Smells and Spells: Plants, Olfaction, and Evolution in the Greek Magical Papyri

By
Laura Phillips
B.A. University of Kansas, 2021
B.S. University of Kansas 2021
M.A. University of Kansas 2022

Submitted to the graduate degree program in Classics and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Master of Arts.

Chair: Professor Craig Jendza

Professor Pam Gordon

Professor Paul Touyz

Date Defended: 9 May 2022

The thesis committee for Laura Phillips certifies that this is the approved version of the following thesis:

Smells and Spells: Plants, Olfaction, and Evolution in the Greek Magical Papyri

Chair: Professor Craig Jendza

Date Approved: May 12, 2022

Abstract

This thesis explores the rationale behind the inclusion of botanical ingredients in the Greek and Demotic Magical Papyri using an interdisciplinary lens. After summarizing current anthropological and pharmacological approaches, I conduct a statistical analysis of the botanical ingredients present in the corpus of spells to evaluate the frequency and diversity of botanicals. The statistical analysis allows for an evaluation of existing theories and suggests a new approach grounded in olfaction and evolution. Basing magical rationale in olfaction, I demonstrate that odor was likely a form of communication in magic and an avenue for power in magical spells. These ideas are supported by a discussion of the role of odor in the works of ancient Greek botanist Theophrastus. In the application of these ideas, I present my olfactory theory as a complement, not a substitute, to approaches based on persuasive analogy and homeopathic magic as offered by Frazer, Tambiah, and others. I end by turning to a broader discussion of fragrance in Greek literature to understand the wider use of odor in Greek culture. By demonstrating the parallels between the use of fragrance in archaic Greek poetry, as illustrated by the *Homeric Hymn to Aphrodite* and two poems of Sappho, and the use of fragrance in the magical papyri, I further show how odor should be interpreted as a method of communication and power more broadly in classical literature.

Dedication

This thesis is dedicated to my grandfather, Dr. Oliver C. Phillips, who gave me a magical childhood filled with ancient myths and epic tales.

Table of Contents

Chapter 1: Introduction 1
Chapter 2: Existing Approaches to the Magical Papyri and Their Pitfalls 7
Chapter 3: The Role of Olfaction and Evolution in Magic 23
Chapter 3: A Case Study 46
Chapter 4: Olfaction and Persuasion in Archaic Poetry and Beyond 52
Chapter 5: Conclusion 78
Appendix A 82
Works Cited 83

Chapter 1: Introduction

Throughout the collection of ancient spells known as the Greek Magic Papyri (*PGM*) and the Demotic Magic Papyri (*PDM*), a dizzying array of botanical ingredients are used for magical rituals.[1] While wormwood and myrrh may be the most common, the ancients used a range of foods, spices, resins, and flowers. Spells using wormwood, lotus, leeks and turnips were used to predict the future.[2] Sesame and cumin were used to put males in a trance.[3] To win chariot races, magicians wrote the names of chariots and charioteers on papyrus leaves, using cinnabar ink, which was then wrapped around a dead cat, buried, and fumigated with storax gum.[4] There is no simple equation between particular botanicals and the types of spells they were used in; thus, the reason why these particular ingredients or practices were employed in these spells is not immediately clear. Current theories, such as the analogical approaches and pharmacological approaches discussed in Chapter 1, do not sufficiently explain the probable reasoning for botanical selection. While a comprehensive explanation of botanical usage in magic is not possible, uniting these existing theories on botanical selection and bridging the gaps between them with a new hypothesis—what I call the olfactory approach—can provide a fuller interpretation of botanical use in ancient Greek magical thought.[5]

The spells in the *PGM* and *PDM*, our main source of ancient Greek spells, were written between the 2nd century BCE to the 5th century CE. They are of Greco-Roman and Egyptian

[1] For the text of the *PGM*, see Preisendanz 2001. For the English translations of the *PGM* and the *PDM* used in this thesis, see Betz 1986.
[2] *PGM* III.282-409.
[3] *PGM* IV.850-929.
[4] *PGM* III.1-164.
[5] In this thesis, I will not enter into the long-standing debate about the relationship between magic and religion (see Collins 2008: 1-26 and Edmonds 2019: 1-34). Although religion commonly includes botanical materials as well, this thesis will be limited in scope to magical thought with some applications to broader Greek and Roman literature.

origin and were not originally part of a set collection.[6] Rather, the spells were pieced together from disparate papyri by modern scholars. Throughout history, burnings of magical texts were frequent, forcing magicians and their literature to an underground network that lasted into the 19th century CE.[7] Although there is some scant evidence of a system of apprenticeships for magicians, the overarching reaction to magical documents makes it uncertain that the author of an individual spell was aware of or influenced by other magicians from the time.[8] Consequently, compared to the length of time and the wide geographic span this collection covers, there are relatively few extant spells, and the spells that do survive lack specific geographic or temporal context. Between the limited number of extant spells and the inability to place them into a social, political, or economic context, it is difficult to parse the thought process behind the rituals and extrapolate findings to other spells or magical documents.

