THE ECONOMY OF BEEKEEPING: EXAMINING AN OVERLOOKED INDUSTRY OF THE ANCIENT WORLD

by

HANNAH L. BOCHAIN

(Under the Direction of Erika Hermanowicz)

ABSTRACT

The impact of beekeeping on the ancient Mediterranean has yet to be thoroughly examined. As an industry whose products leached into many aspects of cultural importance, such as religion, food, and medicine, beekeepers and bees shaped the daily life of the ancient world. This thesis attempts to illuminate the methods, uses, and economics behind beekeeping in the ancient world through compiling literary, physical, and comparative evidence from the Mediterranean. Through an in-depth analysis of the various types evidence, this thesis illustrates the realities of beekeeping in Ancient Greece and the Roman empire.

INDEX WORDS: Bees, beekeeping, honey, beeswax, beehives, Rome, Ancient Greece, ancient economy
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THE ANCIENT WORLD

by

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For the bees
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INTRODUCTION

Although beekeeping and bees played significant cultural and economic roles in the ancient world, there is a dearth of scholarship on the subject. This paper intends to examine the economy of beekeeping in the ancient Mediterranean. I compile archaeological and literary evidence in hopes of answering questions of scale, profitability, and the practicality of keeping bees. My thesis will be divided into three chapters. First, I examine the physical evidence for beekeeping, using material culture to help understand who kept bees and to what scale. Second, I discuss the uses of beekeeping products, namely, honey and beeswax, in the ancient world and attempt to demonstrate their ubiquity. Third, I shall try to recreate what the industry looked like, focusing on issues of profit, shipping, and cultivation.

This first chapter addresses archaeological evidence for ceramic beehives. The sites of the hives provide crucial evidence about what socioeconomic groups kept bees since most were discovered around modest homes; additionally, the ceramic hives were found in small clusters, suggesting that the beekeepers intended to use the hives to provide honey and beeswax for small, local markets; however, the remains might be misleading. Because most materials used for beekeeping were biodegradable, if there were specialized, large-scale estates dedicated to producing honey and beeswax, then the physical evidence would probably be lost.

After beehives, the chapter will address containers for honey. This chapter will analyze the tituli picti found at Pompeii in order to demonstrate what socioeconomic classes were buying honey and wax. The survey involves five tituli picti identified as labels on honey containers in Pompeii, some of which indicate that they were imported to the city. Honey from
certain areas—namely Attica and Sicily—was highly prized, so it is possible that while the vast majority of honey was sold locally, there was still a market for export for the higher quality products.

The second chapter focuses on how products of beehives, such as honey and wax, were used in the ancient world. While trying to calculate the consumption of these products is impossible, the variety of ways bee-products were used can provide a sense of how large the beekeeping industry must have been to accommodate demand for these products. First, this chapter will address uses for honey, starting with an examination of its medicinal functions. Since honey was most commonly used as a sweetener, this chapter will then turn to recipes for honey provided by Apicius. Next, the second chapter address the uses for beeswax. Like honey, beeswax was also used medicinally, but served as a matrix to form pills. Beeswax was also used to polish and protect marble, create sculptures, and make encaustic paintings; additionally, wax writing tablets used a significant amount of beeswax. Finally, beeswax was used for creating the death masks of Roman funerals, a process that used great quantities of wax. Through the compilation of this evidence, the chapter will demonstrate the ubiquity of beekeeping products to show the need for beekeeping in antiquity.

In the third chapter, I will formulate how beekeeping functioned in the ancient world, from examining how an ancient beekeeper might procure the materials necessary for beekeeping, what laws and incentives existed to motivate someone to keep bees, and how the products got to market and made the beekeeper a profit. The chapter will take into account differences between honey sold in rural areas and cities, marked by different chains of transportation and unique market settings. This chapter will use all available evidence to make
the case that beekeeping ranged from small farmers to hobbyists to massive operations involving transporting, renting, and taxing beehives in order to make enormous profits.
CHAPTER ONE

PHYSICAL EVIDENCE

While it may seem obvious that bees were kept in the ancient world because of the abundant literary references, there is little extant archaeological evidence of beekeeping. In this chapter, I intend to look at the physical evidence for beekeeping, as well as explain why evidence for what must have been a widespread and profitable economic industry is so scarce.

In order to provide a framework against which one can analyze the archaeological evidence, this chapter addresses what ancient authors, particularly Columella, recommended that beekeepers use for hives. Once I have established common beekeeping practices, the chapter will proceed to discuss the physical remains of beehives. The sites at which the hives have been found provide crucial evidence about where beekeeping flourished as an industry. Most hives have been found in Greece, particularly Attica and Crete, which are areas noted by ancient authors for producing excellent honey.¹ The evidence rarely indicates large beekeeping production. Excavations generally have uncovered ceramic hives in small clusters, suggesting that the beekeepers intended to use the hives to provide honey and beeswax for small, local markets; however, the remains might be misleading since only ceramic hives have survived. Any trace of decomposable hives has long since disappeared, leaving behind only evidence of the hive type discouraged by Columella. If there were specialized, large-scale estates dedicated to producing honey and beeswax, then much of the physical evidence has been lost.

¹ Horace Odes II.6; Petronius Satyricon I.38, Synesius Epistulae 148; Pliny Naturalis Historia XI.13
After discussing beehives, this chapter will address containers for honey. This section records and analyzes the inscriptions used to label commercial amphorae, called *tituli picti*, that identify vessels as honey containers. It then attempts to draw conclusions from the locations in which the amphorae were found. While many *tituli picti* of honey amphorae exist, a full collection of those *tituli* is beyond the scope of this study. Instead of providing a full and comprehensive catalogue of the epigraphical evidence, the amphorae section will focus on the vessels uncovered at Pompeii in order to provide a snapshot of a Roman market for honey. The amphorae of honey found in the ruins of Pompeii provide illuminating information about the sources of honey and its consumers. By providing evidence of who bought and owned honey, the section will demonstrate common consumers of honey in the ancient world.

**Literary Evidence**

Because the physical evidence is rare, particularly in Rome, one must turn to the literary record to fill in gaps about ancient beekeeping practices. While many ancient authors wrote about bees, there are few who discuss beekeeping methods, and even fewer who show a practical knowledge of beekeeping. Of the works known to have discussed bees, Mago, Hyginus, and Celsus are lost to us. Virgil dedicates a book of his *Georgics* to bees and beekeeping, drawing much from Varro, but he writes more as a poet than a farmer. Varro, as mentioned, writes about beekeeping, but Columella provides more detail than Varro does and writes with the intention of providing practical knowledge.

Among all the Roman authors, Columella provides the most information on Roman beekeeping in Book IX of his *De Re Rustica*. Of the nine methods Columella lists, eight of them are still used today, lending credibility to Columella’s advice. The best method, Columella tells
us, is to use hives made of cork bark because of its natural properties as an insulator. In Eva Crane’s *The Archaeology of Beekeeping*, she asserts that “cork hives are still used today in Spain, Portugal, and where the cork oak grows on the north side of the Pyrenees” and that they are “warm, weather-tight hives, lighter in weight than logs,” all of which supports Columella’s claims.

Pliny also recommends using cork trees, but warns that “the cork tree does not grow throughout the whole of Italy, and in no part of Gaul.” If cork trees are not available, then Columella recommends fennel stalks, a hive-type still used today in Sicily, as proper material for hives since they have similar qualities to bark and can be woven together to make the hives.

When neither fennel nor cork is available, Columella recommends plaiting together branches in order to make baskets for hosting bees. In the absence of all three, Columella concedes that a farmer can use bark or wood to make his hives. While no Roman wooden hives remain, in *The Archaeology of Beekeeping*, Eva Crane points to the Exultet Rolls, which date back to the 11th century, as evidence of wooden board hives existence in Italy. The Exultet Rolls were used by Catholic priests while performing the praise of the paschal candle blessed on Holy Saturday. Adorning the backs of

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2 Columella *De Re Rustica* XI.7
4 Pliny *Naturalis Historia* XVI.96
5 Crane, *The Archaeology of Beekeeping*, 54.
6 Crane, *The Archaeology of Beekeeping*, 53.
twenty of the Exultet Rolls are scenes of beekeeping, a tribute to the animals that provided the wax for the candle.\textsuperscript{7} As a priest read the scroll, he unravelled the scroll over his pulpit, allowing the congregation to see a depiction of the domestic bees he was praising. The depictions of beekeeping on the scrolls provide evidence of the wood beehives mentioned by Columella. Although difficult to gauge the availability of wood as a hive material, Columella provides some comparative evidence. In \textit{De Re Rustica}, he advises that a farmer use oak or cork wood to build a fence since “olive wood is only rarely attainable” although this may speak more to how profitable it was to own a productive olive tree than how common cork trees or oaks were.\textsuperscript{8}

After discussing the best types of hives for a beekeeper, Columella turns to the less successful hive types. Columella describes earthenware hives as “\textit{deterrima}” because they grow too hot in the summer and too cold in the winter—a sentiment he shares with Varro; however, the only archaeological evidence we have left of any apiary type are the remains of several earthenware hives. Following ceramic beehives, Columella advises that dung hives, still found in Ethiopia today, should be avoided because of their flammability.\textsuperscript{9} Lastly, Columella discusses brick beehives at length. Although Celsus recommended this type, Columella believes brick hives are disadvantageous because a beekeeper cannot move the hives either to a better location or to sell.\textsuperscript{10} Crane writes that she has not found an exact equivalent of the brick hives today, but does provide the following anecdotal evidence in her \textit{Archaeology of Beekeeping}.

An interesting apiary in Central Anatolia, Turkey has been reported to me by Dr. D. P. Erdbrink. He came across a beekeeper at Yarı near Pazarören whose garden, containing many fruit trees, consisted of a number of compartments separated by brick walls. Some 30 to 40 large earthenware jugs, like amphorae, had been incorporated into these walls, lying horizontally, at places where the trees shaded

\begin{itemize}
\item \textsuperscript{7} Ibid.
\item \textsuperscript{8} Columella \textit{De Re Rustica} IX.I.3
\item \textsuperscript{9} Crane, \textit{The Archaeology of Beekeeping}, 53.
\item \textsuperscript{10} Columella \textit{De Re Rustica} IX.VI.2-4
\end{itemize}
them. All the jugs were occupied by bees. The beekeeper had knocked the bottom out of each, and replaced it with a wooden plug so he could reach into the jug from behind. The bees flew from the mouth of the amphorae, always facing the garden. Dr Edenbrink comments that a number of agricultural practices from Ancient Rome linger on in the area, and these hives are probably one such survival.\textsuperscript{11}

While Dr. Edenbrink’s discovery does not exactly match the description of brick hives given by Columella, it does establish that ancient Mediterranean agricultural practices still have a place in the world today, and we can use these modern examples of beekeeping to imagine the beekeeping methods of Ancient Rome.

Using Columella to understand Roman beekeeping requires that the reader knows his audience and his reliability as a source. B.G. Whitfield lays out a categorization system for authors who wrote about ancient beekeeping in his \textit{Virgil and the Bees: A Study in Ancient Apicultural Lore}. For Whitfield, authors can be split into two categories:

“...first, a small one which contains the beekeeper of practical experience, and second (much larger) that of the encyclopaedists who are writing on apiculture in general, plagiarizing freely, and possibly with little or no first-hand knowledge of bees. In the second class too comes the landowner on a largish scale, as opposed to the smallholder: he would not work the hives himself, but would certainly employ a \textit{mellarius}--a horn-handed rustic, responsible to his master through the \textit{vilicus} (the bailiff) for this part of the produce, and no literary student.”\textsuperscript{12}

Columella straddles both of these categories. Although Columella’s desire to moralize through his agricultural writings leads to the occasional inaccurate slip, Columella likely had practical beekeeping experience. In Aude Doody’s \textit{Virgil the Farmer? Critiques of the Georgics in Columella and Pliny}, she writes that Columella has “a sense that agriculture is emblematic of a traditional Roman way of life, an agrarian morality that can be set in opposition to the corruption

\textsuperscript{11} Crane, \textit{The Archaeology of Beekeeping}, 194.
Nevertheless, Whitfield believes that Columella’s detailed and in-depth discussions of beekeeping practices indicate he was experienced in keeping bees himself. Although Columella does join the ranks of the first, limited category of experienced authors, he also falls into the second category in that he aims De Re Rustica towards the large scale landowner who needs to manage a farm rather than perform the day-to-day responsibilities of the vilicus and mellarius.

While important to note what the literary record tells us about ancient beekeeping, the archaeological record provides significant information about who kept bees, where they kept them, and where their products ended up. The next section will focus on the physical remains of beehives found across the ancient world in order to portray the known beekeeping practices in the Mediterranean, particularly around Greece.

**Archaeological Evidence of Hives**

As mentioned above, the only hive remains we have today are ceramic, typically found in the Hymettus region of Attica. Though most hives come from Attica, archaeologists have reported hives found at sites across several Aegean islands. Excavators have also found evidence of beehives in Spain. Although the ceramic hives found in Spain predate Roman colonization, it seems unlikely that the tradition of keeping bees would have stopped due to Roman intervention; our lack of hives from Spain under Roman occupation may be due to the

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adoption of using cork tree bark as beehives, a practice continued today in Spain because of its particular abundance of cork trees.¹⁷

This section will first discuss hives discovered at the Vari House in Hymettus since that dig provided the first non-circumstantial proof that these ceramic containers, described originally as umbrella stands, contained beeswax and likely bees. The discoveries allowed archaeologists to identify similar containers at other sites. Next, the hives found at Marathon will be discussed, which were repurposed as a grave for a young boy. The section will then turn to describing the unique finds at sites in Isthmia of upright hives, whose unusual shapes may provide clues about their function. Finally, the hive fragments discovered in Crete provide important evidence on the effect beekeeping could have had on an economy in the ancient world.

