410 Nepi

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_122
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-515
Inscription	Translation		

411 Nikaia

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_058
Date	287 CE	Winter	Nikaia 1
Findspot	Keramet	Berlin	
Inscription	Translation		

ἀγαθῇ [τύχῃ] / ἔτους δ' τῶν [κυρίων ἡ] / μ [ῶν] Αὐτοκρατ [όρων
Γαίου] / Οὐα [λ] ερί [ου Διοκλητιᾶ] / να [οῦ λητιᾶ] / να [οῦ
λητιᾶ] / να [οῦ λητιᾶ] / να [οῦ λητιᾶ] Αὐρ. Οὐαλ. Μα] /
ξιμιανού εὐ [σεβῶν εὐτυ] / χῶν Σεβαστ [ῶν ---] / ΟΣΟ
ΩΡΟΛΟΓΙΑ [--- τῆς] / τετρακομίας [ἐτείνμη] / σεν Αὐρ. Μαρκία
[νὸν ἐ] / γδίκου, βου <λ> ο [γράφου] / οἰνοποσιάρχου [βει] /
θυνιάρχου καὶ [εὐερ] / γετούντα τὸν δ [ῆμον] / σὺν τῇ γυνεὶ α
[ύτου Αὐ] / ρηλία Στεφάνη [μετὰ τῶν] / τέκνων αὐτῶν, [---] /
ἐπιμελησαμέν [ων] / Χρήστου γραμ [μ] ατέως / τοῦ δήμου καὶ
Αὐ / λου προθύτο [υ].

For good success! In the year 4 of our masters, the Emperor Gaius
Valerius Diocletianus and Marcus Aurelius Maximianus, the pious
and blessed Augusti, ... of the four village community (or Mendel:
the watch overseer), Aurelius Marcianus, the legal advisor,
boulographos, Oinopsiarches (club drinker / priisident of the wine
festival), Bithyniarches (imperial priest and head of the festival of the
Greeks in Bithynia) and benefactors of the people, with his wife and
their children, the scribe Chrestos and the Prothytes (priest in the
imperial cult) took care of cars. "

412 Nikopolis

Type	Inscription	Gibbs	
Location	Temple	Bonnin	E_068
Date	2nd century CE	Winter	Nikopolis 1
Findspot	Column sundial mount from a sanctuary	Berlin	
Inscription	Translation		

Ἀρτέμιδι Κελκ <α> ἰα <Σ> (ἐξτος) / Κο <μ> εἰ <ν> ιος Σούπερ /
βορ καὶ Κλαυδία Νευκη / φορὶς τὸ ὥρολόγιον / καὶ τὸν κείονα
καὶ τὴν / βάσιν ἐκ τῶν ἰδί <ω> / κατεσκευάσαν / ὑ <π>
οδιακονοῦν <τ> ες, / ἐπ <ι ἰ> ερείας Κλαυδίας / Σω <σ> ο <ὑ> ς,
ἐπιμελητοῦ <δ> ἐ / Τολυγνου Θεαέου.

Sextus Kominius Superbus and Claudia Neikephoris set up the
horologion, the column and the base for Artemis Kelkaia from their
own resources under the term of office of the priestess Claudia Soso,
the overseer was Julius Theagenos

413 Nola

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_010
Date	1st century BCE	Winter	Nola 1
Findspot	In modern construction outside the city walls	Berlin	
Inscription	C(aius) Catius M(arci) f(ilius) llllvir campum publice / aequandum curavit maceriem / et scholas et solarium semitam / de s(ua) p(ecunia) f(aciendum) c(uravit) / Genio coloniae et colono- rum I honoris causa / quod perpetuo feliciter utantur.		
	Translation Caius Catius, son of Marcus, Quattuorvir, used his own fortune to plan a public space for the genius of the colonies and in honor of the colonies and to build club bars and a fenced-in solarium for permanent and happy use.		

414 Nomentum

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_008
Date	Mid-1st century CE	Winter	Nomentum 1
Findspot	Found in modern construction	Berlin	
Inscription	C(aius) [...] VIGILUM [...] A(uli) f(ilius) TI(beri) CAESA[ris Aug (usti) ...] FLA[men ...] PROCUR[ator ...] PRAE[f (ectus) ...] PROVINC[iae ...] HOROLOGIIUM [d (e) s(ua) p(ecunia) donum dedit]		
	Translation Caius... vigilum ... son of Aulus Tiberius Caesar Augustus Flamen procurator... praefect of the province, gave this horologium with his own money		

415 North Palatine Uplands

Type	Plane	Gibbs	
Location	Residence	Bonnin	A_315
Date	3rd or 4th century CE	Winter	
Findspot	Likely from North Palatine Uplands, Germany	Berlin	dialface-627
Inscription	Translation		

416 Nova Gorica

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_334
Date	Unknown	Winter	
Findspot	Pavlini v Lokah archaeological site	Berlin	dialface-524
Inscription		Translation	

417 Novaesium

Type	Sphere	Gibbs	
Location	Forum	Bonnin	A_324
Date	Before 100 CE	Winter	Novaesium 1
Findspot	Legion camp, section K	Berlin	dialface-369
Inscription		Translation	Roman numerals 1-12

418 Numlulis

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_029
Date	2nd century CE	Winter	Numlulis 1
Findspot	Stray find near the Temple of Saturn	Berlin	
Inscription	----- / [pa] go and civitati Numlulitano [rum] / [---] ex testame [n] to suo [---] / [---] + Cornelio An [t] onino A ++ o + [---] / [hered↵] ibus suis TA [---] reliquit II (milia) HS [n (umum) ---] / [---] eiusdem Cornelii An [tonini↵] / [ut die de] dicationis horologi epulatis [---].		
Translation	[...] to the pagus and to the citizens of Numluli [...] in execution of his will [...] to Cornelius Antoninus son of A [...], as well as his descendants [...], left the sum of two thousand sesterces [...] to the same Cornelius Antoninus so that he could provide the banquets for the day of the dedication of the clock.		

419 Ocriculum

Type	Cone	Gibbs	3081
Location	Unknown	Bonnin	A_115
Date	Imperial	Winter	Ocriculum 1
Findspot	Unknown	Berlin	dialface-182
Inscription	Translation		

420 Odena

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_296
Date	Imperial	Winter	Espelt 1
Findspot	Roman Villa of Espelt	Berlin	dialface-487
Inscription	Translation		

421 Ogulin

Type	Sphere	Gibbs	1063G
Location	Unknown	Bonnin	A_330
Date	Unknown	Winter	
Findspot	Found near a modern church	Berlin	dialface-64
Inscription	Translation		
I [ovi] o [ptimo] m [aximo] Sol Invicto Conser [atori] Aug [usti] n [ostri]		To Jupiter very good, very great and to Sol Invictus, protector of our Augustus.	

422 Oinoanda

Type	Inscription	Gibbs	
Location	Funerary	Bonnin	E_053
Date	1st half 2nd century CE	Winter	Oinoanda 1
Findspot	20m east of the South Stoa (Winter argues reuse from a funerary context)	Berlin	
Inscription	[Lines 1–3] [. . .] 4–6 [. . .]. ΜΟΝΙ [.] Ὑ τὴν εἰθύδικον / νν Νέμεσιν · ν / 7–9 τὴν μέν, ὅτ' ὀγδοί / κοντα διεκπεράσας / ἐνιαυτοῦς 9–11 πάντας [ἄ] μωμῆτω πλήσεν / .. ἐν ἡρεμίῃ, .. / 12–14 γνῶμονά δ', ὅττι τοῖ / ΙΣΕΝΟΣ. ΙΣΕΝΕΣ / ὥρη 14–16 δαίτης καὶ / λιπαρῶν ἤθενεν. α .. / . γυμνασίων ..		
Translation	... Absolutely just nemesis, when he had completed his 80 years, he accomplished it in an irreproachable tranquility, and a sundial because [...] the hour of the meal and the habits of the shining gymnasiums of oil ...		

423 Olympia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	4th century BCE	Winter	
Findspot	Unknown	Berlin	dialface-736
Inscription	Translation		

424 Olympia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	4th century BCE	Winter	
Findspot	Unknown	Berlin	dialface-737
Inscription	Translation		

425 Olympis

Type	Plane	Gibbs
Location	Unknown	Bonnin
Date	Imperial	Winter
Findspot	Found during excavations of a well	Berlin
Inscription		Translation

426 Oplontis

Type	Sphere	Gibbs
Location	Residence	Bonnin A_087
Date	1st century CE	Winter
Findspot	Villa B	Berlin dialface-481
Inscription		Translation

427 Oplontis

Type	Cone	Gibbs
Location	Residence	Bonnin A_124
Date	1st century CE	Winter Oplontis 1
Findspot	Villa A, Peristyle garden #32	Berlin dialface-476
Inscription		Translation

428 Oropos

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	4th century BCE	Winter	Oropos 1
Findspot	Northern area of the temple	Berlin	
Inscription	Translation		

429 Oropos

Type	Plane	Gibbs	8005
Location	Temple	Bonnin	A_563
Date	350 BCE - 300 BCE	Winter	Oropos 2
Findspot	Temple of the Amphiareion	Berlin	dialface-319 & dialface-718

Inscription

[ὅταν μὲν ἐπὶ τοῦ κ] ὑκλου τοῦ ἐνγύς τοῦ γνώμονος ἡ σκιά πορε
[ύηται, ἐν τούτῳ τῷ μέρει τοῦ ὁρολογίου τὰς τροπὰς τὰς τοῦ
ἡλίου] / [σημαίνει χειμεριν] ἀς· ὅταν δὲ τοὺς μεγίστους
κύκλους αἱ σκι [αἱ πορεύονται, τὰς ἰσημερίας σημαίνουσιν·
τοῦτο τὸ μέρος] / [vacat σημαίνει τῇ] ν σκιὰν τοῦ γνώμονος·
ὅταν μὲν φθινοπῶρι [νῇ παρῇ ἰσημερία, ὅταν δὲ ἔαρινῃ, ἡ σκιά
ἀφανίζεται]·
Θεόφιλος Θ [- - -] / [- - - = Ἀθηναῖος {²⁷Ἀθήναιος (?)} ²⁷ Γ [- - -]

Translation

When the shadow passes over the circle near the gnomon, it indicates the winter solstice in that part of the dial; when the shadows travel the large circles, they indicate the equinoxes; the shadow of the gnomon [indicates] this part as soon as the autumn equinox is there; it disappears at the spring equinox

430 Oropos

Type	Unknown	Gibbs	5007G
Location	Unknown	Bonnin	A_546
Date	350-322 BCE	Winter	Oropos 3
Findspot	Unknown	Berlin	dialface-256 & dialface-717

Inscription

Translation

431 Oropos

Type	Plane	Gibbs	5005G
Location	Unknown	Bonnin	A_544
Date	2nd century BCE	Winter	Oropos 4
Findspot	Unknown	Berlin	dialface-254
Inscription	Translation		

432 Oropos

Type	Plane	Gibbs	5006G
Location	Unknown	Bonnin	A_545
Date	2nd BCE	Winter	Oropos 5
Findspot	Unknown	Berlin	dialface-255
Inscription	Translation		

433 Oropos

Type	Cone	Gibbs	3021G
Location	Temple	Bonnin	A_373
Date	1st century BCE	Winter	Oropos 6
Findspot	Church of Saint George	Berlin	dialface-121
Inscription	Translation		
Ἰάσων Ἰάσονος Ἀζηνι[εύς] Ἑρμῆι		Jason son of Jason of the demos Azenieus to Hermes	

434 Ortonovo

Type	Sphere	Gibbs	
Location	Residence	Bonnin	
Date	Imperial	Winter	
Findspot	Domus degli Affreschi	Berlin	dialface-868
Inscription		Translation	

435 Ostia

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_03
Date	3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription	D M L · AEMILIO DAPHNO POMP TINA VIXIT · ANN IIII · D · VI LIVIA DAPHNE · FIL · DULCISIMO		
	Translation To the spirits of the dead. For Lucius Aemilius Daphnus of the Pomptina voting-tribe. He lived 4 years and 6 days. Livia Daphne (set this up) for her dearest son.		

436 Ostia

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_14
Date	End of 3rd century CE	Winter	
Findspot	Façade of the House of Prince Aldobrandini	Berlin	
Inscription		Translation	

437 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_57
Date	3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

438 Ostia

Type	Cone	Gibbs	3061G
Location	Temple	Bonnin	A_097
Date	1st century BCE	Winter	Ostia 1
Findspot	Found during cleaning work in the area of the four temples at Ostia	Berlin	dialface-162
Inscription		Translation	

439 Ostia

Type	Plane	Gibbs	5012G
Location	Unknown	Bonnin	A_156
Date	Late Antique	Winter	Ostia 10
Findspot	Unknown	Berlin	dialface-261
Inscription		Translation	

440 Ostia

Type	Sphere	Gibbs	1032G
Location	Baths	Bonnin	A_027
Date	1st century CE	Winter	Ostia 2
Findspot	On the Decumanus Maximus near the Neptune baths	Berlin	dialface-33
Inscription		Translation	

441 Ostia

Type	Cone	Gibbs	3062G
Location	Forum	Bonnin	
Date	1st century CE	Winter	Ostia 3
Findspot	Found on the east side of the intersection of Decumanus and Piazza dei Lari	Berlin	dialface-163
Inscription		Translation	

442 Ostia

Type	Plane	Gibbs	5013G
Location	Unknown	Bonnin	A_137
Date	1st century CE	Winter	Ostia 4
Findspot	Unknown	Berlin	dialface-262
Inscription		Translation	

443 Ostia

Type	Plane	Gibbs	5014G
Location	Baths	Bonnin	A_138
Date	1st century CE	Winter	Ostia 5
Findspot	Reused as a paving stone in the Decumanus	Berlin	dialface-263
Inscription	Translation		

444 Ostia

Type	Sphere	Gibbs	1034
Location	Villa Rustica	Bonnin	A_029
Date	Late 1st century CE	Winter	Ostia 6
Findspot	Imperial villa at Tor Paterno	Berlin	dialface-36
Inscription	Translation		

445 Ostia

Type	Sphere	Gibbs	1033G
Location	Unknown	Bonnin	A_028
Date	Early Imperial	Winter	Ostia 7
Findspot	Unknown	Berlin	dialface-34
Inscription	Translation		

446 Ostia

Type	Sphere	Gibbs	1061G
Location	Residence	Bonnin	A_034
Date	2nd Cenury CE	Winter	Ostia 8
Findspot	Found in a house near the Porta Romana	Berlin	dialface-62
Inscription	Translation		

447 Ostia

Type	Cone	Gibbs	3063G
Location	Unknown	Bonnin	A_099
Date	Imperial	Winter	Ostia 9
Findspot	Unknown	Berlin	dialface-164
Inscription	Translation		

448 Paestum

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_044
Date	Late Antique	Winter	Paestum 1
Findspot	Unknown	Berlin	dialface-441
Inscription	Translation		

449 Pagus Laebactium

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	
Date	58-64 CE	Winter	Laebactium, Pagus 1
Findspot	Reinstalled at the altar of a church in Longarone	Berlin	
Inscription	Translation		
In honorem / [[Neronis]] Claudi / Caesaris Augusti / Germanici / Sex(tus) Paeticus Q(uinti) f(ilius) / Tertius et / Sex(tus) Paeticus Sex(tii) f(ilius) / Firmus / horilogium cum sedibus / paganis laebactibus / dederunt.		In honor of the emperor Nero, Sex(tus) Paeticus, son of Q(uintus), Tertius and Sex(tus) Paeticus Firmus, son of Sex(tus) donated the sitting horology to the inhabitants of the Laebactian pagus	

450 Palermo

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_15
Date	Third quarter of 3rd CE	Winter	
Findspot	Crypt of the Duomo	Berlin	
Inscription	Translation		

451 Frejus

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_593
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		

452 Palermo

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_16
Date	Third quarter of 3rd CE	Winter	
Findspot	Crypt of the Duomo	Berlin	
Inscription		Translation	

453 Palestrina

Type	Plane	Gibbs	5017
Location	Forum	Bonnin	
Date	Mid-1st century CE	Winter	Praeneste 1
Findspot	South exterior face of the basilica	Berlin	dialface-266 & dialface-787
Inscription		Translation	

454 Palestrina

Type	Cone	Gibbs	3084G
Location	Unknown	Bonnin	A_118
Date	1st century CE	Winter	Praeneste 2
Findspot	Unknown	Berlin	dialface-185
Inscription		Translation	

455 Palestrina

Type	Sphere	Gibbs	1018
Location	Unknown	Bonnin	A_013
Date	2nd century CE	Winter	Praeneste 3
Findspot	Unknown	Berlin	dialface-19
Inscription	Translation		

456 Palmyra

Type	Sphere & Convex	Gibbs	1074
Location	Temple	Bonnin	A_468
Date	1st century BCE	Winter	Palmyra 1
Findspot	In a house built inside the Baal Temple	Berlin	dialface-76 & dialface-725
Inscription	Translation Astronomical inscription		

457 Palmyra

Type	Cone	Gibbs	3096
Location	Forum	Bonnin	A_465
Date	64 CE	Winter	Palmyra 2
Findspot	North of the last column in the Via Principalis of the Diocletian's camp, near a building that Puchstein interpreted as the	Berlin	dialface-198
Inscription	Translation		

458 Palmyra

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_464
Date	3rd century CE	Winter	Palmyra 3
Findspot	Caravanserai Room 10	Berlin	dialface-523
Inscription	Translation		
	Χιμερινὸς τροπικὸς / Ἰσημερινός / [Θ]ερινὸς τροπικὸς[ς] Winter solstice / equinox / summer solstice		

459 Pantikapaion

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_585
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-421
Inscription	Translation		

460 Paphos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_578
Date	End 3rd / beginning 2nd century BCE	Winter	Paphos 1
Findspot	Kato, Paphos	Berlin	dialface-590
Inscription	Translation		
	[.....] ΕΠΟΙΕΙ		

461 Paphos

Type	Cone	Gibbs	3048
Location	Unknown	Bonnin	A_436
Date	Unknown	Winter	Paphos 2
Findspot	Unknown	Berlin	dialface-148
Inscription		Translation	

462 Paphos

Type	Cone	Gibbs	
Location	Temple	Bonnin	A_438
Date	1st century CE	Winter	Paphos 3
Findspot	Kouklia	Berlin	dialface-449
Inscription		Translation	

463 Paphos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Imperial	Winter	Paphos 4
Findspot	Unknown	Berlin	dialface-619
Inscription		Translation	

464 Paros

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century BCE	Winter	Paros 1
Findspot	Modern monastery	Berlin	dialface-658
Inscription		Translation	

465 Paros

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	1st century BCE	Winter	Paros 2
Findspot	Modern monastery	Berlin	dialface-592
Inscription		Translation	

466 Paros

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	1st century BCE	Winter	Paros 3
Findspot	Modern monastery	Berlin	dialface-593
Inscription		Translation	

467 Passo Corese

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_143
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-483
Inscription	Translation		

468 Patras

Type	Cylinder	Gibbs	
Location	Unknown	Bonnin	A_521
Date	1st BCE - 1st CE	Winter	Patras 1
Findspot	Unknown	Berlin	dialface-310
Inscription	Translation		

469 Pautalia

Type	Inscription	Gibbs	
Location	Forum	Bonnin	A_485
Date	Unknown	Winter	Pautalia 1
Findspot	Northwest of the forum of Pataulia	Berlin	dialface-380

Inscription

ἀγαθῇ τύχῃ. /
οἰκῶ θεῖῳ καὶ τῇ πόλει / ἀρχιτέκτονες Λαομέδων καὶ Γλαυκίας
/ οἱ Στράτωνος ν τὸ ὠροσκόπιον.