Despite being taboo, the extant spells were continually reproduced and used over a lengthy period of time.[9] There must have been a reason for their resilience. While a modern reader could easily dismiss the texts as spurious and ineffective, the authors of these spells must have intended for a particular outcome to occur. That is, the ancients must have *believed* that the spells were efficacious, at least to some degree. If these spells had no effect, whether tangible or perceived, they would not have survived centuries of systematic suppression to the present day. Through either pharmacological or placebo effects, there must be a reason for their continuity and why particular ingredients used were integral to the spells.

The earliest attempts to understand how ingredients were used in magic came from the anthropological theories of magic and witchcraft that developed in the first half of the 20th

---

[6] Betz 1986: xli.
[7] Betz 1996: xli.
[8] Graf 1997: 147.
[9] Betz 1996: xli.

century. These theoreticians, especially Sir George James Frazer, Edwards Evans-Pritchard, and Stanley Tambiah, studied the magical practices of various cultures around the world, and their insights were easily applicable to study of the *PGM* and *PDM.*[10] They broadly conceived of magical ingredients as being analogical in use, and offered significant contributions to our understanding of magical thought. Examining spells through the lens of sympathetic magic, however, cannot explain all spells and their ingredients. While there are certainly some occasions where a spell's ingredients might have some analogical effect where, to use Frazer's famous phrase, "like produces like", there are many other times when no such analogy can be detected.[11] How do myrrh and calf's-snout help find a thief?[12] How does drowning a cat resemble winning a chariot race?[13]

Some explanations could lie within semiotics, the study of signs, symbols, and the interpretation of materials. Many analyses of magical ingredients, even if not explicitly labeled as semiotic approaches, do tend to employ some semiotic interpretation. Generally, semiotic approaches receive less attention than analogical theories, and unlike Tambiah and his predecessors, the history of semiotics tends not to be included in surveys of Greek magic.[14] While discussions of the symbolism of the materials in spells can further our understanding of ingredients, the scholarship that labels itself as a purely semiotic approach generally focuses on statues and inscriptions rather than botanical ingredients and thus provides only little application to our understanding of botanicals in magical texts.

---

[10] Frazer 1924; Evans-Pritchard 1937; Tambiah 2017.
[11] One example of a botanical ingredient being used for analogical purposes can be seen in *PGM* V. 70-95, where the plant bugloss, known for its swelling properties in ancient medical texts, is used analogically to swell the eye of a thief, on which see Jendza 2014. For another example, see Dieleman 2019.
[12] *PGM* V. 172-212.
[13] *PGM* III. 1-164.
[14] Collins 2008 only cites one source on semiotics. Edmonds 2019 offers very limited information on semiotic approaches and sources. Evans et al 2016 provides the most comprehensive bibliography on scholarship that analyzes the *PGM* and *PDM* through a semiotic approach.

More recent scholarship attempts to explain *PGM* and *PDM* ingredients in ways beyond just the analogical. Scholars discuss the purported mind-altering effects of ancient botanical ingredients using a modern understanding of plant physiology and pharmacology.[15] Ingredients such as opium, mandrake root, and certain incense have tangible effects on a mental state that could explain their place in magical spells. While a pharmacological approach explains a subset of ingredients, many spells did not require using botanicals in a way that could create physical effects, or if they did, the botanical ingredients were used in such small doses that the effects would not be felt. Other spells include plants that have no currently known physiological effects on humans. Even when pharmacological approaches are considered in tandem with other theories such as those based on analogy, there are clear gaps in our understanding of botanical ingredient choice.[16]

I will supplement existing theories of botanical ingredient use in the *PGM* and *PDM* by offering a new approach that attempts to bridge the gaps between these established theories. In Chapter 1, I begin by offering an overview of current theories of analogical thought and pharmacological reasoning to demonstrate what gaps in our understanding remain. To supplement our understanding of pharmacological botanical use in magic and to gain a stronger understanding of the ubiquity and types of botanicals in ancient Greek magic, I will provide a statistical analysis of the botanicals found in the *PGM* and *PDM*. Although the results do not show a strong pharmacological basis for the majority of botanical ingredients in the spells, they indicate that many of the ingredients were aromatic, and many are known to have been used in Greek and Roman perfume production.

---

[15] Scarborough 1991; Sumler 2017.

[16] LiDonnici 2001: 61–91 suggests using trade routes and botanical availability to construct information about botanical ingredients in magical texts. While interesting, this approach depends on too many uncertain variables and will not be discussed extensively in this thesis.

The strong correlation between smells and spells indicates that olfaction is a key component in botanical selection and forms the basis of my approach to the *PGM* and *PDM*, discussed in Chapter 2. To create a more robust understanding of olfaction and magic, I will provide a discussion of the biological mechanisms that forge human interactions with botanicals and how evolution shapes our perception of aromas. While this provides a modern understanding of olfaction in magic, I will compare my arguments with Theophrastus's work, *On the Nature of Odors,* to incorporate an ancient perspective on olfaction. Theophrastus's understanding of odor combined with a modern understanding of our evolutionary relationship with evolution strengthens recent suggestions that smell is a method of communication and power, lending more credibility to aromatic properties as a factor in botanical selection for spell ingredients.