Perhaps the most significant development in beekeeping archaeology was the work on the Vari hives by John Ellis Jones. In 1976, John Ellis Jones wrote the article *Hives and Honey in Hymettus: Beekeeping in Ancient Greece* that would provide the litmus test for identifying beehives at other ancient sites. The article contained an analysis of some unusual courseware vessels discovered among coins and blackware pottery at a villa near the Attic village of Vari. What set these vessels apart from the common kitchen pots was that these courseware pots were deliberately etched on the interior.¹⁸ Most of the etches were made in a neat pattern as if by a comb, indicating that the marks were not caused by typical wear and tear.¹⁹ Due to the pattern

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¹⁷ Crane, *The Archaeology of Beekeeping*, 95.
¹⁹ ibid.
of etches, the unusual pottery became known as “combware” while the vessels’ purpose remained a mystery.\footnote{Ibid.}

Jones divided the types of combware found at Vari into three categories. In the first was “a large open–mouthed pot which had a thickened out–turned rim, tapering walls and a nearly flat closed end” measuring about one foot in diameter and two to three feet in length.\footnote{Ibid.} Due to the fragmentary nature of the vessels, only approximations of the original size could be made. In this particular vessel, only about half of the interior had been etched.\footnote{Ibid.}

The second combware type resembled hoops, also about a foot in diameter, but they were much shorter than the pots, measuring only three to four inches high.\footnote{Ibid.} Many contained thick and outturned rims, etched minimally.\footnote{Ibid.} Jones believed that the third type, although not combed like the others, functioned as a lid to the combware.\footnote{Ibid.} The lids had raised concentric ridges, and often had one to two protrusions, which Jones determined were used to attach forked sticks.\footnote{Ibid.}

From the remains, Jones was able to reason that the combwares’ variations in shape and size did not rule out a common function.\footnote{Ibid.} Jones then learned that similar sherds had been discovered at the site of Justinian’s Fortress at the Isthmus of Corinth, where a pot was fully reconstructed and hypothesized to be a beehive.\footnote{Ibid.} At Trachones, a site near to Vari, similar
sherds were also found that dated to the Hellenistic period. After having some of the sherds reconstructed, M. I. Geroulanos, owner of the site at Trachones, put forth a possible explanation for the beehive set: the pot, lying horizontally, would act as the nursery or main hive where eggs, larvae, and pupae would live and be tended to by the bees themselves. The hoops would be attached to the hive, extending the length and allowing the bees a new area on which to build their honeycomb. The beekeeper could then easily remove hoops filled with honeycomb and harvest the honey and wax while adding fresh, empty hoops to promote new honeycomb production. To protect the hives from the elements, the hives were likely stacked horizontally above one another and held in place by dried mud.

What perhaps is most important about *Hives and Honey in Hymettus* are the results Jones includes from gas chromatography tests on the sediments from combware. Realizing that significant amounts of beeswax would have been used in the hives, John Graham, an excavator at Vari, sent sherd samples to the University of Manchester for comparison against pure beeswax. The sediments

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29 Jones, “Hives and Honey of Hymettus,” 84.
30 Ibid.
31 Ibid.
32 Ibid.
34 Jones, “Hives and Honey of Hymettus,” 86.
from the combed sherds shared strong chemical coincidences with the pure beeswax, indicating that the pots did at one time contain beeswax. To insure that the beeswax was not used as some sort of polish for the terracotta, Graham also had the uncombed sherds from Vari analyzed, all of which came up negative for traces of beeswax.\textsuperscript{35} It is difficult to say how common it was for people in the region to keep bees. When trying to figure out the use of the ceramic pots found in the farmhouse at Vari, John Ellis Jones reasoned that, whatever their function, they were neither necessary nor common for farms since no such pots at the time had been found at comparable villas in the area. If organic materials for hives were more popular than their ceramic counterparts, the archaeological evidence would have no means to indicate this.

**The Marathon Grave Hives**

The work done at Vari allowed for other similar terracotta pots to be positively identified as beehives. Perhaps our most intact examples were found at Marathon, where a young boy was found encased and buried in two pots. The boy measured about .75 meters in length and was estimated to be around seven years old at the time of his death.\textsuperscript{36} These pots matched the pots found at Vari and Trachones; however, they were far better preserved. The Marathon pot

![Figure 3: Beehives encapsulating skeleton at gravesite at Marathon. Jones, “Hives and Honey of Hymettus,” 89.](image)

\textsuperscript{35} Jones, “Hives and Honey of Hymettus: Beekeeping in Ancient Greece,” 88. For a much more detailed account of the process involved with getting viable samples from the courseware for the chromotography, see “Hives and Honey of Hymettus: Beekeeping in Ancient Greece,” 86-88.\textsuperscript{36} Jones, “Hives and Honey of Hymettus: Beekeeping in Ancient Greece,” 89.
that encased the boy’s skull and ribcage measured .59 meters in length, and .35 meters in diameter. The container that encased the pelvis and legs of the boy measured .55 meters in length and .30 meters in diameter. The lids and hoops found at Trachones and Vari were not found in the grave, as they were not required for the repurposed function of providing a makeshift coffin; nevertheless, the pots featured the same outturned rim that Geroulanos hypothesized prevented the cords used to attach lids from slipping off the beehives. Though no gas chromatography analysis has been done on the Marathon hives, Jones believes that the pots functioned as beehives prior to the burial, either taken from discarded hives or from hives that were in use but sacrificed to provide the semblance of a coffin.

The use of beehives as a coffin may suggest something about the economic status of its owners. John Ellis Jones writes that “it is likely the boy who was buried in the pots was the child of a local peasant family; his kinsfolk either buried him in old discarded hives or sacrificed two of their working hives to give him the best coffin which they could afford.” If Ellis is correct about the economic status of the boy’s family, then it shows that even the lowerclass peasants could afford to keep beehives and sacrifice them in order to provide a touching and symbolic resting place for their son.

**Isthmia’s Upright Hives**

In Isthmia, more terracotta beehives were recently discovered at the Sanctuary of Poseidon and at the site of Rachi. Along with the horizontal hive type mentioned above,

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37 Ibid.
39 Ibid.
40 Ibid.
upright hives were also discovered. Rather than being long and cylindrical, these hives sat upright on a flat bottom with a removable lid on top. The vessels were made of Corinthian coarseware and were wheelmade. Towards the bottom of the beehives, a small rectangular or round hole provided a flight hole for the bees, allowing them an entrance and exit to the hive. Though there has been some controversy about the legitimacy of the hives because of their inconveniently small size yet heavy weight, gas chromatography again determined significant amounts of beeswax residue on the combed sherds, strongly suggesting that these vessels were used as beehives.

The discovery of beehives at the Temple of Poseidon, the Fortress of Justinian, and the Rachi settlement in the area raises questions about the function of beehives in the region. The hives found within Tower Seven in the fortress were all horizontal hives like those found at Vari, and perhaps were used to provide honey and beeswax to the military personnel stationed there. In the Roman fortress at Vindolanda, a large amphora of honey was found at the outpost. Although the sample size is small, it does seem that the army liked to have a sweetener for their meals on hand. Likewise, the majority of the hives found at the settlement were horizontal and likely used for providing honey locally. The hives found at the Temple of Poseidon were also upright.

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43 Ibid.
44 Ibid.
46 Ibid.
Poseidon were exclusively upright hives, suggesting a different use than their horizontal counterparts. Perhaps these upright hives served a more ritual function. Rather than serving as a source of revenue, the hives may have acted as votive offerings for Poseidon, allowing him a constant stream of honey from the active hives. The upright beehives have been criticized as being both small and unusually heavy—factors that would not be ideal for a beekeeper looking to make money, but perhaps acceptable for votive hives that did not need to produce a profit or be moved to market.49

The Sphakia Hives

A survey in Sphakia, a deme of Crete, has uncovered several beehive fragments. The region contains little arable land which may have made beekeeping one of the few possible agricultural livelihoods in the area. The survey looks at evidence of human activity beginning from 3000 BCE to 1900 CE.50 Over the course of this nearly 5000 year time span, beehives have been found dated between the Geometric to the Late Roman period. The beehive fragments proved difficult to date because the majority of the fragments were surface finds. Of the 381 fragments recorded, only three have been dated certainly to the Hellenistic Age and six to the Late Roman period.51 In Sphakia, there are a few areas worth particular note. In western Sphakia, in the city of Tarrha, the remains of beekeeping tools and pottery have been discovered, although excavators have found no beehives there, perhaps because non-ceramic hives were preferred in the region. In Jane Francis’s “Beehives and Beekeeping in Graeco-Roman Sphakia,” she notes that Tarrha’s coinage often depicted bees, which she believes shows

51 Ibid.
a “civic pride connected with beekeeping” as well as the “economic benefits of honey and beeswax.”

Further demonstrating the importance of beekeeping in Sphakia, Francis points to the city of Ergastiria. She believes that the region experienced an economic boom in the 1st century CE, as proven by the increase in high quality ceramics and imported wares. Francis attributes this economic upturn to the inhabitant’s discovering the economic possibilities of beekeeping, pointing to the construction of a beehive enclosure in the area. Having architecture dedicated to the farming of bees indicates to Francis the importance of beekeeping to the local economy. Finally, the sanctuary at Agiasmatsi Cave in Sphakia contained several beehive fragments. Francis believes that beehives do not seem appropriate at the sanctuary and likely fell into the cave during a storm long after the site had lost its ritual importance, positing that perhaps the cave was converted into a shelter by beekeepers in order to guard their nearby hives. However, hives have been found at the Temple of Poseidon in Isthmia, so it does not seem impossible that bees and beekeeping could have a religious function.

As we have seen, there are few remains of beehives, and what is left likely only represented a small fraction of the hive types used in the Mediterranean. What we do have seems centered around Attica, stretching to Corinth and Marathon, and the surrounding islands: a phenomenon that may be explained by a popularity of using terracotta rather than tree bark or fennel in that area. If selling honey and beeswax was lucrative enough in the region, however, then the ceramic hives may indicate a desire to have any sort of hive, regardless of quality, in order to profit from the booming market. Attic honey was renowned in the Latin literary record,

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52 Francis, “Beehives and Beekeeping in Graeco-Roman Sphakia,” 386.
53 Ibid.
54 Ibid.
55 Francis, “Beehives and Beekeeping in Graeco-Roman Sphakia,” 387.
which may suggest that it was a particularly popular and lucrative enterprise in the area, a belief underscored by our remarkably high physical record of beehives in Attica.  

Curiously, ceramic hives had a reputation as being poor for the purposes of beekeeping in the Roman literary record, yet the honey from areas that employed ceramic hives was considered best of all. The literary tradition tried to dissuade Romans from using the ceramic hives, citing that they were too cold in winter and too hot in summer. However, recent experiments with ceramic hives have demonstrated that the temperatures during both summer and winter are more than within the parameters for bees. Additionally, the material required for ceramic hives may have been much more abundant in the region than cork bark or wood. Beekeepers may have decided that the convenience of using readily available materials outweighed whatever downsides ceramic hives produced.

It has been suggested that the popularity of Attic honey comes from the method of having attachable, or, more importantly, detachable hoops on which bees could build their honeycomb. These horizontal ceramic hives, found in several regions, had detachable hoops that would allow a beekeeper to break off the honeycomb without disrupting the hive proper. Because it was less disturbing to bees, less smoke would be needed in order to pacify them. In his Geography, Strabo refers to the superior unsmoked honey found in the regions of the silver mines, i.e. Attica, where the majority of ceramic hives have been found. While today the smoke used on bees tends to be scented pleasantly so that it does not interfere with the honey’s

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56 Horace Carmina II.6; Petronius Satyricon I.38, Synesius Epistulae 148; Pliny Naturalis Historia XI.13
57 Horace Carmina II.6; Petronius Satyricon I.38, Synesius Epistulae 148; Pliny Naturalis Historia XI.13
59 Strabo Γεωγραφικά IX.1.23
taste, the smoke used in the ancient Mediterranean generally came from burning dung, leaving behind a predictably unpleasant flavor. The less smoke used on the honey, the better the honey would taste.

The hives found across Attica and Crete show a wide range of people participating in beekeeping. Soldiers at the Fortress of Justinian, worshippers of Poseidon, poor farmers in Marathon, and a large portion of the agriculturists in Sphakia all produced honey either for themselves, local markets, or sale abroad. The Sphakia remains indicate that the entire region used beekeeping as a part of their economy, and the literary record implies that honey and wax were popular exports from the region. In Attica, it seems beekeeping was also a part of the economy, providing to foreign markets what Strabo considered the best honey. Out of the ceramic hive remains emerge images of specialized regions dedicated to the production of honey and beeswax, and consequent profits through the international fame of their wares. In addition to these economies based on specialty export, it also seems that hives were used to provide honey for either the beekeepers alone, or for sale at local markets, as shown by the beehives found in settlements and outposts in Isthmia as well as the use of the hives by a poor family in Marathon.