Translation

To good fortune. The architects Laomedôn and Glaukias, both sons of Stratôn, dedicated the sundial in honor of the city and the domus divina.

470 Pergamon

Type	Clepsydra	Gibbs	
Location	Agora	Bonnin	
Date	3rd/2nd century BCE	Winter	Pergamon 1
Findspot	Altar in the upper agora	Berlin	
Inscription	Translation		
Αγ[ρ]ονόμο[ος δά]μον πάσαι χ[ώ]ραι τότ] Απελλῆς / [ἦν, ὅ]τ' ἀειμνά[σ]του, ξεῖν', ἀ[γορα]νομίας / [μά]ρτυρα κρηναί[αις με διάκτορον εἶσατο Νύμφαις / [Ἐπιμῆ]ν εὐνομίας αἶδιοι φύλακα / [τᾶς] ἔνεκ' εὐόλβου κέραος ῥύοις ἄδ' ἀγοραίοις / μανύσει τακτοῦ τέρμα χυθεῖσα ξπόνον.			

471 Pergamon

Type	Sphere	Gibbs	
Location	Palaestra / Gymnasion	Bonnin	
Date	2nd century CE	Winter	Pergamon 10
Findspot	Gymnasion at the upper palace courtyard	Berlin	dialface-595
Inscription	Translation		

472 Pergamon

Type	Sphere	Gibbs	1069G
Location	Palaestra / Gymnasion	Bonnin	A_571
Date	2nd century BCE	Winter	Pergamon 2
Findspot	In front of room M of the upper gymnasion during the excavations in Dornfeld in 1907	Berlin	dialface-70 & dialface-71
Inscription	Translation		

473 Pergamon

Type Clepsydra
Location Palaestra / Gymnasion
Date 150 BCE
Findspot North wall of the middle terrace in the gymnasium
Inscription

Gibbs
Bonnin
Winter Pergamon 3
Berlin

Translation

(...), the (rooms) in the gymnasium of the Neoi were renewed and that exedra, which is the first oikos at that point when one enters the stoa (seen from the sundial) by its wall overformed with (marble cornices?), the columns replaced and the parastades made of marble, (...)

474 Pergamon

Type Inscription
Location Palaestra / Gymnasion
Date 1st century BCE
Findspot Neoi gymnasium
Inscription
(...) εἰσπορευομένων ἀπὸ τοῦ σκιακοῦ ὥρολο [γῖ] ου εἰς τὴν στοάν (...)

Gibbs
Bonnin
Winter Pergamon 4
Berlin
Translation
Long text, translated in Hepding 1907

475 Pergamon

Type Cone
Location Unknown
Date 1st half 1st century CE
Findspot Burgberg
Inscription

Gibbs
Bonnin
Winter Pergamon 5
Berlin dialface-594 & dialface-698
Translation

476 Pergamon

Type	Cone	Gibbs	3054G
Location	Unknown	Bonnin	A_569
Date	Late 1st century CE	Winter	Pergamon 6
Findspot	Unknown	Berlin	dialface-155
Inscription	Translation		

477 Pergamon

Type	Cone	Gibbs	3053G
Location	Unknown	Bonnin	A_568
Date	Imperial	Winter	Pergamon 7
Findspot	Unknown	Berlin	dialface-154
Inscription	Translation		

478 Pergamon

Type	Inscription	Gibbs	8006
Location	Temple	Bonnin	E_056
Date	First half 2nd centuryCE	Winter	Pergamon 8
Findspot	Level of the vestibule at the Temple of Asklepios	Berlin	dialface-303
Inscription	Translation		
Π. Αἴλιος Ἰνγένουος [Ἀσκληπιῶι (?)] Τὸ ὥρολόγιον σὺν τῇ [μηχα] - νοποιᾷ κατασκευ [άσας ἐκ τῶν] ιδίῳν ἀνενθ].		P(ublius) Aelius Ingenuus donates the horologion with its to the god Asklepios (?) from his own resources	

479 Pergamon

Type Inscription
Location Forum
Date 120-215 CE
Findspot Unknown

Gibbs
Bonnin E_080
Winter Pergamon 9
Berlin

Inscription

[ἡ βουλὴ καὶ ὁ δῆμος] / [τῆς μητροπόλεως τῆς Ἀσίας] / καὶ δις νεωκόρου πρώτης / Περγαμηνῶν πόλεως / εἰμίμβιεν / ἠηῖβιεν / Κλ. Νεικομήδους υἱὸν Κυρεῖνα Πιον / χειλίαρχον σπείρης ἱππικῆς Ῥωμαίων πολιτῶν / χειλίαρχον λεγιῶνος δ' Σκυθικῆς, χειλίαρχον / λεγιῶνος γ' Γαλλικῆς, ἑπαρχον εἰλης Φρυγῶν / ἀρχιερέα Ἀσίας νῶν τῶν ἐν Περγάμῳ, κτίστην / ἔργων · προπύλου τοῦ πρὸς τῇ ἀγορᾷ καὶ ὥροσκο / πίου καὶ ζυγοστασίῳ, ἀγωνοθέτῃ δι' αἰῶνος / τῶν σεβαστονευκιοφορίων κοινῶν τῆς Ἀσίας / ἐκ τῶν ἑαυτοῦ χρημάτων {vac.} ² πατέρα / Τ. Οὐιβίου Πίου ἐπάρχου σπείρης Σπανῶν πρῶ / τῆς, χειλίαρχου σπείρης [...] αὐθαιρέτων πολὶ / τῶν καὶ χειλίαρχου λεγιῶνος ζ Κλαυδίας / [- -] ΟΥ [ἐπάρ] χου εἰλης ΑΒΑΡΒΑΝ ..

Translation

The council and the people of the city of Pergamon, metropolis of Asia, two neocories and the first, honor Tib(erius) Cl(audius) Pius, son of Nicomedes, from the tribus Qu[i]rina, tribunus militum of the cohors civicum Romanorum equitata, tribunus militum of the legio IV Scythica, tribunus militum of the tegio III Gallica, praefectus of the ala Phrygum, high priest of the imperial cult when the parliament held its meeting in Pergamon of the Koinon Asia Minor, due to the (following) foundations: The propylon for the agora and the horoscopy and the measurement and weight station, he also took the costs for games as part of the imperial cult of the koinon KJeinasien and was Ago for life [---] the father T (itus) Vibius Pius, prefectus the the cohors I Hispanorum (-), tribunus militum the cohors [] voluntariorum civicum Romanorum and tribunus militum the legio VI [I] Claudia [-], praefectus the ala ABAPBAN [---].

480 Perge

Type Cone
Location Unknown
Date 1st century CE - 3rd century CE
Findspot Unknown

Gibbs
Bonnin
Winter
Berlin dialface-417

Inscription

Translation

481 Perge

Type Unknown
Location Other
Date Unknown
Findspot Stray find in the acropolis of Perge

Gibbs
Bonnin
Winter
Berlin dialface-665

Inscription

Translation

482 Perge

Type	Cone	Gibbs	
Location	Residence	Bonnin	A_434
Date	End of 2nd century CE	Winter	Perge 1
Findspot	Northeast corner, House V 10	Berlin	dialface-596
Inscription	Translation		
Σεξτείλιος ἀρχιτέκων	Sextilius was the builder		

483 Petres

Type	Cone	Gibbs	
Location	Temple	Bonnin	A_574
Date	Hellenistic	Winter	Petres 1
Findspot	Temple of Zeus	Berlin	dialface-217
Inscription	Translation		
Ὁ πρὸς ὀρθὰς ... πρὸς τέιν εν ... ὄντα θ (?) ... προ ἡ ἐγίστη ἔμε [... ρα δυειν πεντεκα [ἰδεκα ετηρ [ἡ] θ [ἡ?] ... εν τ	Bonnin: Difficult to understand. One could read there a description of the clock, with an astronomical expression like ἐ μεγίστη ἡμέρα, "the longest day".		

484 Phalara (Stylis)

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	300 -280 BCE	Winter	
Findspot	Unknown	Berlin	dialface-738 & dialface-809
Inscription	Translation		

485 Philippeville

Type	Cone	Gibbs	3090
Location	Unknown	Bonnin	A_284
Date	Imperial	Winter	Philippeville 1
Findspot	Unknown	Berlin	dialface-191
Inscription		Translation	

486 Philippi

Type	Inscription	Gibbs	
Location	Agora	Bonnin	
Date	2nd-3rd century CE	Winter	Philippi 1
Findspot	Within Basilica B	Berlin	
Inscription		Translation	

487 Philippi

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_394
Date	2nd-3rd century CE	Winter	Philippi 2
Findspot	The clock comes from a drainage channel that was created with the construction of the so-called Paulus Basilica	Berlin	
Inscription		Translation	

488 Philippopolis

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_467
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-519
Inscription		Translation	

489 Piazza Armerina

Type	Representation	Gibbs	
Location	Residence	Bonnin	
Date	2nd - 4th century CE	Winter	
Findspot	Villa del Casale, room 40	Berlin	
Inscription		Translation	

490 Piazza Armerina

Type	Representation	Gibbs	
Location	Residence	Bonnin	
Date	2nd - 4th century CE	Winter	
Findspot	Villa del Casale, palaestra	Berlin	
Inscription		Translation	

491 Piraeus

Type	Cone	Gibbs	3023G
Location	Unknown	Bonnin	A_374
Date	Late 1st century CE	Winter	Piräus 1
Findspot	Unknown	Berlin	dialface-123
Inscription	Translation		

492 Pisa

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_17
Date	140-160 CE	Winter	
Findspot	Reused in fountain in Pisa	Berlin	
Inscription	Translation		

493 Polygyros

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-828
Inscription	Translation		

494 Pommeroeul

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_511
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-796
Inscription		Translation	

495 Pompeii

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_97
Date	Before 79 CE	Winter	
Findspot	House of Pinarius Cerialis (III.4.b)	Berlin	
Inscription		Translation	

496 Pompeii

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_111
Date	1st century BCE	Winter	
Findspot	Villa of T. Simnius Stephanus	Berlin	
Inscription		Translation	

497 Pompeii

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_118
Date	Before 79 CE	Winter	
Findspot	House of the Small Fountain (VI.8.23)	Berlin	
Inscription		Translation	

498 Pompeii

Type	Cone	Gibbs	3070
Location	Unknown	Bonnin	A_105
Date	before 79 CE	Winter	
Findspot	Unknown	Berlin	dialface-172
Inscription		Translation	

499 Pompeii

Type	Cone	Gibbs	3073G
Location	Unknown	Bonnin	A_108
Date	Before 79 CE	Winter	
Findspot	Unknown	Berlin	dialface-174
Inscription		Translation	

500 Pompeii

Type	Cone	Gibbs	3075
Location	Unknown	Bonnin	A_110
Date	before 79 CE	Winter	
Findspot	Unknown	Berlin	dialface-176
Inscription		Translation	

501 Pompeii

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Before 79 CE	Winter	
Findspot	Unknown	Berlin	dialface-339
Inscription		Translation	

502 Pompeii

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Before 79 CE	Winter	
Findspot	Unknown	Berlin	dialface-340
Inscription		Translation	

503 Pompeii

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Before 79 CE	Winter	
Findspot	Unknown	Berlin	dialface-342
Inscription	Translation		

504 Pompeii

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Before 79 CE	Winter	
Findspot	Unknown	Berlin	dialface-344
Inscription	Translation		

505 Pompeii

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	Before 79 CE	Winter	
Findspot	House of the Menander (I.10.4)	Berlin	dialface-345
Inscription	Translation		

507 Pompeii

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_509
Date	Before 79 CE	Winter	
Findspot	Casina dell'Aquina (IX.7.12)	Berlin	dialface-631
Inscription		Translation	

508 Pompeii

Type	Plane	Gibbs	
Location	Residence	Bonnin	A_169
Date	Before 79 CE	Winter	
Findspot	House of the Emperor Joseph II (VIII.2.39)	Berlin	dialface-756
Inscription		Translation	

509 Pompeii

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_132
Date	Before 79 CE	Winter	
Findspot	Villa of Cicero (outside Herculaneum gate)	Berlin	dialface-757
Inscription		Translation	

510 Pompeii

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_508
Date	Before 79 CE	Winter	
Findspot	Casa di Ercole Fanciullo (VII.3.11)	Berlin	dialface-758
Inscription		Translation	

511 Pompeii

Type	Plane	Gibbs	
Location	Residence	Bonnin	A_171
Date	Before 79 CE	Winter	
Findspot	A "dwelling near the main gate of the city"	Berlin	dialface-759
Inscription		Translation	

512 Pompeii

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Before 79 CE	Winter	
Findspot	Unknown	Berlin	dialface-760
Inscription		Translation	

513 Pompeii

Type	Cone	Gibbs	3071G
Location	Baths	Bonnin	A_106
Date	2nd century BCE	Winter	Pompeji 1
Findspot	Stabian baths	Berlin	dialface-171
Inscription		Translation	
Mr. Atiniis Mr. Kvaisstur eitiuvad multasikad Kombennieis tangi [n (ud)] aamanaffed		Mara Atinius son of Mara, quaestor, by decree of the Senate made realize this monument with the proceeds of the fines.	

514 Pompeii

Type	Plane	Gibbs	4005G
Location	Residence	Bonnin	A_160
Date	200 BCE - 80 BCE	Winter	Pompeji 10
Findspot	House of the Figured Capitals (VII.4.57)	Berlin	dialface-228
Inscription		Translation	

515 Pompeii

Type	Plane	Gibbs	4004G
Location	Unknown	Bonnin	A_159
Date	before 79 CE	Winter	Pompeji 11
Findspot	Unknown	Berlin	dialface-227
Inscription		Translation	

516 Pompeii

Type	Sphere	Gibbs	1029G
Location	Residence	Bonnin	A_024 & A_203
Date	30 BCE - 32CE	Winter	Pompeji 12
Findspot	House of M. Obelius Firmus Garden (IX.14.2)	Berlin	dialface-30
Inscription		Translation	

517 Pompeii

Type	Cone	Gibbs	3068
Location	Unknown	Bonnin	A_104
Date	before 79 CE	Winter	Pompeji 13
Findspot	Unknown	Berlin	dialface-169
Inscription		Translation	

518 Pompeii

Type	Sphere	Gibbs	1030G
Location	Unknown	Bonnin	A_025
Date	before 79 CE	Winter	Pompeji 14
Findspot	Unknown	Berlin	dialface-31
Inscription		Translation	

519 Pompeii

Type	Sphere	Gibbs	2019G
Location	Unknown	Bonnin	A_083
Date	before 79 CE	Winter	Pompeji 15
Findspot	Unknown	Berlin	dialface-95
Inscription	Translation		

520 Pompeii

Type	Sphere	Gibbs	1019G
Location	Unknown	Bonnin	A_014
Date	before 79 CE	Winter	Pompeji 16
Findspot	Unknown	Berlin	dialface-20
Inscription	Translation		

521 Pompeii

Type	Sphere	Gibbs	1023G
Location	Unknown	Bonnin	A_018
Date	before 79 CE	Winter	Pompeji 17
Findspot	Unknown	Berlin	dialface-24
Inscription	Translation		

522 Pompeii

Type	Sphere	Gibbs	1024G & 1003 (with wrong localization:
Location	Unknown	Bonnin	A_019
Date	before 79 CE	Winter	Pompeji 18
Findspot	Unknown	Berlin	dialface-25
Inscription		Translation	

523 Pompeii

Type	Sphere	Gibbs	1025G
Location	Palaestra / Gymnasion	Bonnin	A_020
Date	before 79 CE	Winter	Pompeji 19
Findspot	House of the Triclinium (II.9.5-6)	Berlin	dialface-26
Inscription		Translation	

524 Pompeii

Type	Sphere	Gibbs	1027G
Location	Unknown	Bonnin	A_022
Date	before 79 CE	Winter	Pompeji 2
Findspot	Unknown	Berlin	dialface-28
Inscription		Translation	

525 Pompeii

Type	Cone	Gibbs	3065G
Location	Unknown	Bonnin	A_101
Date	before 79 CE	Winter	Pompeji 20
Findspot	Unknown	Berlin	dialface-166
Inscription	Translation		

526 Pompeii

Type	Cone	Gibbs	3066G
Location	Unknown	Bonnin	A_102
Date	before 79 CE	Winter	Pompeji 21
Findspot	Unknown	Berlin	dialface-167
Inscription	Translation		

527 Pompeii

Type	Cone	Gibbs	3064G
Location	Residence	Bonnin	A_100
Date	before 79 CE	Winter	Pompeji 22
Findspot	House of the Golden Cupids (VI.16.7)	Berlin	dialface-165
Inscription	Translation		

528 Pompeii

Type	Sphere	Gibbs	
Location	Residence	Bonnin	
Date	Before 79 CE	Winter	Pompeji 23
Findspot	House of Fabius Amandus (I.7.3)	Berlin	dialface-336
Inscription		Translation	

529 Pompeii

Type	Sphere	Gibbs	3069
Location	Temple	Bonnin	A_035
Date	before 79 CE	Winter	Pompeji 24
Findspot	Temple of Apollo	Berlin	dialface-170
Inscription		Translation	

530 Pompeii

Type	Plane	Gibbs	4006
Location	Unknown	Bonnin	A_161
Date	before 79 CE	Winter	Pompeji 25
Findspot	Unknown	Berlin	dialface-229
Inscription		Translation	

531 Pompeii

Type	Plane	Gibbs	5015
Location	Unknown	Bonnin	A_139
Date	before 79 CE	Winter	Pompeji 26
Findspot	Unknown	Berlin	dialface-264
Inscription	Translation		

532 Pompeii

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Before 79 CE	Winter	Pompeji 27
Findspot	Unknown	Berlin	
Inscription	Translation		

533 Pompeii

Type	Sphere	Gibbs	1022G
Location	Unknown	Bonnin	A_017
Date	before 79 CE	Winter	Pompeji 29
Findspot	Region VIII; exterior of the house of the boar	Berlin	dialface-23
Inscription	Translation		

534 Pompeii

Type	Sphere	Gibbs	1021G
Location	Unknown	Bonnin	A_016
Date	before 79 CE	Winter	Pompeji 3
Findspot	Unknown	Berlin	dialface-22
Inscription	Translation		

535 Pompeii

Type	Sphere	Gibbs	3072G
Location	Residence	Bonnin	A_107
Date	200 - 80 BCE	Winter	Pompeji 30
Findspot	House of the Figured Capitals (VII.4.57)	Berlin	dialface-173
Inscription	Translation		

536 Pompeii

Type	Sphere	Gibbs	1026G
Location	Unknown	Bonnin	A_021
Date	before 79 CE	Winter	Pompeji 31
Findspot	Unknown	Berlin	dialface-27
Inscription	Translation		

537 Pompeii

Type	Cone	Gibbs	3067G & 3022 (wrongly located in Olympia)
Location	Baths	Bonnin	A-103
Date	before 79 CE	Winter	Pompeji 32
Findspot	Suburban baths	Berlin	dialface-168
Inscription	Translation		

538 Pompeii

Type	Sphere	Gibbs	1020G
Location	Residence	Bonnin	A_015
Date	before 79 CE	Winter	Pompeji 33
Findspot	House of Narcisus (V.3.6)	Berlin	dialface-21
Inscription	Translation		

539 Pompeii

Type	Inscription	Gibbs	
Location	Temple	Bonnin	
Date	Augustan	Winter	Pompeji 34
Findspot	Column in front of Temple of Apollo	Berlin	
Inscription	Translation		
L(ucius) Sepunius L(uci) f(ilius) SandilianusIM(arcus)HerenniusA(uli)f(ilius) Epidianus I duovir(i) i(iure) d(icundo) scol(am) et horol(ogium) I d(e) s(ua) p(ecunia) f(aciendum) c(uraverunt)		L. Sepunius Sandilianus son of Lucius, Marcus Herennius Epidianus son of Aulus, duoviri for administering the law, saw to it being done at their own expense.	