After applying these ideas to a spell from the *PGM,* I will turn my focus in Chapter 3 to the use of my theory outside the realm of strictly magical texts. The *Homeric Hymn to Aphrodite* and select poems of Sappho, along with a survey of aroma in other Greek and Latin texts, suggest that olfaction played a key role in magical thought throughout antiquity. Although spells from the *PGM* and *PDM* lack geographic and temporal context, the use of olfaction in magical thought throughout the classical world indicates that olfaction is a key component of *PGM* and *PDM* spells even if we lack the social and cultural context for any given magical spell.

While we will likely never be able to find a correlation between a specific smell and desired outcome, we can see that aroma is not simply a side effect of ingredients chosen purely for analogical, semiotic, and pharmacological reasoning. Rather, the theories set forth and investigated in the following chapters can equip us to analyze botanical ingredient choice from multiple perspectives, creating stronger hypotheses about a specific spell and its ingredients based on analogy, pharmacology, and olfaction. Through this multifaceted and interdisciplinary

approach, we can begin to investigate the implications of botanical ingredients and formulate a stronger understanding of magical thought across the *PGM,* and *PDM* as well as other classical texts with references to magic.

Chapter 2: Existing Approaches to the Magical Papyri and Their Pitfalls

From the late 1800s to the second half of the twentieth century there was significant development of anthropological theories that attempted to explain magic across cultures.[17] These theories focused on analogy as potential reasoning for magical thought, often centering around ideas of sympathetic magic and persuasive analogy. While analogical approaches became a cornerstone of scholarship on rituals and ingredient manipulation in Greek magic and the magical papyri, studies often include semiotic analyses to offer more details on the reasoning for material choice. The second half of the twentieth century marked the emergence of analyzing magic through a biological lens. These more scientific approaches look for pharmacologically active magical ingredients that could prove ancient spells created the desired outcome or at least caused a significantly altered mental state, leading a magician to believe the desired outcome occurred. Each of these theories contributes to our understanding of magic. Instead of canceling each other out, they instead build on each other to offer a more interdisciplinary explanation for the conscious, and perhaps even subconscious, reasoning behind botanical selection in ancient magic.

Sir James George Frazer (1854-1938) developed one of the first major anthropological theories about magic. Frazer, whose theories were based on those of Sir Edward Tylor (1832–1917), believed magic was a false science, distorting laws of cause and effect to create inaccurate reasoning for outcomes.[18] According to Frazer's theories, a magician would expect a figurine resembling the magician's target to hold magical power over the target based on shared resemblance.[19] Frazer refered to magic based on these fallacious associations stemming from

[17] I will only cover select anthropologists. For a more comprehensive list of anthropologists and their views on magic, see Collins 2008: 1-26.
[18] Tylor 1871; Frazer 1924; Collins 2008: 3.
[19] Collins 2008: 3.

physical similarities as *homeopathic magic*. In other instances, Frazer hypothesized that magicians thought objects once in contact would hold power over each other after the connection was severed based on an idea of extended personhood, which he termed *contagious magic*. Since both homeopathic and contagious magic rely on distortions of reasoning and fixations on resemblance, Frazer coined the term *sympathetic magic* to encompass both theories. Frazer's concept of sympathetic magic has been continually used in subsequent theories about magical thought and fueled the work of his successors.[20]

Thirteen years later, anthropologist Edward Evans-Prichard expressed views similar to Frazer, basing his theory on a study of rituals in the Azande people, who lived in central Africa and had a robust system of magic and witchcraft in their culture.[21] Evans-Pritchard inherited from Frazer concerns about the logic of magic and used incantations associated with Azande rituals to theorize about magical thought.[22] He continually noted that their magical practice centered around medicines and used words primarily to link the medicine to the desired outcome. As the incantations often provided links between the physical properties of the ritual materials and the desired outcome, Evans-Pritchard cemented his ideas about analogical magic. Evans-Pritchard used his observations to build upon previous theories with language as a new dimension to analogical thought in magic, demonstrating that magical thought had conscious justification behind it.

Building from and critiquing his predecessor's analogical theories, Stanley Tambiah notably argued that magic was not a form of science at all. Tambiah opined that magic was based

[20] Collins 2008: 14.
[21] Evans-Pritchard 1937; Collins 2008: 11.
[22] The Azande distinguished between witchcraft and magic. While witchcraft can be subconscious, magic required rituals complete with ingredients and incantations. See Collins 2008: 11 for more discussions on the dichotomy between witchcraft and magic and the subsequent effects it had on Evans-Pritchard's theories.

in performative acts "whose positive and creative meaning is missed and whose persuasive validity is misjudged if they are subjected to that kind of empirical verification associated with scientific activity."[23] Instead of viewing magic in relation to science, Tambiah theorized that magic utilizes analogical thought while verbally communicating the outcome, creating what he referred to as *persuasive analogy*.[24] Science, he argues, would not require a verbal announcement of the desired outcome while the experiment is taking place.[25] Since magic is not a science, Tambiah concluded that it cannot constitute a false science.