**Amphorae and Other Containers for Honey**

Although a survey of all the *tituli picti* that mention honey may be useful, sampling the *tituli picti* found at Pompeii provides a more in-depth analysis of the circumstantial evidence provided by the inscriptions. This section discusses five amphorae discovered at Pompeii whose *tituli picti* indicate they once held honey. A look at the homes in which the containers were found shows the types of people, at least in Pompeii, who could afford amphorae of honey,
providing evidence of who bought the products sold by beekeepers and the amounts in which they sold and shipped them.

In Volume IV of the *Corpus Inscriptionum Latinarum*, Mattheus Della Corte interprets five *tituli picti* as packaging labels for containers holding honey, which deals exclusively in inscriptions from Pompeii, Herculaneum, and Stabia. Since their excavation, unfortunately, the vast majority of the *tituli picti* have been misplaced or destroyed. Because the originals have been lost, an independent analysis of the inscriptions is impossible, and Della Corte’s reproductions remain the means of analysis. To complicate matters further, the editors labelled the amphorae types in an unclear and undetailed fashion. J. Theodore Peña, author of *Roman Pottery in the Archaeological Record*, describes the complications with the categorization system thus:

> The editors employed an unsatisfactory typological scheme peculiar to *CIL* IV. This consists of a set of fifteen forms elaborated by Schöne, the editor of the volume’s first fascicule…to which Mau, the editor of the second fascicule, appended a set of thirty additional forms…although some of the Schöne–Mau forms correspond to a currently recognized *amphora* class in a more or less straightforward and consistent fashion, others subsume two or more distinct and sometimes unrelated classes, whereas still others have no discernible relationship to any one currently recognized class or set of classes. ⁶⁰

The loss of the *tituli picti* and the unusual classification system leaves little room for confident conclusions, but it is nevertheless evidence that cannot be ignored.

Table 1: CIL IV.5740⁶¹

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<td>MEL • P • CXXXIII</td>
<td>T • P • XXVIII</td>
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<td>DAT • XXXXIXS</td>
<td>/////////////////ENS</td>
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</tbody>
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⁶⁰ J. Theodore Peña, *Roman Pottery in the Archaeological Record* (Cambridge: Cambridge University Press, 2007), 100. A more detailed breakdown of the classification system can be found on 100-102 of *Roman Pottery in the Archaeological Record*.
⁶¹ I will be discussing the inscriptions in the order they appear in CIL IV.
Della Corte reports the above as an inscription on an amphora found in October 1872 in I.3.3 Pompeii. The first column labels the contents of the container (mel) then records what Peña believes to be the weight and the volume of the container. The final line of the first titulus pictus likely either indicates that the honey was sold by or to an Epidius Fortunatus, whose name appears on two other tituli picti from Pompeii. The second titulus pictus on the amphora proves more mysterious, but Peña believes the numbers might correspond to the container’s weight when empty and the second row of letters might be the remnants of a name. Because of the titulus pictus found there, I.3.3 has been labelled the House of Epidius Fortunatus. In the comments on I.3.3 in the Corpus Topographicus Pompeianus, Warsher describes the area to which the house belonged as “piuttosto poveri” or “rather poor” but notes that I.3.3 is the exception due to its size and its unusual architectural feature of a peristyle above its atrium. It is difficult to say what sort of socioeconomic bracket the house’s owner belonged to because of the conflicting factors of the house’s poor location but relatively nice size, but one can at least make the assumption that whoever the owner was, he likely was better off than those living in the smaller neighboring insulae.

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62 The houses in Pompeii were labelled first by region, then by insula within the region, then by house. For instance, I.3.3 indicates that the house is in Regio 1 (the southeast quadrant of Pompeii), Insula 3, House 3.
63 CIL IV.9532 and IV.42706
64 J. Theodore Peña, Roman Pottery in the Archaeological Record, 100.
Table 2: CIL IV.5741

<table>
<thead>
<tr>
<th>MEL • THYM • IMVM • A</th>
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<td>GAVIAE • SEVER</td>
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*CIL IV.5741* was discovered in the fall of 1871 at VII.7.5, called the House of the Calpurnii, in Pompeii. The first line of the inscription again begins with an identification of the contents of the amphora. The *THYM•IMVM* likely meant that the honey came from bees that predominately used pollen from thyme; coincidentally, Columella believed thyme made honey of a superior flavor.\(^{67}\) The second line likely indicates who produced, sold, or bought the honey. It has been hypothesized that VII.7.5 was once a flower shop that likely made its money by selling perfumes and garlands.\(^{68}\) In *The Flower Industry at Pompeii*, Jashemski implies that honey may have also been produced and sold at VII.7.5, writing that “…many of the flowers that were raised for garlands produced excellent honey,” and “perhaps it is significant that an amphora of thyme honey was found in the House of the Calpurnii.”\(^{69}\) If VII.7.5 indeed supplemented their flower business with the sale of honey, the amphora of honey found there was likely intended to either be sold in its entirety to others or perhaps used as a vat with which one could portion out smaller amounts of honey to be sold to the public.

Table 3: CIL IV.5742

<table>
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<tr>
<th>MELLA</th>
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<td>O[ ]ATA</td>
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\(^{66}\) Regio VII is located in the central western part of Pompeii.

\(^{67}\) Columella *De Re Rustica* IV.4.6


\(^{69}\) “House of the Calpurnii” is one of many names given to VII.7.5.
This *titulus pictus*, discovered in March 1897 in the cella of VI.15.5, was likely produced by a Sextus Iulius Se[ ]tinus. Della Corte provides a sketch of the inscription in the *CIL*, which, if accurate, was a fairly legible *titulus* excluding the second line. The home VI.15.5 Della Corte identified as the house of Marcus Pupius Rufus due to the sheer number of graffiti, political and personal, that mentioned him on the walls. Four of the graffiti were messages of support for his election for duovir and one supports him for aedile, indicating that he was politically active locally.

Table 4: *CIL* IV.9421

<table>
<thead>
<tr>
<th>Q. POMPEI MELLIS</th>
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<tr>
<td>POMPEIO</td>
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<td>PRISCO [ ] FLOS</td>
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<tr>
<td>GALLI [ ] MELLIS</td>
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<td>DESP [ ]</td>
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70 Regio VI is in the northwest quadrant of Pompeii.
71 Perhaps the Of [ ]ATA was *ollata*, which means “little pot.”
73 Franklin, *Pompeius Difficile Est*, 70.
CIL 9421 was discovered on a container that Della Corte describes as “globosa,” standing 33 cm high, found in May of 1931 at I.10.4, the House of Menander. The first line labels the product and perhaps names the producer or receiver of the honey. The third line may have indicated what sort of flowers the bees used to produce the honey, much like the “THYM” of 5741. The fourth line shows that the honey likely came from Gallia originally, split into smaller, more portable containers once it arrived at Pompeii. The house’s size and opulence suggests that the owner himself was upperclass, although it is unclear whether he was only a member of the local elite or if his elite status extended into Rome.

Table 5: CIL IV.10288

| MEL • CORSICV • P • II |

The final titulus pictus from Pompeii listed in the CIL was discovered in 1869 at I. III.23, the House of Actius Anicetus, a gladiator. The only line of the inscription describes its contents, where it came from, and perhaps its weight. Like 9421, this honey was stored in a smaller container, described by Della Corte as a “parvo urceo.” Also like 9421, the titulus pictus indicates that the honey was imported to Pompeii, although this time from Corsica rather than Gallia.

From these five tituli picti, certain themes emerge. At least two of the homes in which the containers were found belonged to members of the local elite, and the house of Epidius Fortunatus shows that the owner was of a social class above that of the occupants around him.

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74 Regio I is located in the southeast quadrant of Pompeii.
75 J. Theodore Peña, Roman Pottery in the Archaeological Record, 105.
77 Located in the southeast quadrant of Pompeii.
The Houses of the Calpurnii and of Actius Anicetus prove more difficult to pin a social class, but the paintings and mosaics found in the homes suggest a degree of economic comfort enjoyed by the owners. One could draw the assumption at this point that honey was presumably a luxury good since evidence of it has only been recorded at well-to-do homes in Pompeii, however, it should be considered not only that the early archaeological and epigraphical record may show a bias towards the more elite homes, but also that the lower classes may have used small and unmarked vessels to contain honey. Without the financial flexibility of being able to buy items in bulk, the poor may have instead purchased smaller, cheaper amounts of honey, perhaps provided from large vats like the one discovered at the House of the Calpurnii, or from vendors from the hinterlands bringing honey into the city to sell each day. Without spectrometry, unlabeled containers are not identifiable as honey jars, making the poor unrepresented in the survey.

Another pattern that emerges—as far as any sample size of five can indicate a pattern—is the use of smaller containers for imported honey. Although the lack of a label of origin on the other amphorae does not necessarily prove that the honey was local, in one of the cases, that of the flower shop at the House of the Calpurnii, it seems probable that the honey was produced at the home itself as a means to diversify the owner’s income. Surely, honey imported from abroad cost more than the local product due to shipping costs and its reputation for superiority. Thus, when merchants sold their imported honey, they labelled where it came from to attract buyers and justify a higher price. The honey would likely arrive in a larger container, but be parceled into smaller ones for sale, resulting in the smaller containers used for 10288 and 9421. When selling local honey, since the merchants could not use its area of origin as a selling point,

\[CIL\ IV.5741\]
they would perhaps emphasize the type of flowers used to create the honey in the hopes of attracting buyers which is why we see “THYM” on the container in the flower shop. Of course, the use of “amphora” as a catch-all term in Book IV of the CIL makes this a hard argument to make as the containers could be any size, but if the “P” inscriptions do indicate weight, then the difference in weight between CIL 5740 and CIL 10288 (XVIII v. II) shows that at least one of the containers was significantly larger than the imported one.

Support for the theory that smaller jars were used to distribute imported honey may be found in TPSulp.80, a wax tablet found at the house of Lucundus in Pompeii, which provides evidence of imported honey arriving in urnalía sicula.79 The wax tablet contains a bill of lading between two peregrini named Aphrodisius and Theophilus. Theophilus writes to Aphrodisius that he will receive sixteen urnalía sicula of honey in addition to wine, vinegar, and grape syrup. Taco P. Terpstra believes the wax tablet indicates the following:

A peregrine merchant, Theophilus, sent merchandise to his local Puteolan agent Aphrodisius who was a compatriot of his, and a settler in Puteoli just like the Tyrian station-operators. Aphrodisius was expected either to resell the goods locally or to reship them to another location (imaginable is Rome). Given the unquestionably large amount of overseas commercial activity in Puteoli, a transaction like this one must have been fairly common place.80

If Terpstra’s interpretation is correct, the tablet indicates a system of overseas trade for honey, providing evidence that there was a market for honey more complex than just local cottage industries.

80 Taco Terpstra, Trading Communities in the Roman World), 90.
Conclusions

Through the compilation of the literary evidence, the remains of beehives, and a sampling of amphorae at Pompeii, a picture emerges of ancient beekeeping practices. The ceramic hives demonstrate the range of the markets in which beekeepers would participate. Sphakia and Attica, renowned for their honey, provide evidence of regions taking advantage of their positive reputations for certain goods. The fact that the evidence is limited to what the literary record reports as the least suitable method for keeping bees indicates that there may have been an even larger production of beekeeping that is now invisible to us, although the literature may not accurately reflect the actual preferences of beekeepers. The ceramic hives also show that beekeeping was done not only by those looking to sell at larger markets, but also those who produced enough for themselves and small transactions at local markets.

Further proof of complex market systems comes from the amphorae found at Pompeii, two of which seem to indicate that they were imported from Corsica and Gallia. The flower shop amphora may be evidence of a shopkeeper, hoping to corner a larger chunk of profit with little added work, who diversified his products and made use of the flower-rich surroundings provided by his business. In addition to the imported honey found at the homes in Pompeii, the wax tablet found at the house of Iucundus in Puteoli also demonstrates a complex system of shipment used to import goods and distribute them throughout larger metropolitan areas like Pompeii and Rome. Out of all of the physical evidence, beekeeping begins to show itself as a diverse pursuit, aimed not only towards larger markets and the wealthy, but also towards humbler local markets and produced by cottage industries.
CHAPTER TWO
USES FOR HONEY AND BEESWAX

While impossible to show how much wax and honey was consumed in the ancient world, this chapter will show the multiplicity of uses for bee products. By carefully looking at the evidence for honey and wax usage, this chapter seeks to demonstrate that an industry for the production, shipment, and purchase of honey and wax must have been in place to account for its widespread use. First, this chapter discusses medical uses for honey and wax as described by Greek and Roman authors. The medicinal benefits of honey were well documented in ancient texts and both honey and wax were amply present in medicinal recipes. After exploring medical texts, the chapter next discusses the frequent appearance of honey as a sweetener in food recipes while acknowledging class stratification and its effects on our perception of the average diet. An examination of honey and wax based cosmetics will follow, careful to distinguish between purely cosmetic uses and cosmeceutical uses.\textsuperscript{81} Next, this chapter analyzes the use of wax in art, from encaustic paintings to wall paintings to wax models to the lost wax casting method of creating bronzes. The chapter then examines wax tablets and their use and ubiquity in legal matters. Finally, the chapter discusses the many ways honey and wax are employed in death rituals, be it through libations or the preservation of the bodies themselves.