540 Pompeii

Type	Inscription	Gibbs	8007
Location	Forum	Bonnin	A_190
Date	Augustan	Winter	Pompeji 35
Findspot	Schola in the Triangular Forum	Berlin	dialface-304

Inscription

L(ucius) Sepunius L(uci) f(ilius) Sandilianus I M(arcus) Herennius
A(uli) f(ilius) Epi- dianus I duovir(i) i(i)ure d(icundo) scol(am) et
horol(ogium) I d(e) s(ua) p(ecunia) f(aciendum) c(uraverunt)

Translation

L. Sepunius Sandilianus son of Lucius, Marcus
Herennius Epidianus son of Aulus, duoviri for
administering the law, saw to it being done at
their own expense.

541 Pompeii

Type	Cone	Gibbs	
Location	Residence	Bonnin	A_092
Date	Before 79 CE	Winter	Pompeji 36
Findspot	House of Gaius Polybius Peristyle (IX. XIII.1-3)	Berlin	dialface-333
Inscription		Translation	

542 Pompeii

Type	Cone	Gibbs	3975
Location	Funerary	Bonnin	
Date	1st century BCE	Winter	Pompeji 4
Findspot	Via dei Sepulchre, 1762	Berlin	
Inscription		Translation	

543 Pompeii

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Before 79 CE	Winter	Pompeji 5
Findspot	Unknown	Berlin	dialface-337
Inscription		Translation	

544 Pompeii

Type	Sphere	Gibbs	1028G
Location	Residence	Bonnin	A_023
Date	before 79 AD, Case del Menandro 80 BC -14 AD	Winter	Pompeji 6
Findspot	House of the Menander (I.10.4)	Berlin	dialface-29
Inscription		Translation	

545 Pompeii

Type	Plane	Gibbs	4007
Location	Unknown	Bonnin	A_162
Date	before 79 CE	Winter	Pompeji 7
Findspot	Excavations in 1865	Berlin	dialface-230
Inscription		Translation	

ισημερ(ινός), τροπ(ικός) θερ(ινός), τροπ(ικός) χειμ(ερινός). τοξ
(ότης),
αίγ(όκερως). σκο(ρπίος), ύδρ(οχόος). ζυγ(ός), ιχθ(ύες). παρ
(θένος),
κρε(ιός). λέω(ν), ταϋ(ρος). καρ(κίνος), δίδ(υμοι). μεσηνβρία.

546 Pompeii

Type	Plane	Gibbs	
Location	Baths	Bonnin	
Date	Before 79 CE	Winter	Pompeji 8
Findspot	Suburban baths	Berlin	dialface-335
Inscription		Translation	

547 Pompeii

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Before 79 CE	Winter	Pompeji 9
Findspot	Unknown	Berlin	dialface-338
Inscription		Translation	

548 Pompeiopolis

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-669
Inscription		Translation	

549 Ponte Lucano

Type	Sphere	Gibbs	1012
Location	Funerary	Bonnin	A_007
Date	Early Imperial	Winter	Tibur 3
Findspot	Osteria di Ponte Lucano	Berlin	dialface-13
Inscription	Translation		

550 Puteoli

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_50
Date	3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		

551 Puteoli

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_060
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-393
Inscription	Translation		

552 Puteoli

Type	Inscription	Gibbs	
Location	Forum	Bonnin	
Date	1st century CE	Winter	Puteoli 1
Findspot	Unknown	Berlin	
Inscription	Translation		
Ti(berius) Caes(ar) A)ug(ustus) horolog(ium) po[suit ---] [---] res public(a) refec(it).		Emperor Tiberius set up the horologium (...) and the city had it repaired (...).	

553 Priene

Type	Unknown	Gibbs	
Location	Temple	Bonnin	
Date	ca. 350 BC - ca. 300 BC	Winter	
Findspot	Temple of Demeter (in situ)	Berlin	dialface-650
Inscription	Translation		

554 Priene

Type	Cone	Gibbs	
Location	Palaestra / Gymnasion	Bonnin	
Date	2nd century BCE	Winter	Priene 1
Findspot	In situ at upper gymnasion	Berlin	dialface-597
Inscription	Translation		

555 Priene

Type	Clepsydra	Gibbs	
Location	Theater	Bonnin	
Date	Mid-2nd century BCE	Winter	Priene 2
Findspot	Theater, in front of the western face of the analemma in the orchestra hallway	Berlin	
Inscription	Ἀθηνοπολις Κυδίου	Translation	Athenopolis, son of Kydimus, (consecrated this) to Dionysus, as he was his priest

556 Priene

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Late antiquity	Winter	Priene 3
Findspot	Found at lower gymnasium	Berlin	dialface-598
Inscription		Translation	

557 Prosymna

Type	Globe	Gibbs	7002G
Location	Unknown	Bonnin	A_556
Date	2nd century BCE	Winter	Prosymna 1
Findspot	Unknown	Berlin	dialface-284 & dialface-719 & dialface-723
Inscription	Ἡρῆς ἱεροπόλος με θεῆς ἀνέθηκε Θάλεια ἡλιακῶν ὥρων ἄγγελον ἡμερίοις	Translation	The priestess of the goddess Hera, Thalia has ordained me, the herald of the sunny hours for the mortals.

558 Pula

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century CE	Winter	
Findspot	Unknown	Berlin	dialface-636
Inscription		Translation	

559 Pula

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_062
Date	1st/2nd century CE	Winter	
Findspot	Unknown	Berlin	dialface-648
Inscription		Translation	

560 Pula

Type	Sphere	Gibbs	2012G
Location	Funerary	Bonnin	A_078
Date	1st century CE	Winter	Pola 1
Findspot	Near Pula, though style suggests grave installation	Berlin	dialface-88
Inscription		Translation	

561 Pula

Type	Sphere	Gibbs	2013G
Location	Funerary	Bonnin	A_331
Date	1st century CE	Winter	Pola 2
Findspot	Findspot unclear, but matches local traditions for grave installation	Berlin	dialface-89
Inscription		Translation	

562 Qumran

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	1st century BCE	Winter	Qumran 1
Findspot	Unknown	Berlin	
Inscription		Translation	

563 Rabat

Type	Cone	Gibbs	3091
Location	Unknown	Bonnin	A_290
Date	Imperial	Winter	Rabat 1
Findspot	Unknown	Berlin	dialface-193
Inscription		Translation	

564 Ramat Negev Regional

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_447
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-435
Inscription		Translation	

565 Ravenna

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	1st century CE	Winter	Ravenna 1
Findspot	Unknown	Berlin	dialface-521
Inscription		Translation	

566 Ravenna

Type	Sphere	Gibbs	
Location	Forum	Bonnin	A_090
Date	Early 2nd century CE	Winter	Ravenna 2
Findspot	Unknown	Berlin	
Inscription		Translation	

567 Marcianopolis

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_477
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-381
Inscription		Translation	

568 Marcianopolis

Type	Convex, Curved	Gibbs	1060G
Location	Unknown	Bonnin	A_472
Date	Unknown	Winter	Marcianopolis 1
Findspot	Marcianopolis urban area	Berlin	dialface-61
Inscription		Translation	

569 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-546
Inscription		Translation	

570 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-548
Inscription		Translation	

571 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-551
Inscription		Translation	

572 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-552
Inscription		Translation	

573 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-553
Inscription		Translation	

574 Rhodes

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-554
Inscription		Translation	

575 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-556
Inscription		Translation	

576 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-557
Inscription		Translation	

577 Rhodes

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-558
Inscription		Translation	

578 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-560
Inscription		Translation	

579 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-561
Inscription		Translation	

580 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Archaeological Park of Filerimos, Ialysos	Berlin	dialface-562
Inscription		Translation	

581 Rhodes

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_430
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-689
Inscription		Translation	

582 Rhodes

Type	Cone	Gibbs	3037G
Location	Temple	Bonnin	A_408
Date	2nd century BCE	Winter	Kamiroi 1
Findspot	Temple in the lower agora of Kamiroi	Berlin	dialface-137
Inscription		Translation	

583 Rhodes

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	
Date	Hellenistic	Winter	Rhodos 1
Findspot	Unknown	Berlin	
Inscription		Translation	

584 Rhodes

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	Late Hellenistic	Winter	Rhodos 10
Findspot	Modern house on Parthenopis Street	Berlin	dialface-550
Inscription		Translation	

585 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Late Hellenistic	Winter	Rhodos 11
Findspot	Unknown	Berlin	dialface-549
Inscription		Translation	

586 Rhodes

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Hellenistic	Winter	Rhodos 12
Findspot	Unknown	Berlin	dialface-600
Inscription		Translation	

587 Rhodes

Type	Cone	Gibbs	3036G
Location	Unknown	Bonnin	A_407
Date	Unknown	Winter	Rhodos 13
Findspot	Unknown	Berlin	dialface-136
Inscription		Translation	

588 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Hellenistic	Winter	Rhodos 14
Findspot	Unknown	Berlin	dialface-555
Inscription		Translation	

589 Rhodes

Type	Cone	Gibbs	3035G
Location	Residence	Bonnin	A_406
Date	Hellenistic	Winter	Rhodos 15
Findspot	Mela Street during construction May 26, 1966	Berlin	dialface-135
Inscription		Translation	

590 Rhodes

Type	Cone	Gibbs	3034G
Location	Unknown	Bonnin	A_405
Date	Unknown	Winter	Rhodos 16
Findspot	Unknown	Berlin	dialface-134
Inscription		Translation	

591 Rhodes

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	
Date	Hellenistic	Winter	Rhodos 2
Findspot	Unknown	Berlin	
Inscription		Translation	

592 Rhodes

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	
Date	Hellenistic	Winter	Rhodos 3
Findspot	Unknown	Berlin	
Inscription		Translation	

593 Rhodes

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Late 2nd century BCE	Winter	Rhodos 4
Findspot	Unknown	Berlin	dialface-547
Inscription		Translation	

594 Rhodes

Type	Cone	Gibbs	3106G
Location	Unknown	Bonnin	A_428
Date	1st century BCE	Winter	Rhodos 5
Findspot	Reused in christian basilica	Berlin	dialface-208 & dialface-716
Inscription		Translation	

595 Rhodes

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Hellenistic	Winter	Rhodos 6
Findspot	Unknown	Berlin	
Inscription		Translation	

596 Rhodes

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Hellenistic	Winter	Rhodos 7
Findspot	Modern house	Berlin	dialface-599
Inscription		Translation	

597 Rhodes

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Hellenistic	Winter	Rhodos 8
Findspot	Unknown	Berlin	dialface-764
Inscription		Translation	

598 Rhodes

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	Imperial	Winter	Rhodos 9
Findspot	in the rubble when uncovering the property S. Gianna, or Sarandaporou 9	Berlin	
Inscription		Translation	

599 Riano

Type	Sphere	Gibbs	1016G
Location	Unknown	Bonnin	A_011
Date	1st century BCE	Winter	Riano 1
Findspot	In Riano, 1949	Berlin	dialface-17
Inscription		Translation	

600 Rigomagus

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_045
Date	218 CE	Winter	Rigomagus 1
Findspot	Remagen Castle	Berlin	
Inscription	Translation		
[M (arci) Opellii Antonini Diadumeniani] / nobil [issimi caesaris] / sub c [-] a [-] / leg (ato) / pr (o) pr (aetore) agens P [e] / trinius Athenodorus prae (fectus) / coh (ortis) (primae) fl (aviae) horologium ab ho / ris intermissum et vetus / tate co (l) labsum suis inpendis / restituit		In honor of Emperor Macrinus and Caesar Diadumenianus: Under the governor (the province of Germania Inferior), Petronius Athenodorus, the prefect of the Cohors Flavia, has a horologium that was collapsed due to its old age and whose hour display was interrupted, at his own expense Stand set when the Emperor Macrinus was consul for the second time	

601 Rodez

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_257
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-452
Inscription	Translation		

602 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_02
Date	First half of 3rd century CE	Winter	
Findspot	Via Appia	Berlin	
Inscription	Translation		

603 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_18
Date	Late 3rd century CE	Winter	
Findspot	Catacomb of Novation	Berlin	
Inscription		Translation	

604 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_19
Date	3rd CE	Winter	
Findspot	Catacombs of Praetextatus	Berlin	
Inscription		Translation	

605 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_20
Date	270-280 CE	Winter	
Findspot	Basilica of Saint Paul Outside the Walls	Berlin	
Inscription		Translation	

606		Rome	
Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_21
Date	End 2nd- Mid 3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		

607 Rome	
Type	Representation
Location	Funerary
Date	280-300 CE
Findspot	Foro Italico
Inscription	

608 Rome	
Type	Representation
Location	Funerary
Date	Beginning 4th CE
Findspot	Villa dell Cave di Pietralata
Inscription	

609 Rome	
Type	Representation
Location	Funerary
Date	Second half of 3rd CE
Findspot	Portonaccio
Inscription	

610 Rome	
Type	Representation
Location	Funerary
Date	270-280 CE
Findspot	Unknown
Inscription	

611 Rome	
Type	Representation
Location	Funerary
Date	2nd century CE
Findspot	Portonaccio
Inscription	

612 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_27
Date	230's CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

613 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_28
Date	Second half 3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

614 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_29
Date	3rd CE	Winter	
Findspot	Catacomb of Callixtus	Berlin	
Inscription		Translation	

615 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_30
Date	Second half 3rd CE	Winter	
Findspot	Catacomb of Callixtus	Berlin	
Inscription		Translation	

616 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_31
Date	Beginning of second quarter of 3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

617 Rome

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_43
Date	Beginning 3rd CE	Winter	
Findspot	Embedded in a wall of Palazzo Vaccari	Berlin	
Inscription		Translation	

618 Rome

Type	Representation	Gibbs
Location	Funerary	BonninI_52 & I_53
Date	2nd century CE	Winter
Findspot	Via Appia	Berlin
Inscription		Translation

619 Rome

Type	Representation	Gibbs
Location	Funerary	BonninI_54
Date	2nd century CE	Winter
Findspot	Unknown	Berlin
Inscription		Translation

620 Rome

Type	Representation	Gibbs
Location	Funerary	BonninI_61
Date	240-250 CE	Winter
Findspot	Near Porta S. Giovanni	Berlin
Inscription		Translation

621 Rome

Type	Representation	Gibbs
Location	Funerary	Bonnin I_63
Date	Unknown	Winter
Findspot	Unknown	Berlin
Inscription		Translation

622 Rome

Type	Representation	Gibbs
Location	Unknown	Bonnin I_120
Date	4th century CE 354 CE	Winter
Findspot	Unknown	Berlin
Inscription		Translation

623 Rome

Type	Representation	Gibbs
Location	Temple	Bonnin
Date	Late Antique	Winter
Findspot	Santa Cecilia in Trastevere	Berlin
Inscription		Translation

624 Surrentum

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_041
Date	Roman	Winter	
Findspot	Unknown	Berlin	dialface-334
Inscription		Translation	

625 Rome

Type	Sphere	Gibbs	1035G
Location	Unknown	Bonnin	A_030
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-35
Inscription		Translation	

626 Rome

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_148
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-350
Inscription		Translation	

627 Rome

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_147
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-351
Inscription		Translation	

628 Rome

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-354
Inscription		Translation	

629 Rome

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-518
Inscription		Translation	

630 Rome

Type	Plane	Gibbs	
Location	Baths	Bonnin	A_145
Date	225-335 CE	Winter	
Findspot	Northern area of the baths of the Arval Brethren	Berlin	dialface-750
Inscription		Translation	

631 Rome

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_208
Date	Unknown	Winter	
Findspot	Via Ardeatina	Berlin	dialface-751
Inscription		Translation	

632 Rome

Type	Sphere	Gibbs	2022
Location	Unknown	Bonnin	A_085
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-99
Inscription		Translation	

633 Rome			
Type	Clepsydra	Gibbs	
Location	Forum	Bonnin	
Date	159 BCE	Winter	Rom 1
Findspot	Taberna 9, Forum Romanum	Berlin	
Inscription		Translation	

634 Rome			
Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	1st century BCE	Winter	Rom 10
Findspot	Regio III, there also temple for Isis and Serapis, opposite the monastery of St. Lucia	Berlin	
Inscription	JG XIV 1307a	Translation	

635 Rome			
Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	1st century CE	Winter	Rom 11
Findspot	Temple of Fortuna at the Porta Portese in the Vigna Bonelli	Berlin	
Inscription		Translation	

636 Rome

Type	Cone	Gibbs	3076
Location	Funerary	Bonnin	A_111
Date	Imperial	Winter	Rom 12
Findspot	Via Appia, near the Circus Maximus; part of funerary monument	Berlin	dialface-177
Inscription	Translation		

637 Rome

Type	Plane	Gibbs	4008G
Location	Funerary	Bonnin	A_163
Date	period of Antonius Pius, about 138 CE	Winter	Rom 13
Findspot	Vigna Cassini near the Via Appia	Berlin	dialface-231
Inscription	Translation		
[νότ]ος εὐρονοτος εὐρος ἀπηλιώτης καικίας / ἰσημε(ρινή)			

638 Rome

Type	Plane	Gibbs	4009
Location	Unknown	Bonnin	A_164
Date	138 CE	Winter	Rom 14
Findspot	Unknown	Berlin	dialface-232
Inscription	Translation		