Tambiah's approach offers more insight than Frazer's or Evans-Pritchard's, as he provides a more nuanced relationship between utterances and ritual actions. Scholars often bring in theories of persuasive analogy when offering potential explanations for *PGM* and *PDM* spells. Both Smith and Jendza note the persuasion evident in the analogy in *PGM* V.70-95, where the magician is instructed to say, "as long as I strike the eye with this hammer, let the eye of the thief be struck, and let it swell up until it betrays him."[26] Similarly, in *PGM* XXXVI. 69-101, multiple aspects of analogical theories are present:

> "…Take a pure papyrus and with blood of an ass write the following names and figure, and put in the magical material from the woman you desire. Smear the strip of papyrus with moistened vinegar gum and glue it to the dry vaulted vapor room of a bath, and you will marvel… The writing is this:… as you are in flames and on fire, so also the soul, the heart of her, NN, whom NN bore, until she comes loving me, NN, and glues her female pudenda to my male one, immediately, immediately; quickly, quickly."[27]

By comparing the actions and the written text in this spell, the analogical thought easily becomes evident. Before the magician burns the papyrus, he writes on it, commanding that the target of the spell similarly burn in her soul and her heart. He then writes an order that the target

---

[23] Tambiah 2017: 451.
[24] Tambiah 2017.
[25] Tambiah 2017.
[26] Smith 2000; Jendza 2014.
[27] *PGM* XXXVI. 69-101.

of the spell will have her genitalia (pudenda) glued to the magician's genitalia. As part of the preparation for the ritual, the magician must use vinegar gum to glue the papyrus to the wall. Both the ritual and the text to be written on the papyrus use the same word for glue, κολλάω, emphasizing the connection between the ritual and the desired outcome. Employing Tambiah's theories, the magician is attempting to force the desired outcome by mimicking the outcome in the ritual, creating a persuasive analogy. The magician also demonstrates an example of Frazer's contagious magic, by burning material belonging to the target of the spell in hopes that the material contains a connection to the target of the spell.

Employing these analogical theories offers potential reasoning for the magicians' actions. Still, Tambiah and Frazer's theories cannot explain why the spell needs vinegar gum to glue the papyrus to the wall. Although it is unclear what ingredient the magician would use for vinegar gum, the Greek (ὀξόκομι) suggests that it is of botanical origin. The word appears to combine ὄξος, meaning vinegar or bad wine, and κόμμι, which refers to gum or resin from a tree.[28] There are many instances similar to this, where analogical theories can explain the ritual process, but not the ingredients chosen. There are many different ways to stick papyrus paper to a wall, and yet the magician specifies vinegar gum. While it is impossible to determine all the reasons for the choice of a botanical, considering analogical thought in tandem with other theories can give more insight.

Another common approach to Greek magic is through semiotics. Semiotic approaches focus more on the signs and interpretations of ingredients than analogical theories. The study of semiotics is often credited to linguist Ferdinand de Saussure (1857–1913) and philosopher Charles Sanders Peirce (1839–1914).[29] Saussure created a model that included the signifier, or

[28] Betz 1986: 270 also suggests ὄξος and κόμμι as the root of ὀξόκομι.
[29] Atkin 2013; de Saussure 1983; Peirce 1931-58.

the form that the sign takes, and the signified, or the concept represented by the sign. Peirce introduced a model with three components. The first two, the representamen (the form the sign takes), the object (the concept represented by the sign) are similar to Saussure's idea of the signifier and signified, respectively. Peirce included a third component, the interpretant, which refers to the understanding that we have of the sign and its meaning. Within magic, these semiotic theories can help illuminate reasons for material choices, which nicely complements the analogical theories that focus on the manipulation of the materials to imitate an outcome.

Within the field of Greek magic, discussions of symbolism are often wrapped into other discussions of other approaches, and only some scholars apply semiotics in a strict sense, looking for the components of Saussure or Peirce's models within the magical papyri.[30] For example, Evans, in his discussion of semiotics in the *PGM,* provides lists of ingredients with symbolic ties to deities (specifically flowers and metals), then applies them across the *PGM* to find correlations between the common symbolism of ingredients and both the gods invoked in the spell and the desired outcome.[31] Yet, similar to other theories, there is a gap in our understanding of why certain botanical ingredients came to be so prominent in symbolism and thus were included in the magical papyri.

Within the past century, new theories rooted in pharmacology emerged to attempt to fill the gap created by relying solely on anthropological theories. While much of the initial debate centered around magic as either a science, false science, or completely outside the realm of science altogether, modern pharmacological approaches attempt to explain the *PGM* and *PDM* by forgoing the analogical arguments and examining how the spells might have created desired

[30] Haluszka 2008 writes on the semiotics of statues in the PGM; Södergård 1999 includes multiple PGM spells in his discussion on semiotics; Evans et al 2016 provides the most comprehensive analysis of the PGM using a strict semiotic analysis.
[31] Evans et al. 2016: 58-60, 62.

outcomes.[32] These views often look to ancient medical texts for insight into the degree of understanding that magicians could have possessed about pharmacologically active ingredients, providing more insight and understanding to botanical ingredient usage.

Prominent in this category of scholars is John Scarborough, who has numerous publications on the pharmacology of botanicals in ancient thought, including the *PGM* and *PDM*.[33] He grounds his work in an ancient understanding of plants by using texts from Theophrastus and Dioscorides, comparing their writings to our modern knowledge of plant physiology and pharmacology. His work spans past Ancient Greece, observing how botanical knowledge evolved over time from the Late Byzantine empire to recent folk medicine. Throughout his work, Scarborough focuses both on how medical knowledge of the time contributed to the overall magic and sacred botanical folklore of the time, and how that the botanicals could create desired outcomes.[34] His work provides an excellent baseline for possible pharmacological reasoning behind botanicals in magic while rooting his research in science, ancient spells, and classical texts to create a thorough understanding of the factors at play in the choice of medicinal and psychoactive plants in ancient spells.