\textbf{Medicine}

In the ancient Mediterranean world, honey was known for its ability to heal when used both topically and internally. According to Athenaeus’ \textit{Deipnosophistai}, Democritus once was

\textsuperscript{81} Cosmeceutical is a portmanteau of cosmetic and pharmaceutical.
once asked how he had lived to such an old age, and he replied “Moisten the inside with honey and the outside with oil.”82 While not particularly associated with longevity in the ancient medical texts, honey still had a multiplicity of medicinal functions. In recipes, honey frequently was mixed with other healing materials, used often for fading blemishes and birthmarks, helping coughs, and healing small wounds. Honey’s sticky consistency made it a useful bonding agent for applying pessaries and bandages. Dioscorides, author of De Materia Medica, describes honey’s uses thus:

> It has properties that cleanse, open up, and stimulate the rise of humors. This is why it is a suitable rinse for filthy sores and hollows. Boiled and applied, it glues together components that were separated, it treats the lichen-like eruptions on the skin when boiled with stypteria and smeared on, it treats noises in the ears and earaches when dripped tepid into the ears with salt that was roasted and finely ground, it destroys both lice and their eggs when smeared on, and it repairs the foreskin of those who lack foreskin not due to circumcision…it cleanses those substances that cast a shadow over the pupils of the eyes and, as an ointment or as a gargle, it treats conditions of the trachea, the tonsils, and sore throats.”83

Although some of the claims are exaggerated, modern research shows that honey does have medicinal properties. Honey’s primary health benefit comes from its antibacterial nature. Honey creates hydrogen peroxide, which, when applied topically, produces a bacteria-free environment for wounds that prevents infection. In addition to its production of hydrogen peroxide, honey has an acidic pH which also inhibits bacterial growth. Furthermore, honey helps wounds heal by drawing moisture in from the environment, a process that aids in the production of new and healthy tissue.

Problematically, the practice of medicine was a class-stratified affair. In Romans and

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82 Athenaeus Deipnosophistai II.46e
Physicians, John Scarborough separates the physicians of the Roman Empire into two categories. In the first category were the “philosopher-physicians, who emerged from the Greek tradition of intellectual constructs, and who worked in the patterns set down by Greek and Hellenistic philosophy.”

The philosopher-physicians were employed or enslaved by Roman aristocrats, rarely healing the lower classes, and attracting ridicule from their peers when they did. In the second category were the medici “who learned [their] trade from experience and who performed the mundane tasks of everyday public practice.” The medici were generally freedmen or their descendants, often acting as drug peddlers or army medics. Because philosopher-physicians wrote the extant medical texts, the medical care for the public at large is difficult to determine. Although honey shows up over two hundred times in Dioscorides’s De Materia Medica, that does not necessarily indicate how often it was used, even among the aristocratic class for whom the recipes are aimed. However, Pliny notes its commonness while

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85 Scarborough, “Romans and Physicians,” 305.
86 Scarborough, “Romans and Physicians,” 306.
enumerating twenty-two medical remedies from honey, wax, or propolis. Pliny writes that “honey would be held in no less esteem than laser, were it not for the fact that nearly every country produces it...the uses to which honey is put are quite innumerable, if we only consider the vast number of compositions in which it forms an ingredient.”

Pliny indicates that honey’s commonness caused it to be underestimated as a remedy, seemingly readily available to the public.

Hippocrates, too, recommends honey, but as a mild diuretic when mixed with water, called hydromel, or with vinegar, called oxymel. Also recommended is the following honey-heavy recipe for the treatment of ulcers.

Having pounded the white unripe grape in a mortar of red bronze, and passed it through the strainer, expose it to the sun during the day, but remove it during the night, that it may not suffer from the dew; rub it constantly during the day, so that it may dry equally, and may contract as much virtue as possible from the bronze: let it be exposed to the sun for as great a length of time as till it acquire the thickness of honey; then put it into a bronze pot with the fresh honey and sweet wine, in which turpentine resin has been previously boiled, boil the resin in the wine until it become hard like boiled honey; then take out the resin and pour off the wine: there should be the greatest proportion of the juice of unripe grape, next of the wine, and third of the honey and myrrh, either the liquid (stacte) or otherwise. The finest kind is to be levigated and moistened by having a small quantity of the same wine poured on it; and then the myrrh is to be boiled by itself, stirring it in the wine; and when it appears to have attained the proper degree of thickness, it is to be poured into the juice of the unripe grape; and the finest natron is to be toasted, and gently added to the medicine, along with a smaller quantity of the flowers of copper (flos aeris) than of the natron. When you have mixed these things, boil for not less than three days, on a gentle fire made with fuel of the fig-tree or with coals, lest it catch fire. The applications should all be free from moisture, and the sores should not be wetted when this medicine is applied in the form of liniment. This medicine is to be used for old ulcers, and also for recent wounds of the glans penis, and ulcers on the head and ears.

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87 Laser, or silphium, was a plant of the *ferula* family used as both a medicine and as a seasoning for food. The plant has not been identified in modern times, believed to have gone extinct.
88 Pliny *Historia Naturalis* L.24.1-3
89 Hippocrates *On Regimen in Acute Diseases* 15; 16
90 Hippocrates *On Ulcers* 5
Wine mixed with honey is recommended as a restorative for the weak. In Galen’s *On the Properties of Foodstuffs*, he is careful concerning the consumption of honey. Galen tells of two men who had argued over whether honey was helpful or harmful, comparing its effects on one another. Ever conscious of different humours, Galen takes the stance that honey can be helpful to one yet harmful to the other.

One of those men who were at odds with each other about honey was older, more mucous by nature and lazy in his lifestyle and all other activities (not least in regard to exercise before bathing). Consequently, honey was of benefit to him. But the other was by nature bilious, thirty years of age and endured many hardships in his daily activities. So it was likely that in his case the honey had been quickly converted to bile and so was more harmful.  

A few write about potential dangers of consuming honey. Pliny notes that “the food of bees is of so much importance that their honey may become poisonous. At Heraclia in Pontus the honey turns out in certain years very deadly, and that from the same bees.” In Xenophon’s *Anabasis*, he describes how Greek soldiers in Asia Minor ate from the abundant beehives in the region, causing them “vomiting and diarrhea, with a total inability to stand steady on their legs. A small dose produced a condition not unlike violent drunkenness, a large one an attack very like a fit of madness, and some dropped down, apparently at death’s door.” Pompey later suffers a loss of a thousand men to similar circumstances when Mithridates, aware of the effects of the poisonous honey, set out honeycomb along the path of the army. When Pompey’s men had eaten it and fallen victim to its effects, Mithridates attacked to great success. This effect is actually recognized today, caused by bees pollinating rhododendrons and leaving grayanotoxins in their

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91 Galen *On the Properties of Foodstuff* 472; translation provided by Owen Powell.
92 Pliny *Historia Naturalis* XXI.44.1-2
93 Xenophon *Anabasis* IV.8.20
94 Strabo *Geography* XII.3.18
While recording and discussing every medical use of honey mentioned in extant texts is impossible at the scale of this thesis, this section has catalogued some of the more common uses of honey listed by medical authors. Most of the recipes used honey merely as a bonding agent for more effective ingredients, but medical authors still recognized honey’s own beneficial properties. Such properties include soothing sore throats, speeding the healing of abrasions, and promoting healthy tissue growth. While it does appear as a medicinal ingredient, honey is also commonly recommended as a mere adhesive, suggesting that it was widely available enough for use minor purposes.

**Food**

Perhaps the most obvious use of honey in the ancient world is as a sweetener. Once again, the stark economic class divisions in the ancient world make it difficult to use the texts as proof of honey and wax’s ubiquity. The food recipes left by Apicius represent only what the upper crust might have eaten, promoting rare, expensive, and unusual foods as a way to indicate social standing and good taste. Despite being aimed towards the upper class, Apicius’s recipes still contain plenty of ingredients we know were available to all class levels, such as wheat and olive oil, so assumptions about honey’s expense and rarity cannot be drawn. Presumably, if farmers keep bees, they also consume and use honey and beeswax. Although analyzing Apicius only provides a narrow view of what Romans may have consumed, this section will cover the multiplicity of ways Apicius advises using honey.\(^{96}\)

\(^{95}\) Suze A. Jansen, Iris Kleerekooper, Zonne L.M. Hofman, Isabelle F.P.M. Kappen, Anna Stary-Weinzinger, Marcel A.G. van der Heyden, “Grayanotoxin Poisoning: Mad Honey and Beyond,” *Cardiovascular Toxicology* 12 no. 3 (September 2012): 208.

\(^{96}\) Honey is mention 228 times in Apicius.
In his first recipe, Apicius describes how to create “fine spiced wine,” a recipe which calls for 6 sextarii of honey, or almost one and a half gallons of the sweetener. The very following recipe describes a refreshing drink for travelers, featuring honey for endurance. Honey is also recommended as a method for preserving both cooked and uncooked meat although Apicius warns that the summer weather significantly cuts its efficacy. If your honey spoils, Apicius advises that you cut the ruined honey with good honey at a 2:1 ratio in order to sell it. Most often though, Apicius recommends using honey as a seasoning for fowl or fish, and usually prepared as a sauce or dressing. A fairly typical recipe involving honey follows.

Empty the pig by the neck, clean and dry, crush one ounce pepper, honey, and wine, place heat; next break dry toast and mix with the things in the saucepan; stir with a whip of fresh laurel twigs so that the paste is so nice and smooth until sufficiently cooked. This dressing fill into the pig, wrap in parchment, place in oven. Garnish nicely and serve.

Petronius gives us an equally distorted view of the average diet, but perhaps provides useful clues about attitudes toward honey through his scathing exaggeration of the excesses of the newly upper class in his Satyricon. The work satirizes the nouveau riche, taking unnecessary ostentation to its most absurd point. While Encolpius, the narrator, attends a dinner at the house of the wealthy freeman Trimalchio, he learns from a fellow diner that Trimalchio imported bees from Attica, just so that he may have the best honey available and improve his own local bees through interbreeding. During the banquet, a course is brought out on a circular tray with food

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97 Apicius 1.1.1
98 Apicius 1.2.1
99 Apicius 1.7.10. Honey is used throughout Apicius as a preservative for meats and fruit.
100 Apicius 1.10.17
102 Apicius 7.369; translation provided by Joseph Dommers Vehling.
103 Of course, honey’s quality is determined by what flowers the bees pollinate, so this would be pointless without importing the flowers of Attica too.
representing each of the zodiac signs. In the very center of the circle sits a patch of grass, and upon it a piece of honeycomb. Encolpius is unimpressed with the display, indicating that the mere sight of honeycomb was not enough of an extravagance to excite him.\textsuperscript{104}

The archaeological evidence also suggests that it may have been common to have stores of honey. In \textit{The Roman Military Diet}, TR.W. Davies writes that “…to sweeten their food, the Roman legionaries used honey, and a \textit{titulus pictus} found at the fortress (Vindonassa) records the contents and weight of an amphora of honey (\textit{mel[...]} \textit{p(ondo) CLXXVI[]})” and that “the site also produced…beeswax, perhaps indicating local supplies of honey.”\textsuperscript{105} If soldiers could afford to have a sweetener for their food, then rural and urban masses likely could too.

\textbf{Cosmetics}

Honey and wax also functioned as ingredients for cosmetics in antiquity. Unlike food and medicine, access to cosmetics does not seem to have been determined by class standing. In “\textit{Dress and the Roman Woman: Self Preservation and Society}”, Kelly Olson asserts that “a woman did not need to be wealthy to wear perfumes or cosmetics: some inexpensive pyxides were made of wood, the blown glass used to hold unguents was cheap, and most substances used for cosmetics and scents (or substitutes for them) were widely available.”\textsuperscript{106} While discussing cosmetics, ancient attitudes towards the predominantly feminine use of makeup and skincare must be acknowledged. From the extant literature, we can gather that ancient authors stigmatized the use of makeup, particularly any makeup that drew attention to the eyes as this was associated

\textsuperscript{104} Petronius \textit{Satyricon} 35.3


\textsuperscript{106} Kelly Olson, \textit{Dress and the Roman Woman: Self Preservation and Society} (New York, Routledge, 2008), 114.
with prostitutes. The socially acceptable cosmetics seemed to be aimed toward what Olson
dubbed “the preservation of beauty” (to kosmetikon) versus the “unnatural embellishment of
looks” (to kommotikon), a distinction we can see today in our skincare and makeup
differentiations. Because of the biases against to kommotikon, the majority of textual evidence
discusses recipes for skincare rather than embellishment of the face.