639 Rome

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century BCE	Winter	Rom 15
Findspot	Unknown	Berlin	
Inscription		Translation	

640 Rome

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_176
Date	after 189 CE	Winter	Rom 16
Findspot	Handover to the museum by Luigi Vescovati (mid-19th century?)	Berlin	
Inscription		Translation	
M(arcus) Commodus Antonius Plus Felix Aug(ustus) Brit(annicus)			

641 Rome

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_178
Date	1st century CE	Winter	Rom 17
Findspot	Near Rome, 18th century	Berlin	
Inscription		Translation	
Latin place names			

642 Rome

Type	Plane	Gibbs	5024
Location	Unknown	Bonnin	A_151
Date	1st century BCE	Winter	Rom 2
Findspot	Abbazia di San Nilo	Berlin	dialface-276 & dialface-322 & dialface-484
Inscription	Translation		

643 Rome

Type	Plane	Gibbs	
Location	Other	Bonnin	
Date	10-9 BCE	Winter	Rom 3
Findspot	Campus Martius	Berlin	
Inscription	Translation		

644 Rome

Type	Plane	Gibbs	4010
Location	Residence	Bonnin	A_166
Date	1st century BCE	Winter	Rom 4
Findspot	Mausoleum of Augustus	Berlin	dialface-233
Inscription	Translation		
[SOLST]ITALI[S] / AEQ[UINOCTALIS] VERN[ALIS] / [BRUM] AL[IS] / G[EMINI] / TAVR[US] / ARIES		Solstice / Equinox / Spring / Winter Solstice / Gemini / Taurus / Aries	

645 Rome

Type	Sphere	Gibbs	1068G
Location	Unknown	Bonnin	A_187
Date	after 8 BC	Winter	Rom 5
Findspot	Via Palombara	Berlin	dialface-69

Inscription

Ἰανουάριος τοξ(ότης) αἰγ(όκερως) Δεκέμβριος
 Φεβράριος σκό(οπιος) ὕδρο(οχόος) Νοέμβριος[ς]
 [Μ]άρτιος ζυγ(ός) ιχθ(ύες) Οκτώβρι[ος]
 [Απ]ρίλιος παρθ(ένος) κρει(ός) Σεπτέμβριος[ς]
 [Μά]ϊος λέων ταῦρο(ος) Αὐγο[ῦστος]
 [Ιούν]ιος καρκί(νος) δίδυμ(οι) [ούλιος]

Translation

646 Rome

Type	Inscription	Gibbs	
Location	Funerary	Bonnin	E_018
Date	16 CE	Winter	Rom 6
Findspot	Near Via Labicana	Berlin	

Inscription

T (iti) Coccei Ga (i?) A et / Patiens quaest (ores tertium) / mensam
 quadratam in trichil (a) (sic) / abacum cum basi horologium /
 labrum cum fulmentis marmo (eis) / putiale crustas supra
 parietem / itineris medi cum tegulis columel / lam sub horologio
 Tiburtina / protectum ante porticum truti / nam et pondera d (e) d
 (ecurionum) s (ententia) posuerunt / et locum post maceriam
 ulteriorem / emendum ustrinasque de consaepto / ultimo in eum
 locum trai (i) ciendas and / iter ad eum locum ianuamque bene /
 ficio et liberalitate T (iti) patroni faci / enda curaverunt. Same as
 vitium pomorumq (ue) and florum / viridiumque omnium
 generum / seminibus ea Loca quae T (itus) p (atronus) decuri /
 onibus suis adtribuerat ex pecu / nia publica adornaverunt /
 Sisenna Tauro L (ucio) Scribonio Libone co (n) s (ulibus). (...).

Translation

Titus Cocceius Gaa and Titus Cocceius Patiens, quaestors for the
 third time, took care to place, by decision of the decurions, a square
 table in the triclinium, an abacum with its base, a clock, a basin with
 marble feet , a well with a coping, they had the wall bordering the
 middle path covered with marble slabs, they placed a column under
 the Tiburtina clock, a roof in front of the portico, a scale and weights.
 They bought the land located beyond the enclosure wall, transferred
 the ustrina that were at the bottom of the enclosure to this place and
 the path leading to it, with the gate, was made. The same, on the
 common fund, had vines and fruit trees planted the land given by
 Titus, their patron, to his decurions and had it sown with flowers and
 all kinds of greenery, under the consulate of Sisenna Taurus and L.
 Scribonius Libo. (...).

647 Rome

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	282 BCE; reused under Domitian	Winter	Rom 7
Findspot	Campus Martius, Iseum Campese	Berlin	

Inscription

Translation

648 Rome

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	282 BCE; reused under Domitian	Winter	Rom 8
Findspot	Campus Martius, Iseum Campese	Berlin	
Inscription		Translation	

649 Rome

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	282 BCE; reused under Domitian	Winter	Rom 9
Findspot	Campus Martius, Iseum Campese	Berlin	
Inscription		Translation	

650 Rosignano Marittimo

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	1st century BCE - 3rd century CE	Winter	
Findspot	Unknown	Berlin	dialface-520
Inscription		Translation	

651 Rubí

Type	Sphere	Gibbs	
Location	Baths	Bonnin	A_292
Date	Late 2nd-3rd century CE	Winter	Rubi 1
Findspot	Baths at the villa rustica at Rubi	Berlin	dialface-486
Inscription		Translation	

652 Rubí

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_298
Date	2nd-3rd century CE	Winter	Rubi 2
Findspot	Stray find in the Orioli can San Juan district	Berlin	
Inscription		Translation	

653 Sa'ar

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_442
Date	6th century CE	Winter	
Findspot	Found in ancient ruined village near a kibbutz	Berlin	dialface-442
Inscription		Translation	

654 Sabratha

Type	Representation	Gibbs	
Location	Theater	Bonnin	I_71
Date	2nd CE	Winter	
Findspot	Theater pulpitum	Berlin	
Inscription		Translation	

655 Sagunto

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-425
Inscription		Translation	

656 Saint Romain-en-Gal

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_102
Date	1st quarter of 3rd century CE	Winter	
Findspot	Saint-Germain-en-Gal	Berlin	
Inscription		Translation	

657 Salerno

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_32
Date	End 3rd-4th CE	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		

658 Salvia

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_007
Date	Mid 1st century CE	Winter	Salvia 1
Findspot	Unknown	Berlin	

Inscription

[---] leius Con + [--- / ---] + (---) IIII Narbonensis [--- / --- Urbi S] aluiae munificentia o [--- / --- s (v?)] aluis insignib (us) a solo fec (it) don [um dedit? --- / Mat] ris deum et particibus (sic) horreis [--- / Min] erv (ae) horolog (---) distylis signisq (ue) ac s [--- / ---] s sterilitatium temporib (us) in patriam [--- / ---] us fil (ius) vac. [---] ilia and Li [---]

Translation

...] ius, Con [...] [...], quattuorvir [...] of Narbonne [...] by replacing the insignia of the city, built from the foundations [...] and donated [...] to the mother of the gods and for the galleries of the horrea, [...] to Minerva a clock and statues between two columns and [...] in difficult times for the homeland, [...] his son [....].

659 Samaria

Type	Plane	Gibbs	5023
Location	Temple	Bonnin	A_455
Date	Mid 1st century BCE	Winter	Samaria 1
Findspot	Near the altar of the Herodian Temple	Berlin	dialface-275
Inscription	Translation		

660 Samos

Type	Cone	Gibbs	3047
Location	Unknown	Bonnin	A_566
Date	2nd century BCE	Winter	Samos 1
Findspot	Differing reports	Berlin	dialface-147

Inscription

Αριστομένης
 Αριστίππου ἀγορανομῶν τῷ δήμῳ.
 Βοῖθος Μηνοδώρου Ἀριαραθεὺς ἐποίηι.

Translation

Aristomenes, son of Aristippos, during his charge of Agora gave (the monument) to the people. Boithos, son of Menod Ariaratheia, made it.

661 Samos

Type	Inscription	Gibbs	
Location	Agora	Bonnin	E_094
Date	1st half 2nd century BCE	Winter	Samos 2
Findspot	Modern house in Pythagoreion	Berlin	

Inscription

...τάγλυφον· ἀνατέθεικεν δὲ καὶ πρὸ τοῦ ἀρχείου [— — — —
ὥρολόγια — — — — — — — — — — χά]-...

Translation

...so that they indicate, one, the months [...]

662 Samos

Type	Cone	Gibbs	3046
Location	Funerary	Bonnin	A_564
Date	Late Hellenistic	Winter	Samos 3
Findspot	Along Pythagoreion-Vathy Street, 1910	Berlin	dialface-146

Inscription

Translation

663 Samos

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_400
Date	330-620 CE	Winter	Samos 4
Findspot	Unknown	Berlin	
Inscription	Translation		

664 Samothrace

Type	Sphere	Gibbs	1075
Location	Unknown	Bonnin	A_401
Date	Unknown	Winter	Samothrake 1
Findspot	Unknown	Berlin	dialface-77 & dialface-713
Inscription	Translation		
ισημερινός	Equinoctial		

665 Samothrace

Type	Inscription	Gibbs	8008
Location	Unknown	Bonnin	A_576
Date	Late 2nd century BCE	Winter	Samothrake 2
Findspot	Unknown	Berlin	dialface-305
Inscription	Translation		
Face A Τοῦ γινώμονος ἡ / [σκι] ἂ ἐπιούσα ἐπὶ τὰ / ς γραμμὰς ση / μαίνει τὰς ὥρας / τοῦ ἐνιαυτοῦ καὶ / τῆς ἡμέρας καὶ / τῆς ἡμέρας τροπῶν θερινῶν ἡ / πρώτη, ἱσημερι [ν] ὧν ἡ μέση / [χει] μερι [ν] ὧν ἡ ἐσχάτη.	Face a: "The shadow of the gnomon, when it reaches the lines, indicates the hours of the day and the seasons of the year. The first is that of the summer solstice, the median is that of the equinoxes, the last is that of the winter solstice "Face b: " Hodios, son of Aison, installed me here, I who am divided by 15 lines . He designed this sundial to honor Helios. "		
Face b [Στ] ἦσε Ὀδιός με Αἰ / σῶνος ἔχοντα μέ / ρη δεκαπέντε Ἡ [έ] λιον δὲ [γρ] ἀφῶν / γινώμονα τόνδ' ε [σεβεν]			

666 San Cesareo

Type	Unknown	Gibbs	
Location	Villa Rustica	Bonnin	
Date	Imperial	Winter	
Findspot	Villa di Cesare e Massenzio	Berlin	dialface-786
Inscription		Translation	

667 San Dona di Piave

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Imperial	Winter	
Findspot	Unknown	Berlin	dialface-509
Inscription		Translation	

668 San Miguel de Corneja

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-506
Inscription		Translation	

669 San Miguel de Corneja

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-728
Inscription		Translation	

670 São Domingos de Rana

Type	Cone	Gibbs	
Location	Villa Rustica	Bonnin	A_305
Date	1st - 2nd century CE	Winter	Olisipo 1
Findspot	Secondary deposition at a rustic villa	Berlin	dialface-497
Inscription		Translation	

671 Sardinia

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_11
Date	240-255 CE	Winter	
Findspot	Sardinia	Berlin	
Inscription		Translation	

672 Sardis

Type	Plane	Gibbs	
Location	Baths	Bonnin	
Date	first third of 3rd century CE	Winter	Sardis 1
Findspot	South-east corner of the Caracalla Baths	Berlin	dialface-601
Inscription		Translation	

673 Šarić Struga

Type	Unknown	Gibbs	
Location	Villa Rustica	Bonnin	
Date	4th - 6th CE	Winter	
Findspot	Embedded in the wall of a Roman Villa	Berlin	dialface-687
Inscription		Translation	

674 Ulpia Traiana Sarmizegetusa

Type	Plane	Gibbs	
Location	Temple	Bonnin	
Date	80 BCE - 106 CE	Winter	Sarmizegetusa 1
Findspot	Within the urban area of the administrative capital in the area of the sanctuary there is a paved area, which the	Berlin	
Inscription		Translation	

675 Sarsina

Type	Representation	Gibbs	
Location	Villa Rustica	Bonnin	I_110
Date	2nd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

676 Segóbriga

Type	Cone	Gibbs	
Location	Temple	Bonnin	A_299
Date	Unknown	Winter	
Findspot	Among debris of a small Roman temple	Berlin	dialface-424
Inscription		Translation	

677 Seleukia am Kalykadnos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	5th century CE - 7th century CE	Winter	Seleukia am Kalykadnos 1
Findspot	Modern construction	Berlin	dialface-420
Inscription		Translation	

678 Serdica

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_483
Date	mid 3rd century CE	Winter	Serdica 1
Findspot	Stray find	Berlin	dialface-602
Inscription		Translation	

679 Sétif

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_285
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-864
Inscription		Translation	

680 Shumen

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_480
Date	4-6th century CE	Winter	Shoumen kastell 1
Findspot	Unknown	Berlin	dialface-378
Inscription		Translation	

681 Side

Type	Sphere	Gibbs	
Location	Theater	Bonnin	
Date	2nd century BCE	Winter	Side 1
Findspot	Theater of Side	Berlin	dialface-767 & -769
Inscription		Translation	

682 Laudun

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_592
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

683 Side

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_429
Date	2nd century BCE	Winter	Side 1
Findspot	Unknown	Berlin	dialface-411 & dialface-768
Inscription		Translation	

684 Side

Type	Cone	Gibbs	3059G
Location	Unknown	Bonnin	A_419
Date	Imperial	Winter	Side 2
Findspot	Urban area of Side	Berlin	dialface-160
Inscription	Translation		

685 Siebengebirge

Type	Cone	Gibbs	3104G
Location	Unknown	Bonnin	A_342
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-206
Inscription	Translation		

686 Siena

Type	Cone	Gibbs	
Location	Baths	Bonnin	A_043
Date	Unknown	Winter	
Findspot	Rapolano Terme	Berlin	dialface-368
Inscription	Translation		

687 Sillyon

Type	Inscription	Gibbs	
Location	Funerary	Bonnin	
Date	50-200 CE	Winter	Sillyon 1
Findspot	Reused in a modern building	Berlin	
Inscription		Translation	

688 Sirmium

Type	Sphere	Gibbs	
Location	Funerary	Bonnin	A_476
Date	1st century CE - 2nd century CE	Winter	
Findspot	West Necropolis	Berlin	dialface-439
Inscription		Translation	

689 Smitthus

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Imperial	Winter	Smitthus 1
Findspot	Ain Drahan	Berlin	
Inscription		Translation	

690 Smyrna

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-837
Inscription		Translation	

691 Soluntum

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-836
Inscription		Translation	

692 Sparta

Type	Cone	Gibbs	3107G
Location	Unknown	Bonnin	A_386
Date	2nd century BCE	Winter	Sparta 1
Findspot	Unknown	Berlin	dialface-209 & dialface-210 & dialface-325 & dialface-326
Inscription		Translation	

693 Sparta

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_378
Date	1st century CE	Winter	Sparta 2
Findspot	Unknown	Berlin	dialface-223
Inscription		Translation	

694 Sparta

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_350
Date	Imperial	Winter	Sparta 3
Findspot	During excavation work for a new building in 1986 by E. Kourinou	Berlin	dialface-222
Inscription		Translation	

695 Stabiae

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_131
Date	1st century CE	Winter	
Findspot	Villa San Marco	Berlin	dialface-559
Inscription		Translation	

696 Stabiae

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	1st century CE	Winter	Stabiae 1
Findspot	Atrium of the Villa San Marco	Berlin	dialface-477
Inscription		Translation	

697 Sulci

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_025
Date	48 CE	Winter	Sulci 1
Findspot	Forum area of Sulcis	Berlin	
Inscription		Translation	

[Ti (berio) Cl] aud (io) Caesar [i] Aug (usto) Germanico / [trib (unicia) pot (estat] i VIII imp (eratori) XV [I] co (n) s (uli) IIII / [---] ocium (sic) L (ucius) Aemil [ius] L (ucii) f (ilius) Quir (ina tribe) Saturninus / dedicavit.

To the Emperor Tiberius Claudius Caesar August Germanicus endowed with his eighth tribunician power , hailed imperator for the sixteenth time, four times consul Lucius Aemilius Saturninus, son of Lucius, of the Quirina tribe, dedicated a clock

698 Sulmona

Type	Cone	Gibbs	
Location	Temple	Bonnin	A_058
Date	2nd century CE	Winter	Sulmo 1
Findspot	In the extra-urban terrace sanctuary of Hercules Curinus	Berlin	dialface-603
Inscription		Translation	

699 Sulmona

Type	Cone	Gibbs	
Location	Temple	Bonnin	A_059
Date	2nd century CE	Winter	Sulmo 2
Findspot	In the extra-urban terrace sanctuary of Hercules Curinus	Berlin	dialface-604
Inscription		Translation	

700 Sulmona

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	Unknown	Winter	Sulmo 3
Findspot	Paved terrace in front of the stairway to Naiskos, cuts into the lowest step	Berlin	
Inscription		Translation	

701 Sulmona

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	Unknown	Winter	Sulmo 4
Findspot	Atop the staircase at Sulmo 3	Berlin	
Inscription		Translation	

702 Surrentum

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_020
Date	80 CE	Winter	Surrentum 1
Findspot	Piazza Tasso, Sorrento	Berlin	
Inscription		Translation	
Imp(erator) Titus Caesar [divi] / Vespasiani f(ilius) Vespasi[anus] / Aug(ustus) pont(ifex) max(imus) tr(ibunicia) Pot(estate) I[X imp(erator) XV] / Co(n)s(ul) IIX censor p(ater) p(atriae) horolog[ium cum suis] / ornamentis terrae motib(us) [conlapsum restituit].		Emperor Titus Caesar Vespasian Augustus, son of the divine Vespasian, supreme pontiff, clothed for the ninth time with the tribunician power, hailed twelve times emperor, consul eight times, censor, father of the country, replaced with all its ornaments the clock destroyed by the earthquake.	

703 Syracuse

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_180
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-478
Inscription		Translation	

704 Syracuse

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_582
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-620
Inscription		Translation	

705 Syracuse

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-621
Inscription		Translation	

706 Syracuse

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-622
Inscription		Translation	

707 Syracuse

Type	Plane	Gibbs	5018G
Location	Unknown	Bonnin	A_154
Date	Late Antique	Winter	Syrakus 1
Findspot	Excavations at a modern palazzo	Berlin	dialface-267
Inscription		Translation	Greek Alphanumerics

708 Tanis, San el-Hagar

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	Late Ptolemaic	Winter	Tanis 1
Findspot	Tanis, late Ptolemaic private house M within the surrounding walls of the temple a little north of the pylons	Berlin	dialface-317
Inscription		Translation	

709 Tarragona

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_035
Date	1st century CE	Winter	Tarragona 1
Findspot	Unknown	Berlin	
Inscription	Q. Murrius / Thales / horilegium / col (llrgium) fab (e) rd (onum) d (edit).	Translation	Q (uintus) Murrius Thales has donated a Horilegium to the Fabrorum College (?)