Using a similar biological lens, Alan Sumler focuses solely on the *PGM* and *PDM* in his work "Ingesting Magic: Ingredients and Ecstatic Outcomes in the Greek and Demotic Magical Papyri."[35] In his article, he discusses ingredients that could cause physiological interactions with the magician, or perhaps the target of the spell, and stimulate the desired outcomes. Sumler, more so than Scarborough, uses the physiological interactions as justification for the persistence

[32] This discussion of pharmacology will be limited to Scarborough and Sumler, as they provide two examples of common approaches to pharmacology in magical texts.
[33] Scarborough 1978, 1991, 2006, 2011, 2013.
[34] Scarborough 1991.
[35] Sumler 2017.

of the spells in the *PGM* and *PDM*. He postulates that because these spells survived, they must have had a tangible effect that reinforced their use, and he relies on pharmacological uses to provide evidence of realistic outcomes.[36] He discusses the use of mind-altering substances, such as opium and mandrake root, that could alter a magician's perception to the point that they *believe* the desired outcome occurred, but he does not consider, however, the placebo effect in this discussion.[37] Sumler, more so than Scarborough, focuses on pharmacology as the primary reason for botanical use and presents his approach independent of anthropological theories. While his analysis offers a detailed explanation of spells that boast botanical ingredients with strong pharmacological ties, his focus on a small subset of spells offers a more limited contribution to our understanding of magical rationale across the entire corpus of spells.

While Sumler and Scarborough's approaches are insightful, neither author provides a comprehensive discussion of the frequency of medicinal or psychoactive botanicals. By focusing on select botanicals, the approach effectively misconstrues pharmacologically active ingredients as more prevalent than they actually are within the magical papyri. To understand the role of botany in the *PGM* and *PDM* as a whole and the validity of pharmacology as a supplement to analogical theories, it is important to understand what botanicals were used, how frequently they were employed, and how they were incorporated into the spells across the magical papyri. Knowing the frequency of references to botanicals, regardless of type, will help determine how prominently botanicals are featured within these spells. Furthermore, analyzing the species richness will further provide a foundation for claims that botanical usage results from pharmacological effects, aromatic properties, or other potential hypotheses. It is easy to find a

[36] Sumler 2017: 99.
[37] Sumler 2017: 105.

spell that can illustrate a hypothesis, but harder to prove ubiquitous support based on all the available data.

I begin this statistical analysis with a few caveats and an explanation of my methodology. Since we must assume that a majority of ancient magical spells have been lost to time, the following statistics are only a sample of the true population. Since there is not information about why certain spells were reproduced over others, it is not completely certain if the sample is a random representation or a biased one. Given the variety of spells, the large geographic and temporal scope of the magical papyri, and the differing levels of preservation, however, it is likely that the surviving spells represent a relatively diverse and unbiased sample of spells. Considering the fragmented nature of some spells, there is a strong possibility that a spell could be incorrectly marked as not having a botanical. With this in mind, the statistical analysis cannot be considered a representation of the true proportions of botanical ingredients, but a reasonable and conservative estimate of the real numbers around botanical usage.

Using the standard edition and English translation of the *PGM* and *PDM,* I cataloged every instance of a botanical or a botanical byproduct, along with the circumstances surrounding the spell's usage.[38] For the purposes of this study, magical ingredients such as oil derived from a botanical (e.g. olive oil), incense, and wine were considered botanical, while papyrus was not.[39] Each botanical was researched to determine possible aromatic properties and physiological effects on humans.[40] Many physiological effects are only achieved through consumption or inhalation of the botanical, so usage of the ingredient was noted during cataloging.

[38] Betz 1986.
[39] Since papyrus is necessary as a medium for writing with no common alternatives, it was excluded from the list of botanicals.
[40] Research done using the Biodiversity Heritage Library, Bio One Complete, and JSTOR Global Plants databases.

Before conducting any statistical analysis with the resulting data, certain spells and their botanical mentions were excluded from working data. Spells that were notably fragmented to the point that there were no coherent instructions, spells that were only spoken aloud and contained no instructions, spells less than three lines long, and spells that consisted only of drawings or vocalic sounds were recorded but excluded from the final statistical process. Additionally, *PGM* IV.286-95, *PGM* IV.2967-3006, and *PGM* XII. 401-44 were not incorporated into the statistical process. *PGM* IV.286-95 and *PGM* IV.2967-3006 describe how to pick botanicals for magical purposes, while *PGM* XII. 401-44 addresses the code names of plants. Since these spells focus on ways to obtain botanical ingredients, they can be considered outliers as their incorporation into a statistical analysis would likely skew the data of the average spell. The resulting analysis incorporated 335 spells, which is far above the generally accepted sample size minimum of 30 needed for a reliable statistical analysis.