Honey in particular seems to have been associated with skincare, mentioned by Pliny,
Celsus, Dioscorides, and Ovid. In Ovid’s Medicamina, he provides three recipes that he claims
whiten the complexion, all using honey. In two of the three recipes, Ovid recommends using
honey as a binding agent rather than as a medicinal ingredient in its own right. Ovid’s use of
honey as an adhesive is consistent with Dioscorides’s recommendations for using honey as a
glue for poultices as well as for fading blemishes. Celsus, too, suggests using honey for cleaning
the skin, but recommends combining honey with vetch to boost its efficacy. Pliny advises using
honey to fade liver spots, blemishes, and dead skin from the face. Galen, while summarizing the
well-circulated medical text Cosmetica written by Crito, reports that his second book included
long lists of “lotions and unguents of all compositions, that is to say, of almonds, ben-nuts, nuts,
sesame seeds, myrtle berries, mastic resin, laurel, roses, new wine, honey…” in true Hellenistic
fashion. Unfortunately, this text is not extant. Cleopatra also is credited with writing a work on

107 Allison Glazebrook, “Cosmetics and Sophrosune: Ischomachos’ Wife in Xenophon’s
Oikonomikos,” The Classical World 102, no. 3 (Spring 2009): 238.
108 Kelly Olson, Dress and the Roman Woman: Self Preservation and Society, 294.
109 Pliny Natural Histories 20.23, 30.10, 32.85
109 Ovid Medicamina 5.16; 6.5
110 Ovid Medicamina 81: ut coeant apteque lini per corpora possint, adice de flavis Attica mella
favis; Medicamina 90: pulvis ab infuse melle premendus erit.
111 Plinio Prioreschi, A History of Medicine: Primitive and Ancient Medicine, (Horatius Press,
1996) 118.
cosmetics, but only fragments remain. Galen attributes this recipe on remedying hair loss to Cleopatra:

Another [remedy against alopecia]. The power of this [remedy] is better than that of all the others, as it works also against falling hair and, mixed with oil or perfume, against incipient baldness and baldness of the crown; and it works wonders. One part of burnt domestic mice, one part of burnt remnants of vine, one part of burnt horse teeth, one part of bear fat, one part of deer marrow, one part of reed bark. Pound them dry, then add a sufficient amount of honey until the thickness of the honey is convenient, and then dissolve the fat and the marrow, knead and mix them. Place the remedy in a copper box. Rub the alopecia until new hair grows back. Similarly, falling hair should be anointed everyday.¹¹²

Here, like in many of the medical recipes, honey is used to mix and smear on the more important ingredients of dormice and burnt horse teeth. While a treatment of alopecia would probably fall under the umbrella of medicine rather than cosmetics, the inclusion of honey in a work about cosmetics may suggest that the author was comfortable using bee products elsewhere as well. Honey’s reputation for improving the complexion, a beauty standard encouraged by the male authors, is consistent with the established uses for honey, such as soothing the skin and accelerating the rate of healing for minor cuts. Unfortunately, cosmetics was a female-dominated industry leaving behind a silent record from those who would actually buy and use the products. The best we can do is rely on the makeup pyxes that survived to today and fill in gaps with the opinions of the male authors. While we have little to rely upon, the fact that Ovid thought writing a work on skincare alone was a worthwhile pursuit suggests that it was likely a noticeable part of women’s lives in antiquity. Since much of what we do have references honey as a skincare ingredient, honey likely did act as a common part of a skincare arsenal.

¹¹² Galen Composition of Medicines According to Places 1.2
Art

Beeswax was a much used product in the art world, not only as a method to preserve wood and marble, called ganosis, but also as an art medium itself. Ganosis “may be briefly described as an application of the Punic wax on wall-paintings or statues, a treatment concluded with a final heating of the surface.”113 What distinguishes Punic wax from standard beeswax is a matter of controversy. Rather than merely describing the place of origin of the beeswax, the term “Punic wax” seems to refer to a treatment of regular beeswax. The debate splits into two camps: one argues that Punic wax is just refined white beeswax, the other argues that Punic wax is saponified by mixing an alkali into the beeswax.114 Either way, the process of ganosis required regularly applying Punic wax to statues, wood, and wall paintings for their preservation indicating a demand for beeswax.115

Beeswax also functioned as an art material, used for encaustic paintings as well as decorative wax fruit and flowers.116 Encaustic painting refers to any painting created through the use of melted beeswax. In antiquity, there were three overarching categories that encaustic painting covered.117 The first technique involved melting beeswax and then mixing pigment into it to create a range of colors for painting. The second used melted and pigmented beeswax to fill into engravings on ivory made by a small needle called a cestrum. The third method used emulsified beeswax, or Punic wax, and a brush for application of the pigmented wax.118 This

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115 Agneta Frecerro, *Encausto and Ganosis*, 80; 132
116 Agneta Frecerro, *Encausto and Ganosis*, 45
117 Agneta Frecerro, *Encausto and Ganosis*, 6
118 Ibid.
third method was used to make images such as the Fayum paintings and murals, decorate ships, and also provided surface protection to statues and paintings, as mentioned above.\textsuperscript{119}

In addition to encaustic painting, wax was also used to produce figurines of fruit, animals, and humans. Pliny, quoting Varro, mentions a wax sculptor named Posis who was renowned for his lifelike imitations of apples and grapes in wax.\textsuperscript{120} Elagabulus reportedly insisted that people attending his banquets eat artificial food, sometimes made of wax, wood, or ivory.\textsuperscript{121} Wax figurines may have also served a religious function. In his commentary on the \textit{Aeneid}, Servius claims that sacrifices of wax or dough figurines were acceptable substitutes for animal sacrifices when the animal was hard to obtain, suggesting that wax figurines were affordable alternatives for a worshipper.\textsuperscript{122} In \textit{The Honey-Makers}, Margaret Morley writes that “wax candles and wax wreaths were much used” at the festivals of Saturn, Bacchus, and Ceres, and “wax images and wax fruits were also extensively used in the celebration of the festival of the resurrection of Adonis.”\textsuperscript{123} These wax figurines may have also served as “voodoo dolls”, sometimes embedded with the hair of the intended victims.\textsuperscript{124} Ovid and Horace also speak to the existence, or at least fear of, these wax dolls in Rome.\textsuperscript{125} The only remaining wax voodoo dolls come from Egypt, but papyrus fragments containing magic spells for creating these voodoo dolls, like the following, leave evidence that wax figurines were also used in Greece.\textsuperscript{126}

\begin{flushleft}
Eros assistant; rite of Eros. The consecration and preparation. He carries out the following functions: dream-sending and wakefulness, and he delivers one from an evil
\end{flushleft}

\begin{flushright}
\textsuperscript{119} Ibid.
\textsuperscript{120} Pliny \textit{Historia Naturalis} XXXV.12.45
\textsuperscript{121} Lampridius \textit{Heliogabulus} XXI.5
\textsuperscript{122} Servius \textit{In Vergilii Aeneidem Commentarii} II.116
\textsuperscript{123} Margaret Morley, \textit{The Honey Makers}, (Ithaca, Cornell University Press, 1899), 315-316.
\textsuperscript{125} Ovid \textit{Amores} III.7.27; Ovid \textit{Heroides} VI.88; Horace \textit{Satires} I.8
\textsuperscript{126} PGM IV.2359-72; PGM XII.14-95; PGM IV.1872-1927
\end{flushright}
demon, if you use him properly and in a holy fashion. For he has the power to do everything. Take some Etruscan wax and blend with it every kind of aromatic herb, and make an Eros eight fingers high, carrying a torch, and with a broad base to receive offerings. Let his left hand brandish a bow and arrow. Make a Psyche in similar fashion to the Eros. When you have done all this, consecrate the doll for three days…\textsuperscript{127}

Beeswax was also used in the creation of metal sculptures made through the Lost Wax Method. Joseph Noble, in his analysis of the wax used in the method, describes the process.

In the earliest and simplest form of the process a small object was modeled in wax which was then covered with a layer of damp clay allowing only a small hole to remain, preferably at the base of the object. After the clay had dried thoroughly this mold was inverted and heated slightly causing the wax to melt and run out the hole leaving a hollow cavity behind. (The wax was thus “lost”; hence the name of the process.) The mold was then heated still further until all traces of the wax were eliminated, and finally molten metal was poured in. When it solidified the clay mold was broken away leaving a seamless casting faithfully reproducing the wax original. Each casting was unique, and if a duplicate casting was required a new wax model had to be made and the process repeated.\textsuperscript{128}

Sculptors tweaked this process when applying it to larger sculptures, making pieces separately and forming an inner core of clay and sand to save wasting metals on the interior of a sculpture.\textsuperscript{129} For this method, the sand and clay would be mixed together and molded into the desired shape.\textsuperscript{130} Sculptors would then sculpt a thin layer of wax over the mold, using the pliability to shape finer details for the final product.\textsuperscript{131} The wax was then covered with another layer of sand and clay and pinned with chaplets to prevent the sculpture from shifting when the wax was melted out of the mold.\textsuperscript{132} The gap left behind would be filled with molten metal and

\textsuperscript{127} Daniel Ogden, \textit{Magic, Witchcraft, and Ghosts in the Greek and Roman Worlds: A Sourcebook}, (Oxford, Oxford University Press, 2002), 257. 257; PMG XII.14-95
\textsuperscript{129} Ibid.
\textsuperscript{130} Ibid.
\textsuperscript{131} Ibid.
\textsuperscript{132} Ibid.
the outer layer of clay and sand broken away. Through gas chromatography, Nobels proves that beeswax was indeed the wax of choice for wax casting.

Because of beeswax’s plentiful uses in the world of art, not only for merely decorative purposes but also for religious functions such as sacrificial figurines, wax would have to be produced in enough quantity to supply the various workshops that created statues, painted the walls of the elite, and maintained the marbles of the empire. Because Silvius suggests beeswax figures as substitutes for unavailable animal sacrifice, it seems that, at least in his time, beeswax was an affordable and widely available alternative.

**Wax Tablets**

Perhaps one of the greatest demands for bee products was the need for wax tablets for recording legal and financial matters. While other writing utensils were also employed, archaeological evidence suggests that wax tablets were a preferred medium for official legal documents and the financial records of households. The wax tablets provided security for sensitive information since the tablets could be joined together into a diptych, triptych, or polyptych, with the information facing internally and then bound together with wax seals, providing evidence of tampering. In *Legitimacy and Law in the Roman Law*, Elizabeth Meyer argues that it was rare for Romans to suspect tampering of the tablets because of the seeming permanence of the wax tablets, unsuspicious because of the wax seal safeguards against corruption. Although using wax appeared unimpeachable, Eric Turner notes in *A Roman..."
Writing Tablet from Somerset, “there is now a sufficient number of examples of…dispensing with the wax filling and writing on the wood for it to cause no surprise.”137 This raises questions about why wax was no longer used. Either writing on wood produced more favorable results, be it for legibility or longevity, or wax was not available and so was done away with out of necessity. Writings directly on wood have been found at Vindolanda, where wax and honey have both been discovered.138 This would suggest a preference for writing on wood rather than an issue of availability, although the wax might have been produced in scarce enough quantities that its use had to be prioritized. However, from the little writing that remains on the Vindolanda tablets, A.K. Bowman and J. David Thomas in The Vindolanda Writing Tablets and Their Significance: An Interim Report surmise that all the tablets were sent to the soldiers and did not originate from Vindolanda, leaving little room to draw conclusions about wax availability at the site.139

While wax tablets typically get associated with schoolchildren and impermanence, evidence suggests that this assumption is inaccurate. Meyer writes that of the 1,070 tabulae she knows of, only one shows signs of schoolwork.140 Instead, “these tablets are associated with acts that order the state and the household; they observe no clear distinction between public and private; and they are not temporary jottings, but authoritative and final embodiments of a new

reality they help to create.” Used both for permanent legal documents and impermanent practice for schoolchildren, beeswax must have been widespread and affordable.

**Death Rituals**

As seen in Apicius, honey and wax were suggested as helpful preservatives. While limited to foodstuffs in Apicius, there is evidence that honey and wax were also used for preserving human bodies. Xenophon writes in his *Hellenica* that a recently deceased Spartan king, Agesilaus II is covered with honey or wax to prevent his body from decaying on the journey back to Sparta. At V.3.19, Xenophon says that Agesilaus II “…came to his end outside the sanctuary. And he was placed in honey and carried home and received the royal burial.” Plutarch, however, asserts that “the followers of Agesilaus, for want of honey, enclosed his body in wax, and so conveyed him to Lacedaemon.” Josephus writes in his *Antiquities* that Aristobulus, having been poisoned, “lay…embalmed in honey for a good while, till Antony afterward sent it to Judea.” Aelian tells the story of the wily Cleomenes, king of Sparta from 520 to 490 BCE, who allegedly used the preservation powers of honey to weasel his way out of his word.

Cleomenes the Spartan took to himself from his companions Archonides and made him a partner in his affairs. He swore that, if he achieved power, he would do everything together with the head of Archonides. When he won power, having killed his companion and separated off his head and put it in honey, whenever he was going to do something, he would lean over the receptacle and say what he was going to do, and stated that he was not breaking his agreement or oath, but was consulting with the head of Archonides.