710 Tarsus

Type	Representation	Gibbs	
Location	Residence	Bonnin	
Date	2nd or 3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription	ιδέ κόρακος επίρεια / Ασας /	Translation	Behold the abuse of a crow / "you do damage" / "kra kra"

711 Tayibat al-Imâm

Type	Representation	Gibbs
Location	Temple	Bonnin
Date	442 CE	Winter
Findspot	Church of the Martyr	Berlin
Inscription		Translation

712 Tazzoult-Lambèse

Type	Unknown	Gibbs
Location	Unknown	Bonnin
Date	Unknown	Winter
Findspot	Upper town, reused in a temple wall	Berlin dialface-849
Inscription		Translation

713 Teano

Type	Cone	Gibbs
Location	Unknown	Bonnin
Date	200 BCE	Winter
Findspot	Unknown	Berlin dialface-445
Inscription		Translation

714 Teanum Apulum

Type	Sphere	Gibbs	
Location	Other	Bonnin	A_052
Date	2nd century CE	Winter	Teanum Apulum 1
Findspot	Poggio imperiale, Amorusi district during agricultural work in the 1960s	Berlin	
Inscription	Translation		
Euelpistus Aug(usti) n(ostri) disp(ensator) horololgium praetorio Publilianol d(ono) d(edit)		Euelpistus Augustus, imperial treasurer, donated this horologium to the Praetorium Audilianum.	

715 Tébessa

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Ancient Theveste	Berlin	dialface-860
Inscription	Translation		

716 Tel er Ras

Type	Plane	Gibbs	
Location	Temple	Bonnin	A_462
Date	Hadrianic (117-138 CE)	Winter	
Findspot	Zeus Hypsistos Temple	Berlin	dialface-454 & dialface-532 & dialface-707
Inscription	Translation		

717 Teos

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-838
Inscription		Translation	

718 Terracina

Type	Cone	Gibbs	
Location	Temple	Bonnin	A_130
Date	Mid 2nd - Mid 1st BCE	Winter	
Findspot	Temple of Jupiter as a Child	Berlin	dialface-474
Inscription		Translation	

719 Terracina

Type	Sphere	Gibbs	1014
Location	Unknown	Bonnin	A_009
Date	Late 2nd century CE	Winter	Tarracina 1
Findspot	Unknown	Berlin	dialface-15
Inscription		Translation	

720 Terracina

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_049
Date	Late Imperial	Winter	Tarracina 2
Findspot	Unknown	Berlin	dialface-475
Inscription		Translation	

721 Thessaloniki

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_393
Date	2nd century CE	Winter	Thessaloniki 1
Findspot	Unknown	Berlin	dialface-218
Inscription		Translation	

722 Thessaloniki

Type	Sphere	Gibbs	1053G
Location	Unknown	Bonnin	A_390
Date	Unknown	Winter	Thessaloniki 2
Findspot	Unknown	Berlin	dialface-54
Inscription		Translation	

723 Thessaloniki

Type	Inscription	Gibbs	
Location	Temple	Bonnin	
Date	5/6th century CE	Winter	Thessaloniki 3
Findspot	Main facade of St Demetrios Church	Berlin	
Inscription	Translation I, Bitalianos, as decan donate the horologion to St. Demetrios		

724 Thamugadi

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_276
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-817
Inscription	Translation		

725 Thamugadi

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_279
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-846
Inscription	Translation		

726 Thamugadi

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_278
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-847
Inscription		Translation	

727 Thamugadi

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_277
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-861
Inscription		Translation	

728 Thamugadi

Type	Plane	Gibbs	
Location	Forum	Bonnin	
Date	late 2nd/early 3rd century CE	Winter	Timgad 1
Findspot	Forum	Berlin	dialface-607
Inscription		Translation	

729 Thamugadi

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_275
Date	Early 3rd century CE	Winter	Timgad 2
Findspot	Unknown	Berlin	dialface-457
Inscription	Translation		

730 Tindari

Type	Cone & Sphere	Gibbs	7003G
Location	Unknown	Bonnin	A_181
Date	1st century BCE	Winter	Tyndaris 1
Findspot	Object labeled "tindari 110)	Berlin	dialface-285 & dialface-286 & dialface-287 & dialface-288
Inscription	Translation		

731 Tingi

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-779
Inscription	Translation		
Q. FABIVS O...	Quintus Fabius O...		

732 Tinos

Type	Sphere, Plane, and Cone	Gibbs	7001G
Location	Temple	Bonnin	A_577
Date	2nd century BCE	Winter	Tenos 1
Findspot	Northwest of the altar in the Temple of Poseidon	Berlin	dialface-280 & dialface-281 & dialface-282 & dialface-283 & dialface-347
Inscription	[Ἀνδρόνικος] Κυρρήστ [ης ἀρχιτέκτων?]		
	Translation Andronicos of Cyrrhestes was the builder (of this sundial).		

733 Tirat Zvi

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_440
Date	Unknown	Winter	
Findspot	Kibbutz Tirat Zvi	Berlin	dialface-611
Inscription	Translation		

734 Tire

Type	Inscription	Gibbs	
Location	Funerary	Bonnin	E_075
Date	End of 1st century CE	Winter	Tire 1
Findspot	Heroon of Pelops	Berlin	
Inscription	τη κυρ [ία] [...] [πατρὶ] δ' ἵ υδρολόγ [ιον] [δι] ἅ (?) τε τὴν τέχνην [ην] καὶ κρατίστ [ην (?)] ΓΗΝ		
	Translation To [...] Sovereign ...] [to the father (?)] because of the hydraulic clock thanks to art and very powerful [...]		

735 Tivoli			
Type	Sphere	Gibbs	
Location	Residence	Bonnin	
Date	2nd half 1st century CE	Winter	Licenza 1
Findspot	Villa Sabina, northwest of the pool	Berlin	dialface-582
Inscription		Translation	

736 Tivoli			
Type	Plane	Gibbs	4011
Location	Forum	Bonnin	A_167
Date	1st century BCE	Winter	Tibur 1
Findspot	in the area of Tivoli 1832 on Via Annia	Berlin	dialface-234
Inscription	T. Herennius L (ucii) F (ilius) T. Herennius T (iti?) F (ilius) (quattuor) vir (i) jur (e) dic (undo) res (tituerunt) Titus Herennius, son of Lucius, and Titus Herennius, son of Titi, as triumvirs (have) restored		
		Translation	

737 Tivoli			
Type	Sphere	Gibbs	1011
Location	Unknown	Bonnin	A_006
Date	Late Imperial	Winter	Tibur 2
Findspot	Unknown	Berlin	dialface-12
Inscription		Translation	

738 Tivoli

Type	Sphere	Gibbs	1013
Location	Unknown	Bonnin	A_008
Date	Unknown	Winter	Tibur 4
Findspot	Unknown	Berlin	dialface-14
Inscription		Translation	

739 Tivoli

Type	Plane	Gibbs	5016
Location	Unknown	Bonnin	A_140
Date	2nd or 3rd CE	Winter	Tibur 5
Findspot	Unknown	Berlin	dialface-265 & dialface-352
Inscription		Translation	

740 Todi

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_050
Date	1st century BCE	Winter	Todi 1
Findspot	Modern church	Berlin	dialface-444
Inscription		Translation	

741 Torre Flavia

Type	Cone	Gibbs	
Location	Residence	Bonnin	A_123
Date	Mid-Imperial temple	Winter	
Findspot	Ruins of a Roman Villa built over by a medieval watchtower	Berlin	dialface-516
Inscription		Translation	

742 Tralles

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_057
Date	2nd century CE	Winter	Tralles 1
Findspot	Spoliated in modern walls	Berlin	
Inscription	Μάρκος Σίτριος Θύρσος τὸ ὥρο- λόγιον τοῖς συν- εργα {στα} σταῖς {συνεργασταῖς} ἐκ τῶν ιδίῳν ἀνέθηκεν.	Translation	Markus Sitirius Thyrsus had the horologion set up for his colleagues (?) with his own resources

743 Trier

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_114
Date	Early 3rd century CE	Winter	
Findspot	Near forum	Berlin	
Inscription		Translation	

744 Trier

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-612
Inscription		Translation	

745 Trier

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-613
Inscription		Translation	

746 Trier

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_238
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-614
Inscription		Translation	

747 Trier

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-714
Inscription		Translation	

748 Trier

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_242
Date	2nd half 2nd century CE	Winter	Augusta Treverorum 1
Findspot	Banks near the Roman bridge of Trier	Berlin	
Inscription		Translation	Month names

749 Trieste

Type	Sphere	Gibbs	2015
Location	Villa Rustica	Bonnin	A_080
Date	1st century CE	Winter	Tergeste 1
Findspot	In a "fulling-establishment" at San Sabba	Berlin	dialface-91
Inscription		Translation	

750 Troia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	2nd century BCE	Winter	Ilion 1
Findspot	Unknown	Berlin	dialface-577
Inscription	Translation		
θερ[ινος] χιμε[ριος]			

751 Troia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Late Hellenistic	Winter	Ilion 2
Findspot	Unknown	Berlin	dialface-578
Inscription	Translation		
[θερ]ινος χιμ[εριος] [ισημε]ριν[ος]			

752 Tucci

Type	Inscription	Gibbs	
Location	Theater	Bonnin	E_036
Date	2nd century CE	Winter	Tucci 1
Findspot	Spoliated in walls of medieval castle	Berlin	
Inscription	Translation		
M (arcus) Val (erius) M (arci) F (ilius) Quir (ina tribe) marc [ellus aed (ilis) duum] vir munic (ipii) Aurgit [ani] / accepto loco a Republica horologium omni [impensa suae editis ludis] circensibus et ludis scaenicis [d (onum) d (edit)]		Marcus Valerius Marcellus, son of Marcus, of the Quirina tribe, aedile, duumvir of the Aurgitanian municipality, on a place granted by the city, donated a clock, after having given circus games and scenic games, all on its own property.	

753 Tunis

Type	Sphere	Gibbs	1042
Location	Unknown	Bonnin	A_260
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-43
Inscription		Translation	

754 Tusculum

Type	Sphere	Gibbs	
Location	Residence	Bonnin	
Date	Imperial	Winter	Tusculum 1
Findspot	Villa in Rufinella di Frascati	Berlin	
Inscription		Translation	

755 Tyre

Type	Inscription	Gibbs	
Location	Forum	Bonnin	
Date	2nd century BCE	Winter	Tyros 1
Findspot	Tyros R 17	Berlin	
Inscription		Translation	

756 Uchi Maius

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_028
Date	150-230 CE	Winter	Uchi Maius 1
Findspot	North-east corner of the forum in Henchir es Douamis	Berlin	
Inscription	[...]Hadria[...] / [p]ro honorem m[agisterii] / [horol]ogi promississet, a[edem...] / cum pronao et cistern[am...] / idemq(ue) dedicavit d(ecreto) [d(ecurionum) p(ecunia) p(ublica)].		
	Translation ...] Hadrianus [...] in honor of his election to the charge of magister pagi, promised to build a [...] for the clock, consecrated a temple with a pronaos and a cistern, this by decision of the decurions and on the city treasury.		

757 Ulpia Traiana Sarmizegetusa

Type	Sphere	Gibbs	
Location	Temple	Bonnin	A_488
Date	Unknown	Winter	
Findspot	Temple of Aesclepius and Hygia	Berlin	dialface-528
Inscription	Translation		

758 Umm al-Rasas

Type	Representation	Gibbs	
Location	Temple	Bonnin	
Date	718 CE	Winter	
Findspot	St. Etienne Church	Berlin	
Inscription	Translation		

759 Umm al-Rasas

Type	Representation	Gibbs
Location	Temple	Bonnin
Date	718 CE	Winter
Findspot	St. Etienne's Church	Berlin
Inscription		Translation

760 Umm el-'Amed

Type	Unknown	Gibbs
Location	Unknown	Bonnin
Date	Unknown	Winter
Findspot	Unknown	Berlin dialface-508
Inscription		Translation

761 Umm el-'Amed

Type	Cone	Gibbs	3094G
Location	Unknown	Bonnin	A_579
Date	2nd half 2nd century BCE	Winter	Oum el Ahmed 1
Findspot	Unknown	Berlin	dialface-196
Inscription		Translation	To the Lord Milk-'ashtart god of Hammôn, whom your servant Abdosir, son of Arish consecrated

762 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_01
Date	Last Quarter 3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

763 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_04
Date	3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
LEONTIO FILIO SUPER OMNI CARITATE DULCISSIMO Q V A VIII M[- - -]TIVS PATER	(?)us, (his) father, (set this up) for his son Leontius, sweetest beyond all (bounds of) love, who lived eight years and ... months.		

764 Tarragona

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_06
Date	End of 4th century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

765 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_07
Date	Unknown	Winter	
Findspot	Lintel of a church	Berlin	
Inscription		Translation	

766 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_08
Date	240-250 CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

767 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_09
Date	140-160 CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

768 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_10
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

769 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_46
Date	Mid-3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

770 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_47
Date	Mid-3rd century	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

771 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_51
Date	4th CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

772 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_55
Date	End 2nd - early 3rd	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

773 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_56
Date	End 3rd - 4th CE	Winter	
Findspot	Embedded in wall of Palazzo Sanseverino Rondanini	Berlin	
Inscription		Translation	

774 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_58
Date	270 CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

775 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_59
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

776 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_60
Date	280-290	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

777 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_62
Date	4th-5th CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

778 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_64
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

779 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_65
Date	First half 3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

780 Unknown

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_66
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

781 Odessos

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_67
Date	3rd century BCE	Winter	
Findspot	Rue Parvevic, Varna	Berlin	
Inscription		Translation	

782 Unknown

Type	Representation	Gibbs	
Location	Temple	Bonnin	I_70
Date	2nd century BCE	Winter	
Findspot	Cyclades	Berlin	
Inscription		Translation	

783 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_72
Date	1st BCE	Winter
Findspot	Unknown	Berlin
Inscription		Translation

784 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_73
Date	1st BCE	Winter
Findspot	Unknown	Berlin
Inscription		Translation

785 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_74
Date	Unknown	Winter
Findspot	Unknown	Berlin
Inscription		Translation

786 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_75
Date	1st BCE	Winter
Findspot	Unknown	Berlin
Inscription		Translation

787 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_76
Date	First half of the 2nd BCE	Winter
Findspot	Unknown	Berlin
Inscription		Translation

788 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_77
Date	1st BCE	Winter
Findspot	Unknown	Berlin
Inscription		Translation

789 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_79
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

790 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_81
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

791 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_82
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

792 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_83
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

793 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_84
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

794 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_85
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

795 Colonia Ulpia Traiana

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_86
Date	1st CE	Winter	
Findspot	South wing of Insula 38, Colonia Ulpia Traiana	Berlin	
Inscription		Translation	

796 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_87
Date	1st CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

797 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_88
Date	Last half of 1st BCE - 1st CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

798 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_89
Date	Second half 1st BCE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

799 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_90
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

800 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_91
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

801 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_92
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

802 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_93
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

803 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_94
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

804 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_95
Date	Unknown	Winter
Findspot	Unknown	Berlin
Inscription	Translation	

805 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_96
Date	1st BCE	Winter
Findspot	Unknown	Berlin
Inscription	Translation	

806 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_98
Date	Unknown	Winter
Findspot	Unknown	Berlin
Inscription	Translation	

807 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_99
Date	Unknown	Winter
Findspot	Unknown	Berlin
Inscription		Translation

808 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_100
Date	Third quarter 1st BCE	Winter
Findspot	Unknown	Berlin
Inscription		Translation

809 Unknown

Type	Representation	Gibbs
Location	Unknown	Bonnin I_101
Date	Unknown	Winter
Findspot	Unknown	Berlin
Inscription		Translation

810 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_103
Date	Probably imperial	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

811 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_106
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

812 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_109
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

813 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_119
Date	6th CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

814 Unknown

Type	Sphere	Gibbs	1009
Location	Unknown	Bonnin	A_005
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-10
Inscription		Translation	

815 Unknown

Type	Sphere	Gibbs	1010
Location	Unknown	Bonnin	A_339
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-11
Inscription		Translation	

816 Unknown

Type	Cone	Gibbs	3077G
Location	Unknown	Bonnin	
Date	Unknown	Winter	A_112
Findspot	Unknown	Berlin	dialface-178
Inscription		Translation	

817 Unknown

Type	Cone	Gibbs	3078G
Location	Unknown	Bonnin	A_036
Date	4th century CE	Winter	
Findspot	Unknown	Berlin	dialface-179
Inscription		Translation	

818 Unknown

Type	Cone	Gibbs	3079G
Location	Unknown	Bonnin	A_113
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-180
Inscription		Translation	

819 Unknown

Type	Cone	Gibbs	3080G
Location	Unknown	Bonnin	A_114
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-181
Inscription		Translation	

820 Unknown

Type	Cone	Gibbs	3098
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-200
Inscription		Translation	

821 Auxerre

Type	Cone	Gibbs	3099
Location	Unknown	Bonnin	A_254
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-201
Inscription		Translation	

822 Unknown

Type	Cone	Gibbs	3101
Location	Unknown	Bonnin	A_501
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-203
Inscription		Translation	

823 Unknown

Type	Cone	Gibbs	3102
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-204
Inscription		Translation	

824 Unknown

Type	Cone	Gibbs	3105G
Location	Unknown	Bonnin	A_343
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-207
Inscription		Translation	

825 Unknown

Type	Cone	Gibbs	3108G
Location	Unknown	Bonnin	A_496
Date	Imperial	Winter	
Findspot	Unknown	Berlin	dialface-211
Inscription		Translation	

826 Unknown

Type	Cone	Gibbs	3109G
Location	Unknown	Bonnin	A_431
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-212
Inscription		Translation	

827 Unknown

Type	Plane	Gibbs	5025G
Location	Unknown	Bonnin	A_344
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-277
Inscription		Translation	

828 Cumpana

Type	Cylinder	Gibbs	6002G
Location	Unknown	Bonnin	A_474
Date	2nd century CE	Winter	
Findspot	Unknown	Berlin	dialface-279
Inscription		Translation	

829 Unknown

Type	Cylinder	Gibbs	7006G
Location	Unknown	Bonnin	A_184
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-299, -300, & -301
Inscription		Translation	

830 Montelimar

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_591
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

831 Lerins

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_590
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

832 Unknown

Type	Cylinder	Gibbs	7007
Location	Unknown	Bonnin	A_185
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-318, -873, & -874
Inscription		Translation	

833 Delphi

Type	Unknown	Gibbs	
Location	Temple	Bonnin	A_561
Date	Unknown	Winter	
Findspot	Deposit from the temple of Apollo from the Alcmeonides period	Berlin	
Inscription		Translation	

833 Jericho

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_589
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

834 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_135
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-353
Inscription		Translation	