First, the overall presence of botanicals was calculated. Out of the 335 spells analyzed, 217 (68.7%) included instructions to use a botanical.[41] Many spells called for multiple botanicals, giving a total of 676 mentions of botanicals, 751 if including instances where the name of a botanical was spoken aloud.[42] The statistics establish that botanicals were prevalent in magical rituals, but not to a degree that magic relied on botanicals to operate. Still, the majority of the 335 spells considered in this analysis involved botanical ingredients, and thus an ability to understand these ingredients will be necessary for the majority of the spells.

To calculate the frequency of each botanical appearance, mentions of botanicals were labeled according to the plant they were derived from: laurel leaves and laurel branches were both counted as a mention of the laurel plant. The only exception to this method of cataloging is

[41] Table 1.
[42] Table 1.

wine, which was left independent of the frequency of grape plants, as wine is a common component of the Greek diet independent of grapes. There were 155 different botanicals mentioned within the 335 spells, but only 123 could be identified. In some cases, there were mentions of ingredients such as "the great-of-heart plant", which conveys that it was a plant, but of an indiscernible species.[43] Most botanicals were mentioned only a few times, or only once.[44] Out of the 123 identifiable botanicals and botanical by-products, fewer than 35 were mentioned more than four times.[45]

It is also important to consider here *PGM* XII. 401-44, often known as the "Priestly Interpretations," which claims to offer code names for spell ingredients, many of which are botanicals. Yet the code names are almost never used in the magical papyri and provide no clarification to bizarre ingredients seen in the spells. The spell could, however, mean that botanicals were overlooked during cataloging if they were referred to through a code, or led to a misclassification of an ingredient. Dieleman, however, argues that code words were not prevalent in magical texts and that *PGM* XII. 401-44 is instead presenting coded ingredients as part of a marketing scheme.[46] Evans further points out that some of the ingredients that the spell offers code words for, such as wormwood (ἀρτεμισία), are found throughout the magical papyri, and never referred to as the blood of Hephaestus (αἷμα Ἡφαίστου) or the heart of a hawk (καρδία ἱέρακος) as *PGM* XII.401-44 indicates it should be.[47]

[43] *PDM* Suppl. 149-62.
[44] Table 1.
[45] Appendix A.
[46] Dieleman 2005: 186.
[47] Evans et al 2016: 43.

Table 1: Results from statistical testing	
Number of mentions of botanicals and botanical byproducts including spoken	751
Number of mentions of botanicals and botanical byproducts excluding spoken	676
Number of unique botanical species mentioned, including unknown	155
Number of unique botanical species mentioned, excluding unknown	123
Proportion of spells mentioning botanicals or and botanical byproducts (including spoken)	227/335= .678
Proportion of spells mentioning botanicals or botanical byproducts (excluding spoken)	217/335=.647
Proportion of botanicals with aromatic properties	71/123=0.577 With freq. 441/627=0.703
Proportion of botanicals with physiological (medicinal and psychoactive) effects	38/123=0.309 with freq 293/627=0.467
Proportion of medical and psychoactive botanicals used in an effective manner to induce outcomes	194/293=0.423
Proportion of botanicals used to achieve physiological effect	194/627=.309
Proportion of angiosperms	114/123 With freq. 561/627 = 0.895
Proportion of woody plants (as opposed to herbaceous)	400/627=.63