Lucretius, while discussing different fates that befall a corpse in *De Rerum Natura*, states

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142 Xenophon *Hellenica* V.3.19
143 Plutarch *Life of Agesilaus* XL.3
144 Josephus *Antiquities* XIV.7.4
145 Aelian *Varia Historia* XII.8
I do not see how it can be otherwise than unpleasant for a man, being laid on a funeral pyre, to burn in hot flames, or, placed in honey, to be suffocated, or to grow stiff with cold, when he is lying on the highest flat of a gelid rock or to be pressed down and overwhelmed with the weight of the superincumbent earth.\textsuperscript{146}

Homer also discusses the use of honey for funerary practices. In the \textit{Iliad}, Achilles gives jars of oil and honey as a sacrifice during the funeral of Patroclus.\textsuperscript{147} When Odysseus travels to the Underworld in the \textit{Odyssey}, Agamemnon tells Achilles that his body was burned while wearing the clothes of the gods and smeared in honey.\textsuperscript{148}

In addition to honey being used as a funerary sacrifice, there seems to have been a practice of using honey as a libation. In the \textit{Persians}, Atossa sprinkles honey onto the grave of Darius, her husband.\textsuperscript{149} Euripides, too, discusses honey as a libation. When Iphigenia imagines the funeral of Orestes, she thinks of pouring “the labor of the yellow bees” out as a libation.\textsuperscript{150} In the \textit{Odyssey}, Odysseus offers a libation “first of milk and honey, then of sweet wine, thirdly of water, sprinkled with barley meal” in order to speak with the dead in the underworld.\textsuperscript{151} The libation Odysseus offers bears a similarity to the libation given to the chthonic gods. Chthonic gods required a unique libation, \textit{khoi}, “…usually poured at the grave, either on the steps supporting the \textit{stele} or possibly over the shaft. The liquid could be in either mixed unmixed form, but whichever the case the ingredients were always the same: honey, milk, water, wine and oil.”\textsuperscript{152}

\textsuperscript{146} Lucretius \textit{De Rerum Natura} III.889-893
\textsuperscript{147} Homer \textit{Iliad} XXIII.170
\textsuperscript{148} Homer \textit{Odyssey} XXIII.170
\textsuperscript{149} Aeschylus \textit{The Persians} 611-619
\textsuperscript{150} Euripides \textit{Iphigenia Among the Taurians} 635
\textsuperscript{151} Homer \textit{Odyssey} XI.25-30
Bee products were also used in order to remember the dead. Beeswax death masks were an expression of status and family honor displayed in the armaria in the atrium, able to be seen by guests and clients.\textsuperscript{153} John Pollini believes these masks were created in much the same way masks are today, first by creating a plaster mold of the person’s face, then pouring liquid wax into the plaster in order to produce copies.\textsuperscript{154} The use of funeral masks was a rite limited to the elite as a symbol of power, sanctioned by the Senate, in order to “[reinforce] the hereditary nobility and connecting in a highly personalized communal manner with the deceased.”\textsuperscript{155} Though limited to the elite, it is likely that a great number of wax masks were still created. Each offspring of the nobility would have their own wax ancestral masks created from the plaster casts of the original when they left their home, leading to an exponential need for beeswax.\textsuperscript{156}

The role of bee products in ancient funeral rites and practices cannot be underestimated. From serving to preserve corpses, act as libations to the dead and the gods, and produce ritualized funeral masks, honey and beeswax were entwined with associations of death and funerals. While most of the uses for honey and beeswax discussed in this section were primarily done by or for nobility, it is perhaps this association with death that led to the burial of the young boy in two old beehives discussed in the first chapter. Additionally, the wax figurines made for faux animal sacrifices mentioned by Servius also suggest a relationship between death, sacrifice to the gods, and beeswax.\textsuperscript{157}

\textsuperscript{154} John Pollini, \textit{From Republic to Empire}, 17.
\textsuperscript{155} John Pollini, \textit{From Republic to Empire}, 20.
\textsuperscript{156} John Pollini, \textit{From Republic to Empire}, 48.
\textsuperscript{157} Servius \textit{In Vergilii Aeneidem Commentarii} II.116.
Conclusions

Beeswax and honey provided wide ranging utility to the ancient world. While most of this chapter focuses upon the literary record to make a case for the universality of these products, it is important to acknowledge that these references are made by elite authors and do not necessarily represent the experience of the average ancient; nonetheless, the fact that the literary record represents the elite’s perspective does not rule out the idea that many of these uses were employed by the masses. The elite would not have been personally farming these products; those actually producing the goods would keep some of the output from their beehives for personal use, be it for sweetening food or drink, participating in religious rituals, or to help with injuries and illness in the household. While this chapter cannot claim to cite every ancient function for honey and beeswax, it does provide an index of sorts for the most commonly mentioned uses for these materials. These uses include, but are not limited to, medicine, sweetening food, cosmetic enhancement, skincare, wax sculptures, coating for artwork, paintings, religious sacrifices, honoring the dead, and forming wax tablets. In order to prop up the demand for the goods across the range of markets presented in this chapter, the ancient world likely needed a significant production of honey and beeswax.

The third and final chapter addresses possible ways the ancient world would have produced, shipped, and purchased beeswax and honey to meet the demands for these products enumerated in this chapter. Although evidence for how honey and wax would move through an economy is sparse, the final chapter explores reasonable economic models that explain and account for the movement of these goods through economies small and industrial, local and abroad.
CHAPTER THREE
BEEKEEPING ECONOMIES

In this chapter, I combine the information from the previous two chapters with evidence-based conjecture on what the overall picture of beekeeping in Greek and Roman antiquity looked like. Here, I seek to answer questions of how affordable, profitable, and sustainable beekeeping was. This chapter will begin by addressing the laws surrounding beekeeping in the ancient Mediterranean. An analysis of beekeeping laws provides valuable information on how beekeepers operated in Roman antiquity. The laws repeatedly show that beekeepers were taxed, subsidized, and protected by the Roman government, proving that the industry was large enough to garner regulation. In order to examine the legal and administrative side of beekeeping, this section will turn to a number of resources, beginning with an examination of hypothetical legal discussions presented in Ulpian, next looking at actual laws like those found on the inscriptions in the Bagradas Valley, then finally looking at Egyptian beekeeping administration to help fill in gaps about ancient Mediterranean organizational systems for beekeeping. Throughout this section, I will establish that beekeeping at times involved a tiered system of administration and workers sanctioned by the government for the economic benefit of all.

After showing evidence for large-scale beekeeping economies, this chapter will next discuss how farmers could afford and obtain beehives and bee swarms as well as consider why they might have kept them. This section will explore the initial cost versus potential return on investment, the benefits of diversifying crops, the fringe benefits provided by keeping bees, and
the different class levels of that might have kept bees, arguing that people engaged in beekeeping in all social levels, whether actually maintaining the hives or managing a large collective of farms and gathering honey and wax as in kind rent payment.

This chapter will build upon Dennis Kehoe’s argument in *The Economics of Agriculture on Roman Imperial Estates in North Africa*, in which he asserts that the rent breaks given to beekeepers in the Henchir-Mettich inscription imply that estate owners knew bees accelerated the pollination of the orchards. If tax breaks were given to beekeepers, and beekeeping increased output from orchards as well as produced byproducts that could be sold easily and did not spoil, then it seems like beekeeping would be an appealing agricultural venture for large-scale estates hoping to maximize production. Finally, this chapter will examine the shipment of bee products, analyzing evidence to determine how honey and wax moved to rural and urban markets. Over the course of this chapter, I will communicate the scale of beekeeping in the Mediterranean. I will also address who kept bees, how profitable beekeeping could be, and whether or not beekeeping goods were large-scale, regional exports or locally produced in a cottage industry.

**Property Laws and Administration**

In *Bees and Lawyers*, Bruce Frier addresses some of the laws surrounding Roman beekeeping. Although most animals were divided into two groups, wild or domesticated, bees set the precedent for animals that did not fall neatly into one category. While domestic animals were treated like any other property, whose ownership remained constant even if they broke loose or ran away, wild animals belonged to nobody until they were captured or killed; if they managed to break free after being captured, then they resumed their state of freedom and
nobody could claim possession of them.\textsuperscript{158} Because bees could not neatly be sorted into either
typical group, questions regarding ownership often arose. In order to answer one such question,
Ulpian, a Roman jurist and author, composed a dialogue using the characters of Celsus and
Proculus, two former Roman jurists.

The debate begins when Celsus asks Proculus what would happen should his bees fly
onto a neighbor’s property and the neighbor set the swarm on fire: would the neighbor be held
accountable for destroying livestock?\textsuperscript{159} Celsus and Proculus debate about the categorization of
bees for some time, but then Celsus argues what Frier considers to be the main point of the
debate. Celsus claims that the bees remain in his ownership even if they travel beyond his
property because they are profitable to him.\textsuperscript{160} Frier illuminates the significance of Celsus’s
point, writing

A beekeeper may allow his bees to fly free if they are to return a profit to him; and if the
legal “cost” of continued ownership is that he keep them constantly enclosed, that “cost”
is too high. But if he allows his bees to fly out onto another’s land, the law should
protect these bees in their flight, by granting to the beekeeper a continuing ownership.
This is true not simply because the bees still “belong” (in one sense or another) to their
owner, but because their owner is a beekeeper, and beekeeping is a desirable and
productive activity, one that should be encouraged through law.\textsuperscript{161}

As Frier rightly asserts, if Celsus believes that the law should protect profitable ventures,
then beekeeping must be “…widespread and profitable in the Roman world.”\textsuperscript{162} This
subsidizing of beekeeping can be seen not only in hypothetical dialogues, but also in actual
Roman law in the Bagradas Valley, underscoring the idea that beekeeping was profitable
enough to become part of larger Roman policy.

\textsuperscript{159} Ibid.
\textsuperscript{160} Frier, “Bees and Lawyers,” 112.
\textsuperscript{161} Ibid.
\textsuperscript{162} Ibid.
In *The Economics of Agriculture on Roman Imperial Estates in North Africa*, Dennis Kehoe examines the relationship between *coloni*, *conductores*, and the Fiscus in the Bagradas Valley of North Africa.\(^{163}\) Using three inscriptions, the Henchir-Mettich inscription, the Ain-Wassel inscription, and the Ain-el-Djemala inscription, Kehoe looks at the sharecropper’s role in cultivating unused land on imperial estates. The Henchir-Mettich inscription, dating to 116–117 CE, addresses the issue of beekeeping on rented land. In lines 1.20–2.6, the inscription states that any tenant on the estate of the Villa Magna or Mappalia Siga must give as rent to the landlords shares of crops, demanding that “whoever will have over five hives in the time during which the honey harvest has been [or will have been] will be obliged to furnish a single *sextarii* of honey for honey–producing hives.”\(^{164}\) In 2.6–13, the Henchir-Mettich inscription records that

> If anyone will have transported hives, swarms, bees, or honey [vessels] from the estate of the Villa Magna or Mappalia Siga into one–eighth land, so that fraud <as much as possible?> is committed against the landlords or lessees or bailiffs of this <estate>, the hives, swarms, bees, honey vessels or honey which will have been brought in will belong to the lessees or bailiffs of this estate as a group.\(^{165}\)

Here again, Roman law protects the profits of bee owners, ensuring that any bee-related property removed from the estate returns to the original owners, with any profits generated from the theft given to those who had been defrauded. Kehoe explains that honey was unusually regulated in this respect because “honey was the only crop cultivated by the *coloni* that could be transported off the estate in anticipation of the harvest.”\(^{166}\) If the *coloni* did remove their hives from the estate, then they could avoid payment of taxes, hurting the rent collected by the

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\(^{163}\) Dennis P. Kehoe, *The Economics of Agriculture on Roman Imperial Estates in North Africa* (Gottingen: Vandenhoeck & Ruprecht, 1988.), ix.

\(^{164}\) I am using Kehoe’s translation, which can be found on pg. 34 of *The Economics of Agriculture on Roman Imperial Estates in North Africa*.

\(^{165}\) Kehoe, *The Economics of Agriculture on Roman Imperial Estates in North Africa*, 34.

\(^{166}\) Kehoe, *The Economics of Agriculture on Roman Imperial Estates in North Africa*, 100.
conductores. Even if the coloni own their hives outright, which most likely did, they would still owe the conductores rent on the honey for the privilege of using the land.

Plutarch records that Solon showed agricultural sensitivity regarding the infringement of a neighbor’s rights, limiting both how close a tree could be grown to somebody else’s plot, and how far beehives must be kept from each other, lest the competition for pollen results in a reduction of profits.\textsuperscript{167} In Plato’s final dialogue, \textit{Laws}, Plato discusses apicultural law twice. First, Plato addresses the theft of one’s hive. According to Plato, should somebody steal one’s hive after “yielding to his taste for bees,” he should be forced to pay for the damage.\textsuperscript{168} In Book 11, Plato specifically mentions punishments for poisoning somebody’s beehives, writing that if the poisoner is a doctor, he should be put to death. For a private citizen, the punishment should be left up to the courts.\textsuperscript{169} While Plato’s \textit{Laws} are purely hypothetical, it is highly likely that Plato drew his ideas from Attic tradition.\textsuperscript{170} If so, then beekeeping was considered worthy of legal protection in Attica, showing a widespread acknowledgement that beekeepers and beekeeping were beneficial and productive economic activities.

Glimpses of Mediterranean legal issues surrounding beekeeping can also be found in Ancient Egypt through several surviving papyri. Evidence suggests that beekeeping in Ancient Egypt was highly stratified and organized, involving a hierarchy of administrators and workers from “beekeepers, chief beekeepers, overseers of the beekeepers, and overseers of the beekeepers of the entire land” to “sealers of honey, honey collectors, and beekeepers associated

\textsuperscript{167} Plutarch \textit{Life of Solon} 23.6
\textsuperscript{168} Plato \textit{Laws} 8.843d-e
\textsuperscript{169} Plato \textit{Laws} 11.933d
with temples.”

One papyrus from the 19th dynasty between an overseer and a scribe discusses two beekeepers who have not met their honey quota. The scribe urges stronger action on the part of the overseer, but it is not clear in the letter what legal recourse the overseer would have.