835 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_064
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-355
Inscription		Translation	

836 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-357
Inscription		Translation	

837 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-358
Inscription		Translation	

838 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-360
Inscription		Translation	

839 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-361
Inscription		Translation	

840 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-362
Inscription		Translation	

841 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-364
Inscription		Translation	

842 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-365
Inscription		Translation	

843 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-367
Inscription		Translation	

844 Unknown

Type	Sphere	Gibbs	1036G
Location	Unknown	Bonnin	A_031
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-37
Inscription		Translation	

845 Unknown

Type	Cylinder	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-370
Inscription		Translation	

846 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-374
Inscription		Translation	

847 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-394
Inscription		Translation	

848 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-395
Inscription		Translation	

849 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-396
Inscription		Translation	

850 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-397
Inscription		Translation	

851 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-434
Inscription		Translation	

852 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-458
Inscription		Translation	

853 Gilly-sur-Isere

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_217
Date	2nd - 3rd centuries CE	Winter	
Findspot	Found in backdirt of excavations of a rustic villa	Berlin	dialface-463
Inscription		Translation	

854 Unknown

Type	Sphere	Gibbs	1048G
Location	Unknown	Bonnin	A_470
Date	3rd century CE	Winter	
Findspot	Unknown	Berlin	dialface-49
Inscription		Translation	

855 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-491
Inscription		Translation	

856 Unknown

Type	Sphere	Gibbs	1050G
Location	Unknown	Bonnin	A_340
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-51
Inscription		Translation	

857 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Possibly 2nd half of the 1st millennium BCE	Winter	
Findspot	Unknown	Berlin	dialface-511
Inscription		Translation	

859 Unknown

Type	Sphere	Gibbs	1052
Location	Unknown	Bonnin	A_261
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-53
Inscription		Translation	

860 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	323-31 BCE	Winter	
Findspot	Unknown	Berlin	dialface-538
Inscription		Translation	

861 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-541
Inscription		Translation	

862 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-542
Inscription		Translation	

863 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-543
Inscription		Translation	

864 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-545
Inscription		Translation	

865 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-567
Inscription		Translation	

866 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-568
Inscription		Translation	

867 Unknown

Type	Sphere	Gibbs	1056G
Location	Unknown	Bonnin	A_500
Date	1st century CE - 2nd century CE	Winter	
Findspot	Unknown	Berlin	dialface-57
Inscription		Translation	

868 Unknown

Type	Sphere	Gibbs	1057G
Location	Unknown	Bonnin	A_504
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-58
Inscription		Translation	

869 Catania

Type	Sphere	Gibbs	1005G
Location	Unknown	Bonnin	A_001
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-6
Inscription		Translation	

870 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-609
Inscription		Translation	

871 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-610
Inscription		Translation	

872 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-626
Inscription		Translation	

873 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-638
Inscription		Translation	

874 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-639
Inscription		Translation	

875 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-640
Inscription		Translation	

876 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-641
Inscription		Translation	

877 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-642
Inscription		Translation	

878 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	dialface-643
Inscription		Translation	

879 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	2nd to 1st century BCE	Winter	
Findspot	Unknown	Berlin	dialface-644
Inscription		Translation	

880 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-673
Inscription		Translation	

881 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	3.-2. century BCE	Winter	
Findspot	Unknown	Berlin	dialface-683
Inscription		Translation	

882 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-691
Inscription		Translation	

883 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-712
Inscription		Translation	

884 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-731
Inscription		Translation	

885 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_389
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-735
Inscription		Translation	

886 Fort Richborough

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_337
Date	Unknown	Winter	
Findspot	Unearthed on the site of Fort Richborough	Berlin	dialface-747
Inscription		Translation	
[I] VNI LATIN [I]			

887 Ravenna

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_091
Date	Unknown	Winter	
Findspot	"Center of the city"	Berlin	dialface-752
Inscription		Translation	

888 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-763
Inscription		Translation	

889 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-771
Inscription		Translation	

890 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-783
Inscription		Translation	

891 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-785
Inscription		Translation	

892 Kerch

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-788
Inscription		Translation	

893 Kerch

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-789
Inscription		Translation	

894 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-791
Inscription		Translation	

895 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-792
Inscription		Translation	

896 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-799
Inscription		Translation	

897 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-800
Inscription		Translation	

898 Colonia Genetiva

Type	Unknown	Gibbs	
Location	Villa Rustica	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-801
Inscription		Translation	

899 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-807
Inscription		Translation	

900 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-812
Inscription		Translation	

901 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-815
Inscription		Translation	

902 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-819
Inscription		Translation	

903 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-829
Inscription		Translation	

904 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-830
Inscription		Translation	

905 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-843
Inscription		Translation	

906 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-850
Inscription		Translation	

907 Unknown

Type	Cone	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-852
Inscription		Translation	

908 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-853
Inscription		Translation	

909 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-854
Inscription		Translation	

910 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-870
Inscription		Translation	

911 Unknown

Type	Unknown	Gibbs	7005G
Location	Unknown	Bonnin	A_183
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-871
Inscription		Translation	

912 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-872
Inscription		Translation	

913 Delos

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_552
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

914 Peltre

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_527
Date	2nd-3rd century CE	Winter	
Findspot	Excavated during construction of a subdivision	Berlin	
Inscription		Translation	

915 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	3.-2. century BCE	Winter	
Findspot	Unknown	Berlin	dialface-876
Inscription		Translation	

916 Unknown

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-877
Inscription		Translation	

917 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-878
Inscription		Translation	

918 Muggia

Type	Sphere	Gibbs	2014G
Location	Unknown	Bonnin	A_079
Date	1st century CE	Winter	
Findspot	Near Muggia	Berlin	dialface-90
Inscription		Translation	

919 Unknown

Type	Sphere	Gibbs	2021G
Location	Unknown	Bonnin	A_084
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-97
Inscription		Translation	

920 Unknown

Type	Sphere	Gibbs	2023G
Location	Unknown	Bonnin	A_086
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-98
Inscription		Translation	

921 Unknown

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	331-323 BCE	Winter	Fundort Unbekannt 1
Findspot	Unknown	Berlin	
Inscription	Translation Hour indicator made by the god Thoth in order to offer the sacrifices in it (in the hours?) bring		

922 Unknown

Type	Sphere	Gibbs	2018G
Location	Unknown	Bonnin	A_082
Date	2nd century CE	Winter	Fundort Unbekannt 10
Findspot	Unknown	Berlin	dialface-94
Inscription	Translation		

923 Unknown

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_336
Date	250 CE	Winter	Fundort Unbekannt 11
Findspot	Allegely from near Bratislava	Berlin	
Inscription	Translation Place Names		

925 Unknown

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_249
Date	3rd century CE	Winter	Fundort Unbekannt 13
Findspot	Allegedly Cret-Chatelard, St. Marcel de Felines (Dep. Loire)	Berlin	
Inscription		Translation	
Place Names		Place names, line markers	

926 Unknown

Type	Portable	Gibbs	
Location	Handheld	Bonnin	
Date	4th century CE	Winter	Fundort Unbekannt 14
Findspot	Unknown	Berlin	
Inscription		Translation	
Place names		Place Names	

927 Unknown

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_502
Date	5/6th century CE	Winter	Fundort Unbekannt 15
Findspot	Unknown	Berlin	
Inscription		Translation	
Place Names		Place Names	

928 Unknown

Type	Portable	Gibbs	
Location	Handheld	Bonnin	
Date	5/6th century CE	Winter	Fundort Unbekannt 16
Findspot	Allegedly Lebanon	Berlin	
Inscription		Translation	
	Place Names		Place names

929 Unknown

Type	Clepsydra	Gibbs	
Location	Temple	Bonnin	
Date	Mid 3rd century BCE	Winter	Fundort Unbekannt 2
Findspot	Unknown	Berlin	
Inscription		Translation	

930 Smyrna

Type	Plane	Gibbs	5022G
Location	Unknown	Bonnin	A_425
Date	2nd century BCE	Winter	Fundort Unbekannt 3
Findspot	Unknown	Berlin	dialface-271, -272, -273, & -274
Inscription		Translation	

931 Kalydon

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_523
Date	Unknown	Winter	
Findspot	Found immured in an altar	Berlin	
Inscription		Translation	

932 Mustis

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_510
Date	End of the 2nd - 3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

933 Sandanski

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_481
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

934 Unknown

Type	Unknown	Gibbs	
Location	Temple	Bonnin	
Date	2nd century BCE	Winter	Fundort Unbekannt 4
Findspot	Unknown	Berlin	
Inscription		Translation	

935 Unknown

Type	Cylinder, Cone, & Sphere	Gibbs	7005G
Location	Unknown	Bonnin	
Date	1st Half 1st century CE	Winter	Fundort unbekannt 6
Findspot	Unknown	Berlin	dialface-291, -292, -293. -294, -295, -296, -297, -298
Inscription		Translation	

936 Jerusalem

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_456
Date	1st century CE	Winter	
Findspot	uneearthed in the Jewish Quarter	Berlin	
Inscription		Translation	

937 Jerusalem

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_457
Date	1st century CE	Winter	
Findspot	Unexcavated at the foot of the Temple Mount	Berlin	
Inscription		Translation	

938 Archilais

Type	Cone	Gibbs	
Location	Temple	Bonnin	A_453
Date	2nd century CE	Winter	
Findspot	Excavated from the courtyard of a Byzantine church	Berlin	
Inscription	Unreadable	Translation	

939 Ma'ale Adumim

Type	Sphere	Gibbs	
Location	Temple	Bonnin	A_445
Date	2nd century CE	Winter	
Findspot	Monastery of Martyrius	Berlin	
Inscription		Translation	

940 Philadelphia

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_421
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	Greek alphanumerics

941 Tinos

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_399
Date	Unknown	Winter	
Findspot	Discovered in the foundations of a modern home	Berlin	
Inscription		Translation	

942 Scupi

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_395
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

943 Bithynium

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_432
Date	134 CE	Winter	Fundort Unbekannt 8
Findspot	Unknown	Berlin	
Inscription	Translation		
	H IIATPir ANTINOON 8EON The homeland (honors) Antinous as god		

944 Bithynium

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_433
Date	134 CE	Winter	Fundort Unbekannt 9
Findspot	Unknown	Berlin	
Inscription	Translation		

945 Utica

Type	Cone	Gibbs	
Location	Residence	Bonnin	A_262
Date	2nd century CE	Winter	
Findspot	House of the Cascade	Berlin	dialface-372
Inscription	Translation		

946 Valesio

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-798
Inscription		Translation	

947 Vastura

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_573
Date	2nd or early 3rd century CE	Winter	Vastura 1
Findspot	Unknown	Berlin	dialface-605
Inscription		Translation	

948 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_33
Date	Second quarter of 3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

949 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_34
Date	First half of 3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

950 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_35
Date	First quarter of 3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

951 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_36
Date	End 3rd-4th century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

952 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_37
Date	Second half of 3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

953 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_38
Date	Third quarter of 3rd CE	Winter	
Findspot	Via Salaria	Berlin	
Inscription		Translation	

954 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_39
Date	Second half 3rd - 4th century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

955 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_40
Date	375-400 CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

956 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_41
Date	End of 3rd CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

957 Vatican City

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_44
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

958 Vatican City

Type	Sphere	Gibbs	1037G
Location	Unknown	Bonnin	A_032
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-38
Inscription	Translation		

959 Vatican City

Type	Sphere	Gibbs	1038G
Location	Unknown	Bonnin	A_033
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-39
Inscription	Translation		

960 Veleia

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_022
Date	Before 92 CE	Winter	Veleia 1
Findspot	Found in modern construction	Berlin	
Inscription	Translation		
[---] ci [---] f (ilius) Sabinus pontif (ex) / [---] Ilv [ir --- trib (unus] milit (um) leg (ionis) XXI praef (ectus) / [---] Serranus Ilvir / [--- horol] og [i] um dederunt		Sabinus, son of [...], pontiff [...] duumvir [...], military tribune of Legion XXI, prefect ... and Serranus, duumvir [---] dedicated a clock.	

961 Velletri

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Labeled" found in a field in velletri	Berlin	dialface-678
Inscription		Translation	

962 Velletri

Type	Cone	Gibbs	3085G
Location	Unknown	Bonnin	A_119
Date	1st century CE	Winter	Velitrae 1
Findspot	Unknown	Berlin	dialface-186
Inscription		Translation	

963 Verdú

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-802
Inscription		Translation	

964 Verona

Type	Representation	Gibbs	
Location	Funerary	Bonnin	I_42
Date	Last quarter of 3rd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

965 Verucchio

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_089
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-437
Inscription		Translation	

966 Vetera

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_325
Date	14-70 CE	Winter	Vetera 1
Findspot	1930s Eastern part of camp Vetera I in the officers' quarters	Berlin	dialface-400
Inscription		Translation	

967 Vienna

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_048
Date	1st century CE	Winter	Vienna 1
Findspot	Church of St. Pierre	Berlin	
Inscription	[---] rius Mans [uetus] [II] IIIIvir Aug [ustalis] [ho] rologium de su [a pec (unia)] [fec (it)] res p (ublica) a novo res [tituit] ...]		
	Translation The Collegium of Seviri Augustalis set up a horologium at its own expense, and the city later restored it		

968 Vilanova i la Geltrú

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_300
Date	1st half 1st century BCE	Winter	
Findspot	Unknown	Berlin	dialface-572
Inscription	Translation		

969 Vindonissa

Type	Plane	Gibbs	5019G
Location	Unknown	Bonnin	A_313
Date	Late Antiquity	Winter	
Findspot	Unknown	Berlin	dialface-268 & dialface-727
Inscription	Translation		

970 Vindonissa

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_311
Date	1st century CE	Winter	
Findspot	Reused in the walls of a civilian home in the Vindonissa legionary camp	Berlin	dialface-405
Inscription		Translation	

971 Volterra

Type	Sphere	Gibbs	2017G
Location	Unknown	Bonnin	A_081
Date	Late 2nd century CE	Winter	Volaterrae 1
Findspot	Unknown	Berlin	dialface-93
Inscription	Q (uintus) Poena / Aper (quattuor) vir / Aed (ilis) d (e) s (ua) p (ecunia) f (aciendum) c (uravit)		
	Translation Quintus Poena Aper, quattuorvir, aedile, took care to raise (this sundial) on his own funds.		

972 Volubilis

Type	Representation	Gibbs	
Location	Residence	Bonnin	
Date	2nd or 3rd century CE	Winter	
Findspot	House of Venus	Berlin	
Inscription		Translation	

973 Volubilis

Type	Cylinder	Gibbs	6001
Location	Unknown	Bonnin	A_291
Date	1st century CE	Winter	Volubilis 1
Findspot	Unknown	Berlin	dialface-278
Inscription	Translation		

974 Volubilis

Type	Sphere	Gibbs	1039
Location	Unknown	Bonnin	A_288
Date	Imperial	Winter	Volubilis 2
Findspot	Unknown	Berlin	dialface-40
Inscription	Translation		

975 Volubilis

Type	Sphere	Gibbs	1062
Location	Forum	Bonnin	A_289
Date	Imperial	Winter	Volubilis 3
Findspot	In situ in the forum	Berlin	dialface-63
Inscription	Translation		

976 Vulci

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_121
Date	2/1 century BCE	Winter	Vulci 1
Findspot	Excavation area of vulci	Berlin	dialface-443
Inscription		Translation	

977 Winningen

Type	Plane	Gibbs	
Location	Unknown	Bonnin	
Date	Unknown	Winter	
Findspot	Unknown	Berlin	dialface-514
Inscription		Translation	

978 Zarai

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_033
Date	237 CE	Winter	Zarai 1
Findspot	Zarai center	Berlin	
Inscription		Translation	

Florentissimo / saeculo DD (omnorum) NN (ostrorum) Imp
(eratoris) / [caes (aris) Maximini] / pii felicitis [et / Maxime nobil
(issimi)] / Caes (aris) Augg (ustorum duorum) hori / legium quod
sua / ex sponte C (aius) Iulius Maximi filius Saturninus /
Messapanus and Q (uintus) Can / neius Cannei Ge / mellini filius
Eme / ritus Ap (r) onianus / civibus suis vo / verant de suo /
dederunt and / dedicaverunt / (ante diem) VI kal (endas) April
(es) Per / petuo and Corneliano Co (n) s (ulibus)

Under the flourishing century of Our Twice August Masters, the
Emperor Caesar Maximin, pious, happy, and Maximus, noble
Caesar. Caius Iulius Saturninus Messapanus son of Maximus and
Quintus Canneius Emeritus Apronianus son of Canneius Gemellinus
gave and dedicated to citizens a clock paid for their own property
following a promise, the sixth day before the calends of April,
Perpetuus and Cornelianus being consuls.

979 Zeugma

Type	Cone	Gibbs	
Location	Residence	Bonnin	
Date	2nd-Mid 3rd CE	Winter	
Findspot	House of Poseidon, Peristyle P 9 [A6]	Berlin	dialface-413
Inscription		Translation	

980 Châteauvert du Var

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_341
Date	Unknown	Winter	
Findspot	Unearthed on the SE slope of a hill located to the NW of the place called Doumet	Berlin	
Inscription		Translation	

981 Salona

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_327
Date	Unknown	Winter	
Findspot	Found in a rubble pile	Berlin	
Inscription	Qui tuo [...] cum [...]	Translation	

982 Augusta Emerita

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_306
Date	3rd century CE	Winter	Augusta Emerita 2
Findspot	Stray find near modern Merida	Berlin	
Inscription	Place names	Translation	Place Names

983 Bagacum Nervorum

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_042
Date	Late 1st century CE	Winter	Bagacum Nerviorum 1
Findspot	Reused in a wall at the northeast of the excavated area of Bavay	Berlin	
Inscription	-] ni [-] / —ho] norib [us functus] / [—horolo] gium and pon [derarium] / -] absumptum [-	Translation	...performed in honor of... horologium and ponderarium... destroyed...