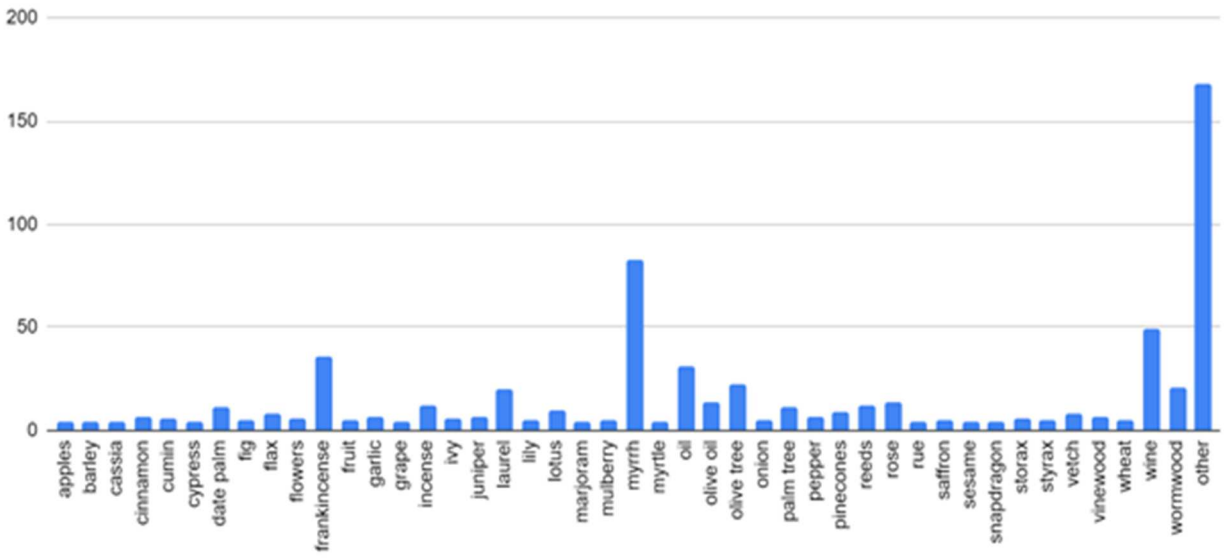

Figure 1: Most frequent botanicals in the PGM and PDM

The statistical results suggest that there was a core set of botanicals that were frequently used across space and time, while other botanicals were more unique to the magician or his location and point in history.[48] The most frequent botanical ingredients were common in the ancient world outside of the magical realm. Some ingredients such as myrrh, frankincense, wine, wormwood, and olive trees held significance in other aspects of ancient life. Beyond that, just under half of the botanical instances utilized a plant that was also a food source or commonly used in cooking.[49] If magicians were using what was accessible to them, it would follow that the most common ingredients were those used elsewhere in ancient life, and less frequent ingredients could represent variation in geographic location.

The prevalence of botanicals relating to everyday life indicates that magicians could not afford to be highly selective in their choice of magical ingredients. Cases of magic that call for

[48] Figure 1.
[49] Table 1.

whatever flowers were in season (e.g., *PGM* III.282-409), incense without specifying the type (e.g., *PGM* IV.154-285), or simply tree bark (e.g., *PDM* xii.21-49) further supports that magicians often had to base their spells on the ingredients at hand.[50] As the availability of ingredients was most likely a determining factor in botanical selection, LiDonnici—who sought to examine the availability of ingredients through investigations into trade routes—becomes more significant to understanding botanical selection within magic. However, the magical papyri spells lack geographic and temporal contexts, limiting the applicability of LiDonnici's study to magical texts with more background information available.[51] Even if trade routes and commonality of ingredients can justify common botanicals in the *PGM* and *PDM*, they cannot fully explain the choice of botanicals, as many plants significant to daily life do not appear in any spells.

Turning to the theories of Scarborough and Sumler, the statistical analysis does not immediately show a strong pattern of pharmacologically active ingredients. While the statistical analysis is only an estimate of botanical representation in the magical papyri, determining the prevalence of ingredients with pharmacological properties becomes hazier. Part of the issue with analyzing botanical ingredients' pharmacological effects is the lack of specificity. Some mentions of botanicals are broad, like nightshade, which refers to an entire family of plants with over 2,700 species.[52] Others were more specific, like frankincense, which can come from only five different species of trees.[53] There is also the risk of misassociating species with ancient names, as there was not a standard, regulated nomenclature for botanicals in ancient Greece. From the data, approximately 42% of the botanicals used could feasibly have pharmacological

[50] This is a non-exhaustive list.
[51] LiDonnici 2005.
[52] Olmstead and Bohs 2007: 255–68.
[53] For information on the production of frankincense see Al-Harrasi et. al. 2021.

properties. Of those, only 30.9% were used in a way that could cause a physiological response (e.g., ingestion, inhalation). To calculate this number, for each plant with medicinal or psychoactive properties, it was recorded if the plant was ingested, inhaled, or applied to the skin. There was no research done on how each plant must be consumed to induce physiological effects, or at what amount, so this number is likely lower than calculated. Given that the already low estimates are likely a generous estimate, the statistical analysis substantially weakens arguments that base botanical ingredients use primarily on pharmacological properties.

Both the high frequency of household botanicals and the relative lack of pharmacologically active botanicals indicate that botanicals were not primarily used for their medicinal or psychoactive properties. Yet Professors Scarborough and Sumler argue extensively that botanical use stems from pharmacological properties. A portion of Sumler's arguments relies on the idea that botanical ingredients, even if they did not cause a tangible outcome, could induce an altered mind state that would make the magician *think* an outcome occurred (e.g., communicating with a god), even if it did not. This argument, however, can only be applied in very few situations. Out of all the botanicals called for, only poppy and mandrake root could conceivably create hallucinations, and poppy was only called for in three spells, and only inhaled twice.[54] Mandrake root was only applied to the target and therefore could not cause the magician to hallucinate the desired outcome.[55] A lack of psychoactive ingredients in the *PGM* and *PDM*

[54] Table 1. *PGM* XII. 96-106 includes a poppy flower as an ingredient for ink. This would have involved applying heat to the poppy at some point during the ink-making process, creating the potential for inhalation of opium compounds. It is not certain that this spell would allow the magician to feel the effects of opium, as it asks for a poppy flower, not the poppy pods which contain the main source of opium. *PGM* IV. 1716-1870 instructs the magician to make a burnt offering of opium, a clearer instance of a magician feeling the effects of the drug. *PDM* xiv. 711-15 states that you can induce deep-sleep by adding opium to a man's food, which would certainly induce the effects of opium.

[55] *PDM* xiv. 716-24 and *PDM* xiv. 727-36.

substantially weakens Sumler's argument that magicians might hallucinate the desired outcome, and furthers the current gap in our understanding of botanical ingredients in the magical papyri.