During the Ptolemaic era, the evidence shows that Egypt’s beekeeping system of overseers and beekeepers remained in place. In the Zenon papyri, letters to the Egyptian administrator Zenon show the day-to-day issues a beekeeping official dealt with in 250 BCE. In one letter, a beekeeping collective from the Arsinoite nome writes Zenon inquiring about the donkeys he promised for removing hives from the fields, presumably because the beekeeping season had ended and the hives would be easier to care for once moved out of the fields to nearby the homes. In order to plead their case more successfully to the administrator, the beekeepers cite the possible loss of tax to the king, writing “…it is no small impost we pay the king. Unless the donkeys are sent at once, the hives will be ruined and the impost lost.” In a similar letter, a widow writes to Zenon complaining that a man named Nikias took the donkey she needs to move her hives back to pasture, and pleads Zenon help her “lest [the hives] be ruined and of no profit to you or the king.” This plea would only be rhetorically convincing if Zenon and the king reap significant revenue from the managed hives, suggesting that there was a legitimate profit to be earned from keeping bees.

172 Gene Kritsky, *The Tears of Re*, 78.
173 Gene Kritsky, *The Tears of Re*, 78.
C.C. Edgar, who analyzed and translated the papyri, asserts that “the beekeepers were usually Egyptian, but the hives were often owned by Greeks such as Zenon as his friends and leased to the natives...Zenon himself derived some benefit from the hives; but whether he was the owner of them or in what capacity he was interested in them is not clear.”\(^{175}\) This system of administrators and workers seems to have been mirrored in North Africa during Roman times, with Zenon perhaps equivalent to the conductores and the beekeepers equivalent to the coloni.

The land owners in the Bagradas Valley of North Africa saw the value in incentivizing beekeeping on their subseciva. The coloni willing to work the difficult subseciva were granted a number of tax breaks, especially when it came to beekeeping. Not only did beekeeping use otherwise nearly unusable land, but it also boosted the production of other crops through pollination. The Henchir-Mettich inscription records that, whereas many crops were taxed at one-third their total production, a colonus could keep up to five hives rent free, and only pay one-sixth of the honey produced by each additional hive. Although the cultivation of honey was incentivized, the materials used to keep beehives had to be furnished by the coloni themselves, but the lower tax rate would compensate for the initial required investment.\(^{176}\) The rent of required from each beehive would be determined by and furnished to the conductor of the imperial estate, leaving the colonus five-sixths of the product to sell or use.

Roman literature further supports the profitability of beekeeping. Varro cites an instance of two brothers using only one iugerum to create a profit of 10,000 sesterces from honey alone.\(^{177}\) The brothers attribute their success to their ability to wait until the market is right to sell, a benefit provided by the longevity of honey. In another instance, a hypothetical Seius rents

\(^{175}\) C.C. Edgar, *Zenon Papyri in the University of Michigan Collection*, 90.  
\(^{176}\) Dennis Kehoe, *The Economics of Agriculture on Roman Imperial Estates in North Africa*, 99.  
\(^{177}\) Varro *On Agriculture* 3.16.10-12
out his apiaries in exchange for 5,000 pounds of honey in annual rent. While these examples may be outstanding exceptions to the average picture of Roman beekeeping, Egyptian papyri support the existence of large-scale, wealthy hive owners. In one letter to Zenon, a beekeeper called Samos writes about his 5,000 hives owned and managed in several nomes. In another, beehive owners describe how they owned 1,000 beehives under the king’s father. A third describes 487 hives owned by two beekeepers. These letters, along with the example provided by Varro, seem to indicate that large scale beekeeping absolutely existed, delegated and rented out to various lower level farmers for a yearly percentage of the profits.

Affordability and Investments

While it seems probable that some estate owners could furnish and maintain hives, how likely was it that the average, that is to say, peasant, Greek or Roman could afford to keep bees? In order to answer this question, the materials needed to keep bees must be taken into account. As we have seen in the first chapter, the only evidence of beehives that remain for us are the terracotta hives found around Greece, but we know from Varro, Columella, Aristotle, and Pliny that an assortment of materials could be used to keep bees. Terracotta, cork bark, wooden boxes, woven baskets, dung hives, and brick were all possible hive options. It is difficult to gauge exactly how much the average hive would cost a farmer since much of the cost would depend upon what materials the farmer had available to him. For instance, bark from cork trees, the most recommended material for hives, could be removed every eight to ten years, and the extraction process does no damage to the tree, producing a free regenerating source of hives

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178 Ibid.
179 Gene Kritsky, *The Tears of Re*, 78.
provided you have cork trees on your property.\textsuperscript{180} In North Africa, ceramic was widely available and likely a cheap way to produce beehives.

Columella does provide a hint of how much a hive could cost when he dissuades farmers against leaving hives out unless placed in a bee-laden area where losses could be recouped. According to Columella, leaving a hive out in the hopes of attracting a swarm is only economically viable when there is an abundance of bees in the region. However, if there is an abundance of bees, Columella writes that “…even if many hives are carried off, their loss is made up by the bees which are obtained.”\textsuperscript{181} The risk of theft of one’s hive and the cost of investment per hive is too high to justify the possible gain of one to two swarms, indicating that the initial investment is only worth it if you can be assured of a significant return.

Bees themselves, considered something in between wild and domesticated, could be caught in the wild and required little to no food to be provided for them. In \textit{De Re Rustica}, Columella gives advice on how to locate a swarm for capturing.\textsuperscript{182} He advises finding a river bank and observing the activities of the bees for some time; then, one should paint the backs of a few bees with red ochre, allowing them to be easily observed and followed.\textsuperscript{183} If the bees fly to locations that are too far for one to follow easily, Columella suggests putting a drop of honey into a reed and placing it by a source of water.\textsuperscript{184} When a number of bees have flown into the reed, one should pick up the reed while keeping a thumb over the entrance, slowly allowing one bee at a time out for the beekeeper to follow.\textsuperscript{185} When the initial bee is lost, another bee should

\textsuperscript{180} Hilmi, Martin, and Nicola Bradbear, \textit{Beekeeping and Sustainable Livelihood}. Rome: Rural Infrastructure and Agro-Industries Division, (FAO, 2011), 53.
\textsuperscript{181} Columella \textit{De Re Rustica} IX.8.14
\textsuperscript{182} Columella \textit{De Re Rustica} IX.8.7-10
\textsuperscript{183} Ibid.
\textsuperscript{184} Ibid.
\textsuperscript{185} Ibid.
be allowed out of the reed, slowly releasing the bees until the hive hunter has tracked down the hive. While this may seem somewhat fanciful, similar methods have been employed in the United States. Instead of a reed, hive hunters would capture bees in a box with two compartments. When enough bees had collected in the first compartment, the partition between the two compartments would be slightly lifted, allowing a few bees into the secondary compartment. When the honey hunter was prepared, he could then open up the lid, freeing a small number of bees to track. If we can use the modern equivalents to support the validity of Columella’s advice, then procuring a hive would merely cost a drop of honey and a day’s time to track down bees. Once found, bees themselves required little to no cost to feed, needing only potable water nearby for survival.

One could also avoid the hunt for a swarm and purchase a hive. Columella, when discussing the merits of each hive type, dissuades farmers from using brick hives solely because they could not be moved and sold at market, showing that hives must have been purchasable. Columella also recommends purchasing bees that are local rather than imported from distant regions to avoid buying weak and distressed swarms. The fact that Columella feels compelled to urge against buying foreign bees suggests that there must have been hives, imported and local, available at some markets. In the Satyricon, Trimalchio is said to have purchased bees from Attica to improve the quality of his own stock, further suggesting that swarms were available for purchase, even from abroad. Of course, purchasing imported hives would

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187 Ibid.
189 Columella *De Re Rustica* IX.6.3
190 Columella *De Re Rustica* IX.8.1-4
191 Petronius *Satyricon* 91
require more of an investment, but the investment might have greater returns, especially if a beekeeper could advertise that his honey was created by the famed Attic bees.\footnote{192 Then again, the example of Trimalchio buying Attic bees is intended to make him look ridiculous.}

Once hives had been either found, gifted, or purchased, the beekeepers stood to profit from their bees both directly from selling honey and wax and from the incidental benefits of pollination. Hives would also help diversify sources of income; in years where crops may fail from drought or disease, beehives could survive and their byproducts could be sold at market, either traded in kind to a farmer who had a successful crop, or sold for coin with which the beekeeper could buy food. Thomas W. Gallant’s \textit{Risk and Survival in Ancient Greece} thoroughly addresses the issue of how subsistence–level farmers survived the years in their household cycle where the food would be too scarce to feed the household adequately. A large part of agricultural risk management for the peasant involved crop diversification.\footnote{193 Thomas W. Gallant, \textit{Risk and Survival in Ancient Greece: Reconstructing the Rural Domestic Economy} (Stanford, California: Stanford University Press, 1991), 36.} Gallant defines crop diversification as “the growing of a wide variety of crops, each possessing slightly different nutritional requirements and growth cycles.”\footnote{194 Ibid.} Gallant also asserts that there is a trade–off for crop diversification. Only growing one crop allows the farmer to specialize and increase output, but growing multiple crops provides a more reliable safety net should one crop fail. Beekeeping does not quite fit into either end of the spectrum, as keeping bees does not require sacrificing land that could be used for growing crops; in actuality, beekeeping actively benefits some crop growth, making beekeeping a risk management method without many traditional sacrifices.
If a farmer kept bees along with growing fruit, then the pollination could provide a number of benefits to crop production. In a study from December 2013, a team set up an experiment to evaluate the effectiveness of pollination on crop growth and health.\textsuperscript{195} The experiment took strawberry plants and pollinated them using either wind, self–pollination, bees, or a combination of the three as a control group. The study found that bee–pollinated strawberries had both increased firmness and shelf life, lasting between twelve to twenty-six hours longer than their wind and self–pollinated counterparts respectively. Modern shelf life is somewhat comparable to a farmer’s ability to get to a market before his goods spoiled; an extra day would allow the farmer to either get to a better market farther away or stay at a nearby market for longer, increasing the chances of selling his products and decreasing the amount of food spoiled by the passage of time.\textsuperscript{196} It is this fringe benefit of beekeeping that Dennis Kehoe believes explains why such large rent breaks given to beekeeping tenants in the Bagradas Valley occur.\textsuperscript{197}

In addition to diversifying sources of income and improving quality of other farmed goods, beeswax and honey–beeswax especially–do not spoil quickly, allowing them to be stored for long periods of time as a sort of insurance against lean years. Honey is naturally hygroscopic, absorbing water from its surroundings and preventing the moisture that typically allows microbial and mold growth. With an average pH of 3.9, honey is also generally too acidic for microbes to survive. When honey absorbs moisture, it produces hydrogen peroxide,


\textsuperscript{196} While the majority of the pollination in this study was done by \textit{osmia bicornis}, a wild, solitary bee, 33.9\% of the pollination was done by \textit{apis mellifera}, the honey bee used in beekeeping.

\textsuperscript{197} Kehoe, \textit{The Economics of Agriculture on Roman Imperial Estates in North Africa}, 46.
creating an even harsher environment for microorganisms. Should the water content of the honey pass a certain threshold, however, it becomes possible for wild yeast to cause fermentation of the honey. Beeswax is chemically inert, allowing it to be stored indefinitely. Because it can be stored indefinitely, beekeepers could hold off on selling their products until the market was favorable to them, allowing a larger time frame for selling their goods and providing more control over their profits. By being free to catch and cheap to maintain, the bees and their products provided a low-input, safe investment source of financial security for the landowning poor.

Beekeeping was not limited to the poor, however. Outside of the evidence provided by Varro that the wealthy kept bees, we can again turn to Dennis Kehoe’s work on tenancy in the Bagradas Valley to show the range of classes that kept bees. While the traditional interpretation of sharecropping on the imperial estates paints the picture of incredibly poor tenant farmers relying on their landlords and a successful crop for survival, Kehoe believes that the coloni had more control than typically believed. If the coloni had their own resources, the Fiscus would need to offer incentives to encourage the famers to cultivate the unused lands in order to compensate for the “chronic abundance of uncultivated land” in North Africa. Such incentives are reflected in the inscriptions, leading Kehoe to conclude that the coloni were not likely as poor and dependent as previously thought. If Kehoe is correct in believing that the coloni had resources at their disposal, then beekeeping could reasonably be considered an

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199 Honey with a water content past 20% is what modern beekeepers deem “poor–quality” because it becomes possible for yeast to ferment past this threshold. At lower water content levels, yeast enters a dormant stage.
200 Intentionally allowing the honey to ferment is how mead is made.
201 Kehoe, *The Economics of Agriculture on Roman Imperial Estates in North Africa*, 72.
202 Ibid.
income source not only for the poor, but also for those with enough resources to invest in uncultivated North African lands.

Beekeeping provided a potentially low investment, high yield avenue for many economic levels of ancient Mediterranean people. Because a farmer could find bees and make hives out of local material, beekeeping could be used as a simple and cheap way to protect against years where more traditional crops may fail. If a farmer could not catch a swarm or wanted luxury bees, then he could buy a hive from local markets. Keeping hives both allowed farmers to make a direct profit from selling bee products, and to make a profit from extending the shelf life of their other crops through pollination.