984 Bulla Regia

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_027
Date	1st century BCE	Winter	Bulla Regia 1
Findspot	Ruins near the Apollo Temple	Berlin	
Inscription	[--- Livi?] Neius [--- filius Quir (ina tribe)] Victor flam (en) perp (etuus) [--- ob hon] orem flaminatus perp (etui) gratis sibi [oblati --- colum] nis omnibus marmoreis and horologio and rostra and frontes and [porticus --- mar] moribus and opere albario sua pecunia exornavit idemque dedicavit.	Translation	Livineius, son of [?], from the tribe Quirinia donated the following from his own funds: pillars made of marble, a horologium, the rostra, a building facade (?) and a marble portico and other charitable works

985 Erythrai

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	
Date	Imperial	Winter	Erythrai 2
Findspot	Urban area	Berlin	
Inscription	Translation		
].βα[I]μεθα π[I παρ]μενισκου [I]μβρι.[I].ροσκο[I μ]ενων ω[I]. <ψρι[I]ριστ[			

986 Calasparra

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_294
Date	Unknown	Winter	
Findspot	Unearthed in the property known as "Campillo", on the edge of Calasparra.	Berlin	
Inscription	Translation		

987 Carthage

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_272
Date	Unknown	Winter	
Findspot	Unearthed in Koudiat-Zateur	Berlin	
Inscription	Translation		

988 Carthage

Type	Cone	Gibbs	
Location	Unknown	Bonnin	A_267
Date	Unknown	Winter	
Findspot	Bottom of a well near Bysra hill	Berlin	
Inscription		Translation	
[s] olsitium / [ae] quinoci [v] ernum / a [equi] noci a [utu] mnale / [b] rumale)		solstice / spring equinox / autmun equinox / winter solstice	

989 Unknown

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	A_319
Date	High Imperial	Winter	Fundort Unbekannt 12
Findspot	Private collection	Berlin	
Inscription		Translation	
Mapil(ius) Mapilianus su(b)pr(a)efect(u)s aquarum dei Borvonis ex aere fracto excitatoriam f(ecit) ex voto s(olvi)t l(ibens) m(erito)		‘Mapilius Mapilianus subpraefect of the waters of Borvo made (this clepsydra) from scrap bronze and the signal (?) in accordance with a vow. He fulfilled (that vow) freely and deservedly	

990 Ammaedara

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_263
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

991 Unknown

Type	Representation	Gibbs	
Location	Unknown	Bonnin	I_80
Date	1st BCE	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

992 Ephesos

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_116
Date	Unknown	Winter	
Findspot	Latrine of house H 2 / SR 29	Berlin	
Inscription		Translation	

993 Unknown

Type	Representation	Gibbs	
Location	Residence	Bonnin	I_122
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

994 Antioch

Type	Representation	Gibbs
Location	Residence	Bonnin I_123
Date	2nd-3rd CE	Winter
Findspot	In ancient residence in Antioch	Berlin
Inscription		Translation

995 Pompeii

Type	Representation	Gibbs
Location	Residence	Bonnin
Date	Before 70 CE	Winter
Findspot	Hortulus of Potitus	Berlin
Inscription		Translation

996 Boscoreale

Type	Representation	Gibbs
Location	Villa Rustica	Bonnin
Date	50-40 BCE	Winter
Findspot	Peristyle E of the Villa of P. Fannius Synistor	Berlin
Inscription		Translation

997 Foussaus-Payré

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_258
Date	Unknown	Winter	
Findspot	Discovered in reuse in a wall of a 15th century construction	Berlin	
Inscription		Translation	

998 Lugdunum

Type	Portable	Gibbs	
Location	Handheld	Bonnin	A_252
Date	1st century CE	Winter	
Findspot	Unearthed at No. 1 rue du Colonel Chambonnet, on the site of the 1st century CE	Berlin	
Inscription		Translation	

999 Apulum

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_078
Date	193 CE	Winter	Apulum 1
Findspot	Unknown	Berlin	
Inscription	I(ovi) O(ptimo) M(aximo) et Iunoni Regin(ae) / pro sal(ute) Imp(eratoris) M(arci) Aur(eli) An(tonini) P(ii) Aug(usti) et / Iuliae Aug(ustae) matris Aug(usti) / M(arcus) Ulp(ius) Mucianus mil(es) leg(ionis) XIII Gem(inae) / horologiar(ius) templum a solo de suo ex voto / fecit Falcone et Claro cons(ulibus)		
Translation	To Jupiter, the Best and Greatest and to Juno the Queen, for the health of the Emperor, M. Aur. Antoninus Augustus, The Pious and of the Mother of the Emperor, Julia Augusta, M. Ulp. Mucianus, soldier of the legion XIII Gemina, 'clockmaker?', has erected the temple, alone, on his expense, following a vow, in the time of the consulship of Falco and Clarus.		

1000 Ostia

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_011
Date	20 BCE	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
[C(aius) Car]tilius C(ai) l(ibertus) / [He]racleo / [mag(ister)] v(e)ici / [horo]logium / [suo(?)] posuit		Caius Cartilius Heracleo, freed from Caius, magister vici, a has a clock installed on his own funds	

1001 Saldae

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_030
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
[ae] / dil (is) horol (ogium) omni sua / impensa conlocavi [t] d (edit) d (edicavit) que		... aedile, placed, gave and dedicated a clock, all to its costs	

1002 Laodikea

Type	Sphere	Gibbs	
Location	Theater	Bonnin	
Date	Augustan	Winter	
Findspot	North Parados passage in the Western Theater	Berlin	
Inscription	Translation		
χψερινή ίσημερινή θερ[ι]νή		Winter, Equinox, Summer	

1003 Alesia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_250
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

1004 Izernore

Type	Unknown	Gibbs	
Location	Villa Rustica	Bonnin	A_251
Date	1st - 3rd century CE	Winter	
Findspot	Unearthed on the site of a Roman villa identified in 1965	Berlin	
Inscription		Translation	

1005 Unknown

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_099
Date	Between the 2nd and the 1st half of the 1st century BCE	Winter	
Findspot	Discovered in the Fayoum, without further information.	Berlin	
Inscription	Ἡφαίστιων Ἀρσινόεὺς γυμνασιαρχήσας τὸ κθ' (ἔτος) Ἐρμῇ [ι]	Translation	Hephaistion, son of Heroes, nicknamed Arsinoè, after having been a gymnasiarch for 28 years, dedicated this monument to Hermes

1006 Sedasa

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_060
Date	Mid-3rd century CE	Winter	
Findspot	Unknown	Berlin	

Inscription

Τούης Μ [α- / κρεῖνος ο
καί Ἀβάσκαν- / καί Βάτα- τος σις Βρετασί- / Ερμῖν δος
μέγιστον / εὐχὴν κατὰ
ἐπισκευάσαν- / σύν ὥρο- τες λογήωι εκ τώ [ν / ἰδίω (άν)
αλωμάτων ἀνέστ [η- / σαν Δί [Ἡλίω

Translation

Toues Macrinus, also called Abascantus and Batasis, son of Bretasis, made following a wish and at their own expense, a statue of Hermes Trismegistus with a sundial dedicated to Helios.

1007 Cyrene

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_102
Date	2nd BCE	Winter	
Findspot	Unknown	Berlin	

Inscription

ἐφοροι οἱ ἐ [φ 'ἱαρεῦς [²τουῦ δεῖνος} ²] / Φιλόξην [ος - - - - -]
Τελεσικρα [της - - - - -]
Δαμάνθης - --λ
--ς - οάνθης - --λ --ς - --νο - νθης - --λ --ς - οάνθης - --λ --ς -
οάνθης - --λ --ς - οάνθης - --λ --ς - οάνθης - --λ --ς - οάνθης - --λ --
ς -
οάνθης - - - - -
Φιλύτας - - - - -
Ἀγησίστρατο [ς - - - - -]
τὸ ὥροσκόπιω [ν ἀνέθηκαν (?)].

Translation

The ephors under the priesthood of...
Philoxenos son of...
Telesikrates son of...
Damanthes son of...
Philoxenos son of...
Sôsis son of Po...
Philytas son of...
Hagesistraos son of...
dedicated the horoscopion

1008 Nikaia

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_059
Date	1st century CE	Winter	
Findspot	Unknown	Berlin	

Inscription

ἀγαθὴ τύχη / θεὰς τὰς Νεμέσεις / Αἰλιανὸς Ἀσκληπιόδοτος /
γνωμονηκὸς ἀνέθηκε

Translation

To good fortune. Aelianus Asclepiodotus, specialist in gnomonics, dedicated the statue of the goddess Nemesis

1009 Rome

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_037
Date	Unknown	Winter	
Findspot	Grottarossa area	Berlin	
Inscription		Translation	

1010 Unknown

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_042
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

1011 Milas

Type	Inscription	Gibbs	
Location	Temple	Bonnin	E_055
Date	5th - 6th century CE	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
	ὁρ (ο) λόγιον [ι] ερὸν τες ἀγ (ιας) ἐκικλ (ησίας).		
	I am the sacred clock of the Holy Church		

1012 Rome

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_051
Date	80 BCE	Winter	
Findspot	Unknown	Berlin	
Inscription	Q(uintus) Pactumeius P(ublī) f(ilius)...		
	Translation Quintus Pactumeius son of Publius		

1013 Bononia

Type	Spherical	Gibbs	
Location	Villa Rustica	Bonnin	A_053
Date	Unknown	Winter	
Findspot	Roman villa outside the Porta Lame, room 9	Berlin	
Inscription	Translation		

1014 Rignano Flaminio

Type	Sphere	Gibbs	
Location	Unknown	Bonnin	A_055
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		

1015 Vindolanda

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	A_338
Date	3rd-4th century CE	Winter	
Findspot	Rubble next to the granaries of Vindolanda	Berlin	
Inscription	SEPTEMBER AE K N ID	Translation	September AE(quinoctium) / K(alendae) ID(us) N(onae)

1016 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_404
Date	4th - 6th century CE	Winter	
Findspot	Unknown	Berlin	
Inscription	(καὶ) τοῦτο ἔργον τοῦ αὐτ(οῦ).	Translation	Here is another work by the same

1017 Santa Maria Capua Vetere

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_093
Date	Unknown	Winter	
Findspot	Against wall K of delta room, excavations along Via Eugenia Ricciardi	Berlin	
Inscription		Translation	

1018 Pompeii

Type	Sphere	Gibbs	
Location	Residence	Bonnin	A_094 & A_205
Date	Before 79 CE	Winter	
Findspot	Oecus of the House of the Citarist (I.4.25)	Berlin	
Inscription		Translation	

1019 Reggio nell'Emilia

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_126
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

1020 Mirandola

Type	Plane	Gibbs	
Location	Unknown	Bonnin	A_144
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription		Translation	

1021 Nemus Aricium

Type	Plane	Gibbs
Location	Unknown	Bonnin A_146
Date	Unknown	Winter
Findspot	Unknown	Berlin
Inscription	Translation	

1022 Herculaneum

Type	Plane	Gibbs
Location	Unknown	Bonnin A_155
Date	Unknown	Winter
Findspot	Unknown	Berlin
Inscription	Translation	
ΑΒΓΔΕ ΣΗΘΙ	Alphanumerics	

1023 Pompeii

Type	Plane	Gibbs
Location	Funerary	Bonnin A_170
Date	Before 79 CE	Winter
Findspot	Tomb of the Melisseai, west of Herculaneum Gate	Berlin
Inscription	Translation	
Melissea Sp(uri) f(ilia) / Asiatice vix(it) / annis XVIII	Melissea Spuri daughter of Asiatice lived to 28 years	

1024 Rome

Type	Clepsydra	Gibbs	
Location	Unknown	Bonnin	A_189
Date	Unknown	Winter	
Findspot	Discovered during the destruction of a private building from Late Antiquity	Berlin	
Inscription		Translation	
EAR			

1025 Ostia

Type	Planar	Gibbs	
Location	Unknown	Bonnin	A_191
Date	Unknown	Winter	
Findspot	Found during excavations along the decumanus	Berlin	
Inscription		Translation	

1026 Ephesos

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_049
Date	Late Imperial	Winter	
Findspot	Unknown	Berlin	
Inscription	Τὸ ὥροσκόπιον Διόφαντος Πορφύρι <ο> ς ὁ γεωργός	Translation	Diophantos Porphyrios, peasant, dedicated the clock.

1027 Tigery

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_214
Date	3rd CE	Winter	
Findspot	Unearthed in a Gallo-Roman villa on the place called Fouent-Créma.	Berlin	
Inscription		Translation	

1028 Frejus

Type	Sphere	Gibbs	
Location	Villa Rustica	Bonnin	A_218
Date	Unknown	Winter	
Findspot	Excavated in the "Villa de Villepey"	Berlin	
Inscription		Translation	

1029 Pompeii

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_198
Date	Before 79 CE	Winter	
Findspot	Reportedly in the House of the Colored Capitals (VII.4.32)	Berlin	
Inscription		Translation	

1030 Pompeii

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_192
Date	Before 79 CE	Winter	
Findspot	Reportedly in the House of Pomponius (VI.10.6)	Berlin	
Inscription		Translation	

1031 Dokimeion

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_050
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription	Loc (o) Liii [b (racchio? -) com (missura) -] / Anullino II and Fro [ntone co (n) s (ulibus) officina] / horolog (i) caes (ura) E [---] / Saturnino juss [u ---]	Translation	Location 53 [...] under the consulate of Fronto and Anullinus, the clock's dispensary, the Caesura Episcopi (or Elpidephori)...

1032 Antioch

Type	Inscription	Gibbs	
Location	Forum	Bonnin	E_071
Date	73 - 74 CE	Winter	
Findspot	Unknown	Berlin	
Inscription	Stele A: Ἐπί Αὐ [τ] οκράτορο [ς] / Τίτου Φλαυί [ο] υ Κ / αἰσαρος Σεβαστ [οῦ] / και Αὐτοκράτορο [ς] / Τίτου Καίσαρος κα / ι Δομετιανού Καίσαρος Σεβαστοῦ υἱών / ἔργον δῶρυγος γναφι / κου και φραγμά / των τῶν ἀποστραφέντ / ων τοῦ αὐτοῦ ποταμοῦ ο νοησαμένου Μάρκ / ου Οὐλπίου Τραϊανού πρεσ / βευτοῦ Καίσαρος Σεβαστοῦ / ηργάσατο Ἀντιοχέων ἡ μη / τρόπολις κατὰ πλινθεία τ / ω Βικρ έτει / (...) stele B: Ἑστίν / δε ἐν ταύτῃ τῇ στή (στη) λη Ἀπολλα Κερέου / λοιπων ὀνομάτων μη (κος) πο (δων) κε, (...) Ὠροσκοπίου μη (κος) / πο (δων) [-]...	Translation	Under Emperor Titus Flavius Caesar Augustus, Emperor Titus Caesar and Domitian Caesar, sons of Augustus. Work of a fuller canal and diversion barriers of the same watercourse, carried out, under the authority of Marcus Ulpius Trajanus, legate of Caesar Augustus, the metropolis of the Antiochians, by islets, in the year 122... ... Appear on this stele: the rest of the people (of the islet) of Apollas, son of Kerias, for 25 ½ feet long; (...) (The islet) of the clock for [-] feet long...

1033 Dionysias Soada

Type	Spherical	Gibbs	
Location	Unknown	Bonnin	A_463
Date	Hadrian or later	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
ΑΝΕΘΗΚΕΝ ΤΙΤΟΣ ΦΛΑΟΥ / ΙΟC ΕΝΓΕΝΟ / ΥC CΤΡΑΤΙΩΤΗC / ΛΕΓΙΩΝΟC ΗΕ	Titus Flavius Ingenuus, soldier of Legion VIII Sebaste, offered this clock.		
	Bodyguard of Vettius Pius Maximus?		

1034 Pompeii

Type	Unknown	Gibbs	
Location	Theater	Bonnin	A_196
Date	Before 79 CE	Winter	
Findspot	Quadriporticus	Berlin	
Inscription	Translation		

1035 Pompeii

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_197
Date	Before 79 CE	Winter	
Findspot	A residence "near the city gate"	Berlin	
Inscription	Translation		

1036 Pompeii

Type	Unknown	Gibbs	
Location	Residence	Bonnin	A_207
Date	Before 79 CE	Winter	
Findspot	In the peristyle of IX.5.6	Berlin	
Inscription		Translation	

1037 Unknown

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	E_006
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
...]. incrustavi [t] ...] q and horolog (io). [..... exor] navit aditum [.....	...] encrusted ... adorned the entrance with a .. and a clock and [had]		
pa] viment (um?) cum t [ectorio?]	a pavement made with (a stucco coating?)		

1038 Unknown

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_009
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
[...] COLLEGAS IEIS LOCAVEERUN	...collegium placed it		

1039 Unknown

Type Inscription

Location Unknown

Date Unknown

Findspot Unknown

Inscription

L (ucius) Saufeius / L (ucii) F (ilius) Claud (ia) / Clemens /
scholam and / solarium / dedit.

Gibbs

Bonnin E_012

Winter

Berlin

Translation

Lucius Saufeius Clemens, of the Claudia tribe, son of Lucius, gave a
public seat and a clock.

1040 Poggio Imperiale

Type Sphere

Location Unknown

Date 120-150 CE

Findspot A place called "Amarusi"

Inscription

Euelpistus Aug (usti) n (ostri) disp (ensator) horolo / gium
praetorio Publano / d (ono) d (edit)

Gibbs

Bonnin A_052

Winter

Berlin

Translation

Evelpistus, dispensator of Augustus, donated a clock to the
praetorium Publianum.

1041 Caesarea Mauretaniae

Type Unknown

Location Unknown

Date Unknown

Findspot Unearthed in the property of Mr. Belle,
route d'Alger.

Inscription

Iolitana pro / salute Flori

Gibbs

Bonnin A_287

Winter

Berlin dialface-832

Translation

Iolitana, for the healing of Florus.

1042 Tucci

Type	Inscription	Gibbs	
Location	Unknown	Bonnin	E_037
Date	2nd century CE	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
Q (uintus) Ilius Q (uinti) f (ilius) T (iti) n (epos) Serg (ia) Celsus aedilis Ilvir bis de suo dedit.		Quintus Iulius Celsus, son of Quintus, nephew of Titus, of the Sergia tribe, aedile and duumvir for the second time, gave [?] on its own property.	