Shipping and Trade

Once the honey and beeswax were collected, the beekeeper faced the challenge of selling his goods. The evidence of shipping and transportation for honey and wax is limited, but their inherent similarities to olive oil allow us to approximate how bee products might have been stored and transported. Both honey and beeswax are hardy byproducts that do not spoil easily, allowing for shipment and reduced losses during transport. There is evidence that amphorae originally used to transport olive oil were recycled for transporting honey to and from the regions around the Black Sea, indicating that they likely had similar shipment and storage requirements throughout the transportation chain.\(^{203}\) In Diocletian’s *Maximum Price Edict*, honey and olive oil are given identical prices for both the high quality products and low quality products, also showing some similarity in their affordability.

\(^{203}\) Polybius *Histories* IV.38.4-5
While honey and wax may have prevented losses due to food spoilage for the farmer, the cost of moving large and bulky amounts over land likely increased their cost. As Paul Erdkamp notes,

…transportation over land required very large investments in terms of human and animal energy, which made transporting bulky goods, such as sacks of grain and amphorae of wine and olive oil, over long distances very expensive. Even if technically feasible, the resulting high costs of imported food would have been beyond the means of the average consumer.²⁰⁴

The high costs associated with shipping over land might prevent some rural people from ever accessing imported honey and wax, but locally produced products would have been much more affordable and available due to their long shelf life and lower shipping costs; additionally, farmers could “piggyback” off of annona shipments, taking advantage of the government-subsidized transportation and predictable timing to get goods to distant markets. Michael McCormick writes that the transport system not only “dimin[ish]ed risk and guarant[e]d predictable business rhythms, routes, and rates,” but “private merchandise might literally have traveled piggyback and duty free.”²⁰⁵ For beekeepers, the ability to ship their goods free of tax and shipping costs would net them extra profit and make beekeeping an even more appealing enterprise.

Within urban areas, imported goods would have been slightly more affordable and available than in their rural counterparts, especially in areas with ports. The tituli picti found at Pompeii and discussed in Chapter 1 show that honey was imported into the city; additionally, shipwrecks containing amphorae with honey have also been discovered.²⁰⁶ Imported specialty

²⁰⁴ Robin Nadeau and John Wilkings, A Companion to Food in the Ancient World, 184-184.
²⁰⁶ Robin Nadeau and John Wilkings, A Companion to Food in the Ancient World, 179.
honey, like that from Hymettus, probably would have only been available to the wealthy regularly and would have been priced as a luxury good; however, the lower classes would have had access to honey perceived as lower quality and honey produced in the hinterlands of their urban areas. Polybius mentions that honey, wax, and salted fish were traded from the Black Sea region in exchange for wine and olive oil, emphasizing that each region traded what it had in abundance.207

In a recent study, researchers proved that many amphorae were recycled for various goods despite being originally assumed to carry wine alone. In the course of the study, the researchers used nine amphorae dredged up by fishermen from the Black Sea and analyzed scrapings to determine whether the amphorae held more than just wine. To test their theory, the researchers used primers designed to amplify traces of DNA from land plant species, which were intended to pick up traces of olives as well as grapes.208 Of the nine amphorae, two do not show traces of either grapes or olives, but do show traces of juniper and thyme, both common pollinators used by bees.209 Because of the amplifiers designed to only pick up plant material, honey would only be detectable through traces of pollen, leaving it invisible. The article asserts that DNA can only be trapped in the ceramic matrix when introduced by a liquid or semi-liquid, indicating that the traces of juniper and thyme had to have been imbued in a liquid in order to leave behind their DNA.210 To me, it seems reasonable that honey was carried in these amphorae, providing an explanation both for the traces of juniper and thyme and for the liquid medium needed to leave behind DNA in ceramic.

207 Polybius Histories IV.38.4-5
The shipping of honey depended primarily on who sold it and how large of a beekeeping operation they managed. Smaller, rural producers would likely bring their products to periodic markets either on the back of pack animals or in carts. The regularity of the *mundinae* provided farmers with a stable time to bring their goods to market, allowing them to plan for more distant trips to sell their goods to a greater number of people. In “Rural Markets in North Africa and the Political Economy of the Roman Empire”, Brent D. Shaw asserts that the *mundinae* would be carefully scheduled so as not to conflict with other nearby market regions, allowing for a “regular circuit for itinerant traders and tribesmen” with one market per day of the week to attend.\(^{211}\) Urban sellers, while usually faced with higher prices for perishable goods, would have an advantage when buying honey and wax. Honey and wax could be brought in from the hinterlands, imported from regions like Hymettus and Pontus, or even produced in the city itself. While the imported goods would likely be out of the economic reach of most people in the city, the products with reduced shipping costs and therefore reduced pricing would likely be available to even the poor occasionally.

**Thought Experiment**

How did honey and wax move through the economy of the ancient world? The evidence, though fragmented, provides a series of footholds we can use to fill in the gaps with some imagination and practical conjecture. It is my view that honey production fell into three broad categories: boutique honey, mass produced honey, and cottage industry produced honey. Boutique honey would come from regions famed for their product such as the honey produced in the Hymettus region, and likely was a mixture of mass production and small cottage industry

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production. Mass produced honey would come from large estates like those mentioned in the Egyptian papyri and by Varro, and small farm produced honey would come from people supplying honey for themselves and selling the excess to neighbors at local markets. Each category would have functioned slightly differently in terms of shipping, organization, and profitability, but each would produce the honey and wax used across the Mediterranean world for a huge range of purposes, from sweetener to preservative to medicine.

**Boutique and Small Farm**

Boutique honey, or specialty honey, originated in areas known for their bees, like Crete or Gallia. The farms in these areas would likely have as many hives as they could afford and support in order to capitalize upon the profitability of the region’s reputation for superior honey which would lead to massive enterprises. Families could make hives out of whatever materials they had available to them, and, when possible, would export their honey to markets abroad so they could fully take advantage of their location. Boutique honey producers would either advertise their region or the flowers from which their honey was created, knowing that certain flavors garnered a higher price at market.

This phenomenon can still be seen today, as a quick shopping trip online proves. Of two sixteen ounce bottles of honey from Walmart, one is priced at $4.98 and the other at $15.67. Despite both being imported honeys, the bottles are both priced and advertised differently. The $4.89 honey, imported from Brazil, emphasizes that it is organic, raw, and...
strained honey, with “Product of Brazil” written unobtrusively below.\footnote{https://www.walmart.com/ip/Great-Value-Organic-Raw-Honey-16-oz/51881464}
The $15.67 honey instead tries to emphasize both the plants that produced it and its place of origin, having “Thyme Honey from the Island of Crete” taking up the majority of the label.\footnote{https://www.walmart.com/ip/Thyme-Honey-from-Crete-Kalas-16-05-oz-455-g/691650238?wmlspartner=wlpa&selectedSellerId=6346&adid=2222222227067141571&wmlspartner=wmtlabs&wll0=&wll1=g&wll2=c&wll3=170917533569&wll4=pla-280865458052&wll5=9008337&wll6=&wll7=&wll8=&wll9=pla&wll10=114232949&wll11=online&wll12=691650238&wll13=&veh=sem}

While determining the price of goods is dependent on a multitude of factors ranging from economies of scale to trade agreements, it is clear that the sellers know they can justify a higher price by drawing attention to the region’s famous reputation for honey that stretches back thousands of years. Evidence of this advertising strategy can also be seen on the amphorae found at Pompeii; two of the amphorae advertise from where they shipped–Corsica and Gallia–and two advertise the flowers used to create the honey–\textit{thymimum} and \textit{flos}.

Cottage industry beekeeping would likely have similar operations to the boutique farms, mostly differing in intended markets and overall profitability. Like boutique farms, these small scale beekeepers would likely have hives made out of whatever materials were cheaply available to them. They could catch wild swarms or buy a swarm at their local market, and use their hives to produce honey and wax for their own household. Whatever surplus a family had

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{thyme_honey_from_crete.png}
\caption{Thyme Honey from Crete.}
\end{figure}
could be brought to market and sold to locals, but the honey and wax likely did not constitute a poor family’s sole source of income; instead, small farms would diversify their crops and livestock with whatever was available, mostly providing enough to live at a subsistence level. While these small farms could likely walk their goods to their local markets or bring them with a pack animal, boutique farms would have to arrange to ship their goods if they wanted to maximize their income. The boutique beekeepers could pay for shipping by offering a percentage of their profits to the middle man or pay them directly before the shipping occurred.

**Mass Production**

Perhaps mass production is a bit of a misnomer: while large operations in the ancient world did exist, they were more akin to a massive collection of smaller farms than one farm that cranked out only wax and honey. Of the evidence I have gathered, there is only one instance of “mass production,” so to speak. Varro, when speaking of the potential profitability of keeping bees, mentions two brothers who make 10,000 sesterces off of one iugerum filled solely with beehives.²¹⁴ Outside of that singular mention, most large scale honey production in ancient Greece and Rome seems to have been operated through taxation and redistribution of the honey that smaller farms produced. While difficult to prove how large and profitable these beekeeping businesses could be, Varro again provides some interesting figures regarding large-scale beekeeping. In *On Agriculture*, the hypothetical Seius makes 5,000 pounds of honey in rent a year through lending out his beehives. I decided to cobble together various pieces of an equation to determine how many hives Seius must have owned to produce those 5,000 pounds of honey.

The result is predicated on a number of very large assumptions, but it is nonetheless interesting. Assuming that Seius would have rented his hives out at the same rate as that

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²¹⁴ Varro *On Agriculture* 3.16.10-12
provided in the HM (1 sextarius, or .55 liters), and assuming that the average hive production is about six times what was taxed (3.36 liters), and using the weight of the Roman pound as provided in the OCD (328.9 grams), while accounting for the fact that one liter of honey weighs 1,440 grams, then Seius would have rented out approximately 2,039 hives. If Diocletian’s *Maximum Price Edict* is remotely close to what somebody in Varro’s day would have paid for high quality (optimum mel) honey, then Seius could make up to 83,055.56 denarii for selling the honey rent.215

Again, these numbers are only to create a rough estimate of how much a Roman who produced and sold honey could make. Likely, the honey and wax would be purchased with coinage, so the figures illustrate a helpful approximation of the profitability of keeping bees. Although over 2,000 hives seems an absurdly high number of hives, Egyptian papyri support the existence of hives numbering in the thousands.216 The Egyptian papyri and the fictional hives of Seius would operate similar to the system alluded to by the inscriptions found in the Bagradas Valley. The *coloni*, essentially maintaining small farms, would keep the bees and gather the byproducts. A portion of the honey and wax would be taxed and distributed to the *conductors*, who could afford to ship the honey-cum-rent collected from the *coloni* that they managed to larger and more profitable markets. Once at the chosen market, the honey would be sold either in small single-use portions, distributed from a larger vat like the one found at the flower shop in Pompeii, or would be sold in amphorae to households who could afford the initial investment to keep their own supply of honey around the house.

215 \( (5000 \text{ pounds})(328.9 \text{ grams}) = 1,644,500 \text{ grams of honey} \)
\( 1,644,500/792 \text{ grams} = 2,076.388888 \text{ sextarii}(40 \text{ denarii}) = 83,055.56 \text{ denarii} \)

216 Gene Kritsky, *The Tears of Re*, 78.
A Final Picture

Beekeepers contributed vital goods to the ancient world, whether small scale who collected honey for personal and local use, or large scale estate owners who managed the slaves or *coloni* actually farming the bees. The necessary materials for beekeeping, bees and beehives, could be found for free, made, or purchased at local markets. Honey itself was likely a household staple, used in small amounts as a sweetener, medicine, or preservative. Wax, too, had a myriad of functions, from medicine to ship sealant to art medium. In order to provide the honey and wax necessary for all of the uses cited by ancient authors, a widespread, multilayered, organized system must have existed. The trade for bee products was almost certainly interregional, with the reputation of luxury honey creating demand for shipping from regions abroad.

The profit from keeping bees could be enormous, especially for an estate owner who could loan out hundreds of hives in return for a percentage of the honey produced. Ancient farmers and authorities seemed to have knowledge of the multiple economic benefits of keeping bees as shown by the incentives given by estate owners to beekeepers in the Lex Manciana and Henchir-Mettich inscription. Additionally, the flower shop in Pompeii with the amphora of honey shows a knowledge of the multiple benefits provided by beekeeping, since the owners likely used bees to both improve their flowers and to make additional income from their convenient flower oasis within the city. Urban buyers of honey and wax would purchase these goods from the large city markets, where honey and wax were brought in from regions local or exotic. In rural areas, honey and wax would be brought to a nearby market because the cost of shipping farther away would be too extreme for smaller businesses to shoulder. For these poorer farmers, the diversification provided by beekeeping may have served as a safety-net for
subsistence level families, allowing them to have a somewhat reliable method of obtaining food or money should other crops fail.

Beekeeping and its effects on daily life in the ancient Mediterranean are often overlooked in scholarship on agriculture, diet, and the economy. Despite the lack of modern investigation, beekeeping, bees, honey, and wax all were important to the ancient world. Bees and honey appear all over ancient literature, from practical guides to metaphors in poetry for hard work and sweetness. The lack of physical traces of beekeeping does not prove a small and unimportant industry; rather, a lack of knowledge about the industry may have led to mislabeling and overlooking hives and earthenware associated with beekeeping. Remaining for us is evidence from laws and literature that show the depth and scope of the industry, encompassing everything from massive operations of thousands of hives to backyard cottage industries. Through examining the evidence left to us, this thesis proves the existence of an ancient beekeeping economy that was diverse and complex.
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