1043 Arausio

Type	Unknown	Gibbs	
Location	Unknown	Bonnin	A_225
Date	Unknown	Winter	
Findspot	Unknown	Berlin	
Inscription	Translation		
VI[// V[			

APPENDIX II
List of Sites

Site	Country	Latitude	Longitud
Abu Mina	Egypt	30.84	29.66
Ad Dumayr	Syria	33.639	36.689
Agen	France	44.2	0.621
Agios Mamas	Greece	40.25	23.35
Agrigento	Italy	37.316	13.583
Ai Khanoum	Afghanistan	37.169	69.391
Ain Draham	Tunisia	36.49	8.577
Ain Kahloulia	Tunisia	35.1	10.567
Aisepos	Turkey	40.267	27.6
Aix-les-Bains	France	45.68	5.915
Alcácer do Sal	Portugal	38.3878	-8.4303
Alesia	France	47.539	4.5
Aletrium	Italy	41.725	13.341
Alexandria	Egypt	31.2011	29.8994
Alife	Italy	41.333	14.333
Altino	Italy	45.5458	12.4019
Amastra	Turkey	41.749	32.386
Amathonte	Cyprus	34.712	33.141
Ammaedara	Tunisia	35.566	8.466
Amorium	Turkey	39.02	31.289
Anacapri	Italy	40.55	14.216
Ancient Corinth	Greece	37.906	22.8773
Ancona	Italy	43.6225	13.5106
Andilly-en-Bassigny	France	47.923	5.525
Annonay	France	45.239	4.667

Site	Country	Latitude	Longitud
Antikythera	Greece	35.86	23.3
Antioch	Turkey	36.204	36.181
Antioch of Pisidia	Turkey	38.306	31.189
Anzio	Italy	41.447	12.629
Aphrodisias	Turkey	37.709	28.725
Apollonia-Arsuf	Israel	32.195	34.806
Apt	France	43.876	5.396
Apulum	Romania	46.066	23.57
Aquae Mattiacorum	Germany	50.082	8.24
Aquae Thiblitanae	Algeria	36.46	7.26
Aquileia	Italy	45.7734	13.3664
Aquino	Italy	41.49	13.7
Aquinum	Italy	41.49	13.7
Arausio	France	44.138	4.809
Archilais	Israel	32.215	35.158
Argilliers	France	43.83	4.35
Arles	France	43.6765	4.6296
Aroeira	Portugal	38.581	-9.173
Arsinoites Nomos	Egypt	29.308	30.844
Aspira	Turkey	38.4	27.1
Athens	Greece	37.9704	23.7276
Augusta Emerita	Spain	38.91	-6.33
Auxerre	Unknown		
Aventicum	Switzerland	46.88	7.04
Awans-Bierset	Belgium	50.658	5.455

Site	Country	Latitude	Longitud
Bad Canstatt	Germany	48.804	9.214
Badalona	Spain	41.448	2.246
Baelo Claudia	Spain	36.089	-5.774
Bagacum Nervorum	France	50.298	3.798
Barcelona	Spain	41.383	2.183
Basa	Sudan	16.7031	33.9817
Bavay	France	50.2991	3.792
Baza	Spain	37.483	-2.766
Bettviller	France	48.884	7.184
Bithynium	Turkey	40.739	31.611
Bois-de-Vaux	France	45.737	-0.118
Bonn	Germany	50.737	7.098
Bononia	Italy	44.49	11.342
Boscoreale	Italy	40.775	14.475
Bosquet	Spain	41.289	1.099
Boutae	France	45.841	6.214
Bovino	Italy	41.25	15.34
Brading	United Kingdom	50.679	-1.142620
Brigantium	Austria	47.505	9.74917
Budva	Montenegro	42.288	18.425
Bulla Regia	Tunisia	36.55	8.75
Burdur	Turkey	37.716	30.283
Caesaraugusta	Spain	41.6524	-0.8775
Caesarea Mauretaniae	Algeria	36.59	2.19
Cagliari	Italy	39.227	9.111

Site	Country	Latitude	Longitud
Calasparra	Spain	38.23	-1.7
Calceus Herculis	Algeria	35.216	5.71
Carthage	Tunisia	36.8613	10.3312
Carthago Nova	Spain	37.6	-0.983
Castelnuovo della Daunia	Italy	41.58	15.11
Castroreale	Italy	38.0994	15.2106
Catania	Italy	37.5	15.09
Cerveteri	Italy	41.99	12.09
Chalkidiki	Greece	40.333	23.5
Châteauvert du Var	France	43.5	6.026
Chellalet-el-Adhaoura	Algeria	36.2	3.1
Cherchell	Algeria	36.59	2.19
Chios	Greece	38.382	26.136
Chlef	Algeria	36.216	1.333
Chryse	Turkey	39.585	26.928
Chusclan	France	44.15	4.683
Cingoli	Italy	43.374	13.203
Citta Lavinia	Italy	41.67	12.69
Claros	Turkey	38.0048	27.193
Colonia Genetiva Urbanorum U	Spain	37.233	-5.1
Colonia Ulpia Traiana	Germany	51.662	6.453
Concordia Sagittaria	Italy	45.75	12.84
Conflans	France	45.6709	6.397
Constanta	Romania	44.172	28.635

Site	Country	Latitude	Longitude
Constantine	Algeria	36.35	6.6
Conza della Campania	Italy	40.87	15.33
Cruseilles	France	46.035	6.108
Cumpana	Romania	44.112	28.555
Curubis	Tunisia	36.566	10.866
Cyrene	Libya		
Darro	Spain	37.178	-3.6
Delos	Greece	37.39	25.26
Delphi	Greece	38.482	22.5
Didyma	Turkey	37.385	27.256
Diluntum	Bosnia Herzegovi	43.0804	17.956
Dimale	Albania	42.15	21.3
Diocletianopolis	Bulgaria	42.505	24.708
Dion	Greece	40.178	22.49
Dionysias Soada	Syria	32.712	36.566
Djemila	Algeria	36.316	5.733
Dokimeion	Turkey	38.866	30.75
Douar ech Chott	Tunisia	37.041	9.99
Dougga	Tunisia	36.422	9.218
Durostorum	Bulgaria	44.1211	27.2595
Durres	Albania	41.3166	19.45
Eckum	Germany	51.035	6.692
Empuries	Spain	42.134	3.12
Enserune	France	43.343	2.967
Ephesos	Turkey	37.937	27.344

Site	Country	Latitude	Longitud
Eretria	Greece	38.392	23.792
Erythrai	Turkey	38.3822	26.4809
Este	Italy	45.233	11.666
Evelette	Belgium	50.4118	5.1736
Falerio Picenus	Italy	43.1	13.466
Fayoum	Egypt	29.308	30.844
Fermo	Italy	43.16	13.71
Florence	Italy	43.783	11.25
Florești	Romania	46.747	23.49
Fort Richborough	United Kingdom		
Foussaus-Payré	France	46.531	-0.682
Frejus	France	43.433	6.737
Gafsa	Tunisia	34.416	8.783
Genoa	Italy	44.411	8.932
Gerunda	Spain	41.984	2.821
Gilly-sur-Isere	France	45.6606	6.35
Gommersheim	Germany	49.29	8.25
Grand	France	48.386	5.486
Gratianopolis	France	45.171	5.722
Guajac	France	44.079	4.579
Guidonia Montecelio	Italy	41.99	12.72
Guimerà	Spain	41.564	1.185
Guissona	Spain	41.786	1.29
Halicarnassus	Turkey	37.034	27.424
Hebron	Israel	31.52	35.1

Site	Country	Latitude	Longitud
Hegra	Saudi Arabia	26.791	37.952
Helvia Ricina	Italy	43.321	13.426
Heraclea Lyncestis	Macedonia	41.01	21.342
Herculaneum	Italy	40.806	14.3475
Herdade da Oliva	Portugal	39.00	-7.03
Herdonia	Italy	41.316	15.633
Hierapolis	Turkey	37.925	29.125
Histria	Romania	44.557	28.742
Ialysos	Greece	36.416	28.155
Iasos	Greece	37.2777	27.5863
Igaeditani	Porutgal	39.997	-7.144
Imbros	Turkey	40.160833	25.844444
Interamna Lirenas	Italy	41.433	13.783
Istanbul	Turkey	41.013	28.955
Isthmia	Greece	37.9161	22.9936
Iuvavum	Austria	47.8	13.033
Izernore	France	46.216	5.55
Izmit	Turkey	40.765	29.94
Jericho	Palestine	31.871	35.444
Jerusalem	Israel	31.7758	35.2363
Kabyle	Romania	42.55	26.484
Kale Akte	Italy	38.016	14.433
Kallipolis	Greece	38.54	22.17
Kalydon	Greece	38.372	21.533
Kamen Bryag	Bulgaria	43.455	28.55

Site	Country	Latitude	Longitud
Kea	Greece	37.6	24.33
Kefalos	Greece	38.96	20.87
Keramos	Turkey	37.3166	27.7833
Kerch	Ukraine	45.36	36.47
Kissamos	Greece	35.49	23.65
Knidos	Greece	36.686	27.374
Knossos	Greece	35.298	25.163
Kos	Greece	36.893	27.28
Kourion	Cyprus	34.6642	32.8877
Kyrene	Libya	32.825	21.858056
Kytaion	Ukraine	45.3	36.4
Lafitte-sur-Lot	France	44.352	0.432
Lambaesis	Algeria	35.485	6.259
Laodikea	Turkey	37.835	29.107
Larino	Italy	41.8001	14.9113
Latmos	Turkey	37.49	27.526
Laudun	France	44.105	4.658
Lavarigo	Croatia	44.915	13.9
Lefkada	Greece	38.716	20.65
Lemnos	Greece	39.91666	25.25
Leontopolis	Egypt	30.683333	31.35
Leptis Magna	Libya	32.6353	14.2941
Lerins	France	43.517	7.045
Les Bolards	France	47.134	4.951
Linares	Spain	38.083	-3.633

Site	Country	Latitude	Longitud
Lindos	Greece	33.562	35.369
Lisbon	Portugal	38.725	-9.15
Lleida	Spain	41.56	1.14
Loutra	Greece	40.88	26.05
Luco dei Marsi	Italy	42.027	13.425
Lugdunum	France	45.759	4.819
Lugdunum Convenarum	France	43.03	0.57
Lunel-Viel	France	43.67	4.09
Lykao Savatra	Turkey	37.967	33.114
Lyon	France	45.76	4.84
Ma'ale Adumim	Israel	31.775	35.298
Maale Adummim	West Bank	31.776	35.298
Madaba	Jordan	31.716	35.8
Magnesia	Turkey	38.63	27.42
Mamphis	Israel	31.016	35.066
Mandeure	France	47.451	6.8
Marcianopolis	Bulgaria	43.2	27.58
Mardimago	Italy	45.07	11.88
Maroneia	Greece	40.9065	25.519
Marruvium	Italy	42.004	13.619
Martberg	Germany	50.1788	7.2861
Maryut	Egypt	31.153	29.898
Matilica Matilicatis	Italy	43.256	13.009
Mazarracín	Spain	39.8	-4
Megara	Greece	37.994	23.343

Site	Country	Latitude	Longitud
Megina	Germany	50.333	7.216
Memphis	Egypt	29.844	31.250
Metz	France	49.12	6.177
Mevania	Italy	42.93	12.6
Milano	Italy	45.46	9.18
Milas	Turkey	37.316	27.783
Miletus	Turkey	37.530	27.278
Milos	Greece	36.6	24.4
Mirandola	Italy	44.88	11.066
Modena	Italy	44.64	10.92
Mogontiacum	Germany	50	8.266
Mons Claudianus	Egypt	26.809	33.486
Montagnana	Italy	45.2335	11.4657
Montana (Mihajlovgrad)	Bulgaria	43.4018	23.2178
Montefiore d'Aso	Italy	43.05	13.75
Montegrotto Terme	Italy	45.3222	11.7928
Montelimar	France	44.558	4.75
Montilla	Spain	37.58	-4.63
Montirone	Italy	44.88	11.06
Morgantina	Italy	37.43	14.479
Muggia	Italy	45.6	13.766
Murcia	Spain	37.986	-1.13
Mustis	Tunisia	36.41	9.803
Mylasa	Turkey	37.316	27.783
Myrina	Greece	39.883	25.066

Site	Country	Latitude	Longitude
Mytilene	Greece	39.1	26.55
Nafpaktos	Greece	38.393	21.83
Naga	Sudan	16.2687	33.2764
Naples	Italy	40.84	14.24
Narbo Martius	France	43.183	3.004
Narni	Italy	42.516	12.516
Narona	Croatia	43.081	17.624
Naukratis	Egypt	30.89	30.59
Nemausus	France	43.838	4.361
Nemus Aricium	Italy	41.716	12.716
Nepi	Italy	42.242	12.34
Nikaia	Turkey	37.966	23.633
Nikopolis	Greece	39.008	20.733
Nola	Italy	40.926	14.527
Nomentum	Italy	42.016	12.65
North Palatine Uplands	Germany	49.583	7.666
Nova Gorica	Slovenia	45.939	13.62
Novaesium	Germany	51.2	6.7
Numlulis	Tunisia	36.523	9.219
Ocriculum	Italy	42.413	12.466
Odena	Spain	41.5996	1.592
Odessos	Bulgaria	43.216	27.916
Ogulin	Croatia	45.26	15.22
Oinoanda	Turkey	36.809	29.549
Olympia	Greece	37.638	21.63

Site	Country	Latitude	Longitud
Olympis	Greece	37.638	21.63
Oplontis	Italy	40.7508	14.4655
Oropos	Greece	38.294	23.734
Ortonovo	Italy	44.088	10.054
Ostia	Italy	41.7537	12.2881
Paestum	Italy	40.42	15
Pagus Laebactium	Italy	46.266667	12.3
Palermo	Italy	38.116	13.36
Palestrina	Italy	41.846	12.8949
Palmyra	Syria	34.547	38.2738
Pantikapaion	Ukraine	45.35	36.469
Paphos	Cyprus	34.7077	32.574
Paros	Greece	37.09	25.15
Passo Corese	Italy	42.154	12.65
Patras	Greece	38.25	21.733
Pautalia	Bulgaria	42.2723	22.6934
Peltre	France	49.075	6.224
Pergamon	Turkey	39.131	27.184
Perge	Turkey	36.961	30.853
Petres	Greece	40.783	21.4
Phalara (Stylis)	Greece	38.916	22.612
Philadelphia	Turkey	38.35	28.516
Philippeville	Belgium	50.2	4.55
Philippi	Greece	41.013	24.286
Philippopolis	Syria	32.85	36.628

Site	Country	Latitude	Longitud
Piazza Armerina	Italy	37.383	14.366
Piraeus	Greece	37.943	23.646
Pisa	Italy	43.716	10.4
Poggio Imperiale	Italy	43.749	11.247
Polygyros	Greece	40.36	23.43
Pommeroeul	Belgium	50.461	3.711
Pompeii	Italy	40.7503	14.4871
Pompeiiopolis	Turkey	41.517	34.213
Ponte Lucano	Italy	41.9548	12.7622
Priene	Turkey	37.6597	27.2978
Prosymna	Greece	37.68	22.78
Pula	Croatia	44.866	13.85
Puteoli	Italy	40.823	14.12
Qumran	West Bank	31.74	35.458
Rabat	Morocco	34.020	-6.841
Ramat Negev Regional Council	Israel	30.71	34.61
Ravenna	Unknown		
Reggio nell'Emilia	Italy	44.7	10.6333
Rhodes	Greece	36.42	28.2
Riano	Italy	42.0913	12.5231
Rignano Flaminio	Italy	42.2	12.483
Rigomagus	Germany	50.579	7.22
Rodez	France	44.349	2.575
Rome	Italy	41.8034	12.689
Rosignano Marittimo	Italy	41.8034	12.689

Site	Country	Latitude	Longitud
Rubí	Spain	41.4927	2.0296
Sa'ar	Israel	33.02	35.1
Sabratha	Libya	32.792	12.484
Sagunto	Spain	39.6766	-0.277
Saint Romain-en-Gal	France	45.533	4.862
Saldae	Algeria	36.75	5.067
Salerno	Italy	40.683	14.766
Salona	Croatia	43.539	16.481
Salvia	Italy	43.198	13.385
Samaria	Israel	32.276	35.195
Samos	Greece	37.7	26.9
Samothrace	Greece	40.501	25.5299
San Cesareo	Italy	41.816	12.8
San Dona di Piave	Italy	45.633	12.566
San Miguel de Corneja	Spain	40.487	-5.286
Sandanski	Bulgaria	41.566	23.283
Santa Maria Capua Vetere	Italy	41.0833	14.25
São Domingos de Rana	Portugal	38.7207	-9.3229
Sardinia	Italy	40	9
Sardis	Turkey	38.4883	28.0403
Šarić Struga	Croatia	43.051	17.486
Sarsina	Italy	43.919	12.143
Scupi	Albania	42.21	21.433
Sedasa	Turkey	37.442	32.162
Segóbriga	Spain	39.8862	-2.8127

Site	Country	Latitude	Longitud
Seleukia am Kalykadnos	Turkey	37.03	32.33
Serdica	Bulgaria	42.69	23.32
Servian	France	43.428	3.299
Sétif	Algeria	36.183	5.4
Shumen	Bulgaria	43.2625	26.8935
Side	Turkey	36.767	31.39
Siebengebirge	Germany	50.5	7.4
Siena	Italy	43.28	11.59
Sillyon	Turkey	36.99	30.989
Sirmium	Serbia	44.98	19.61
Smitthus	Tunisia	36.491	8.576
Smyrna	Turkey	38.418	27.139
Soluntum	Italy	38.074	13.541
Sparta	Greece	37.07	22.43
Stabiae	Italy	40.703	14.4988
Sulci	Italy	39.066	8.45
Sulmona	Italy	42.0333	13.9333
Surrentum	Italy	40.626	14.376
Syracuse	Italy	37.06	15.294
Tanis, San el-Hagar	Egypt	30.9772	31.8814
Tarragona	Spain		
Tarsus	Turkey	36.916	34.895
Tayibat al-Imâm	Syria	35.266	36.711
Tazzoult-Lambèse	Algeria	35.489	6.254
Teano	Italy	41.25	14.06

Site	Country	Latitude	Longitud
Teanum Apulum	Italy	41.733	15.266
Tébessa	Algeria	35.4	8.11
Tel er Ras	West Bank	32.209	35.264
Teos	Turkey	38.177	26.785
Terracina	Italy	41.29	13.25
Thamugadi	Algeria	35.484	6.46
Thessaloniki	Greece	40.65	22.9
Tigery	France	48.639	2.507
Tindari	Italy	38.145	15.03
Tingi	Morocco	35.766	-5.8
Tinos	Greece	37.6	25.16
Tirat Zvi	Israel	32.421	35.524
Tire	Turkey	38.088	27.732
Tivoli	Italy	41.959	12.798
Todi	Italy	42.78	12.4
Torre Flavia	Italy	41.9554	12.0491
Tralles	Turkey	37.848	27.845
Trier	Germany	49.7457	6.6503
Trieste	Italy	45.64	13.77
Troia	Turkey	39.9575	26.2392
Tucci	Spain	37.722	-3.965
Tunis	Tunisia	36.855	10.327
Tusculum	Italy	41.798	12.71
Tyre	Lebanon	33.27	35.196
Uchi Maius	Tunisia	36.4	9.08

Site	Country	Latitude	Longitud
Ulpia Traiana Sarmizegetusa	Romania	45.62	23.3
Umm al-Rasas	Jordan	31.5	35.92
Umm el-'Amed	Lebanon	34.815	37
Unknown	Italy		
Utica	Tunisia	37.056	10.061
Valesio	Italy	40.50	18.03
Vastura	Albania	42.3	19.8
Vatican City	Vatican City	41.902	12.452
Veleia	Spain	42.842	-2.787
Velletri	Italy	41.6861	12.7771
Verdú	Spain	41.61	1.144
Verona	Italy	45.438	10.992
Verucchio	Italy	43.98	12.42
Vetera	Germany	51.662	6.453
Vienna	Austria	48.2	16.36
Vilanova i la Geltrú	Spain	41.212	1.7141
Vindolanda	United Kingdom	54.991	-2.36
Vindonissa	Switzerland	47.486	8.206
Volterra	Italy	43.4	10.86
Volubilis	Morocco	34.0733	-5.55552
Vulci	Italy	42.419	11.63
Winningen	Germany	50.311	7.516
Zarai	Algeria	35.8	5.67
Zeugma	Turkey	37.0574	37.8704