Still, known pharmacological properties cannot be discarded from a magician's reasoning. Sumler points out how both instances of mandrake root involve inducing deep sleep. It is likely that a magician chose mandrake based on their understanding of mandrake root's effects, as there is a record of ancients using mandrake as a sedative.[56] Other ingredients can be considered psychoactive in the sense that they induce mood changes. Mulberry, myrrh, frankincense, wormwood, and wine were all likely known by magicians to have possessed mood-altering properties, although they would not induce visions or loss of consciousness. Overall, Sumler's and Scarborough's arguments are not invalid, but not as applicable to the *PGM* and *PDM* as they might first appear.

The pharmacological theories, even if they do not explain a substantial amount of botanical usage, help increase modern understanding of ancient spells and can supplement analogical theories. Many pharmacological arguments, while focusing on botany and modern understanding of medicinal botanicals, generally give credit to the work of Frazer, Evans-Pritchard, and Tambiah. Yet the current pharmacological views do not discuss how biological insights complement or negate the anthropological theories of magic. Rather, a gap is created between anthropological theories that focus on synthesizing the ancients' conscious reasoning through analogy and symbolism and those that focus on showing tangible results using modern knowledge. Between the frameworks created by these two approaches lies a cohesive explanation that can incorporate both the anthropological postulations on conscious reasoning

[56]Chidiac et al. 2012: 1; Scarborough 2006.

within ancient magical thought, as well as a perhaps more subconscious reinforcement created by operant learning as pharmacologically active ingredients are repeatedly used.

Still, simply bridging these explanations is not enough. Too often, scholars looking for a biological reason for ingredient use focus only on the examples where they can prove a physiological outcome. More often than not, the botanicals used are either not pharmacologically active or not used in ways that would result in their pharmacological properties manifesting. This leaves us again with a gap in reasoning for ingredient choice. However, the statistical results showed that there was one feature common to upwards of 70% of the botanicals: aroma. Many of the ingredients were strongly aromatic and many were even used in the ancient perfume industry. Using a combination approach, involving olfaction from an evolutionary perspective and an understanding of how language and magical thought can alter the instinctive use of botanical ingredients, I will provide a more cohesive explanation that can supplement our understanding of the *PGM* and *PDM,* as well as apply to broader Greek and Roman literature.

Chapter 3: The Role of Olfaction and Evolution in Magic

With the growing evidence for the tangible effects of many ancient medicinal practices, it is understandable why pharmacological approaches are applied when persuasive analogy and semiotics are insufficient. Current biological approaches to the *PGM* and the *PDM,* however, give little attention to plants that do not have outwardly known effects (e.g., pine, peonies, and many others) despite these plants being more common in the magical papyri than pharmacologically active ones. The low percentage of botanicals that can induce physiological effects does not mean that pharmacology is entirely absent from our explanations. Considering the vast biodiversity of plants and the relatively limited amount that can be beneficial to humans, it is highly improbable that 30.9% of the botanicals utilized in the magical papyri were pharmacologically active by random chance.[57] Instead, the low—but still significant—proportion suggests that there must be an examination of how humans perceive plants and determine the traits of a plant. By grounding this examination on comparisons to the animal kingdom, I will demonstrate that our perception of the world is based in chemoreception, specifically olfaction, that is formed through natural selection and evolution. To understand how our perception of the world applies to the magical papyri, I will perform another statistical test to find a correlation between botanicals and human perception of them. Finally, the results of the statistical analysis will be applied to a case study to demonstrate the applicability of this approach and the incorporation of other approaches to create a more interdisciplinary explanation for spells and their ingredients.

Human interactions with beneficial botanicals are incredibly ingrained into behavioral patterns and apply to any study of pharmacology and ethnobotany. Yet these interactions are not

[57] Table 1.

limited to humans: across many species of animals, there is evidence for self-medication with botanicals.[58] For example, chimpanzees will consume entire unchewed leaves to expel gastrointestinal parasites during rainy seasons when risk of contracting infectious nematodes is high.[59] In other instances, chimps will use branches from V. amygdalina, carefully peeling away bark and leaves to chew only the pith to prevent parasites. Although a chimpanzee does not understand the mechanisms that make the botanical helpful, they have formed a positive association with the plant. Knowing this, it is clear there are pathways for animals to identify different plants and their traits, requiring us to turn to studies on animal physiology.

All creatures use a set of senses to perceive their world, each with different pathways between the stimulus receptors and the brain. Within mammals, both taste and smell are based in chemoreception, a physiological process where chemical stimuli activate a protein receptor and trigger a series of pathways leading to the brain.[60] Unlike touch, sight, or sound, chemoreceptors are specialized, meaning that receptors respond only to certain chemicals.[61] This requires that there be a large variety of chemoreceptors, each responding to a specific chemical or set of chemicals. When tasting or smelling something, the triggered chemoreceptors excite a receptor neuron which begins a series of synapses through the nerves to the brain. The brain then determines the types of chemoreceptors triggered and uses this information to decide how to interpret the stimulus. If you are near an overflowing trash can, the air-born odor molecules will interact with a subset of your olfactory chemoreceptors, and the brain will decode the

[58] Hart 2005: 981. Biological fitness refers to an individual's ability to contribute their own genes to the next generation. This either manifests as reproducing or, in some circumstances, ensuring that a close relative who shares the individual's genes is able to pass down their genes. Allen Orr 2009.
[59] Hart 2005: 977. See Huffman 2001 for the initial study on chimpanzees.
[60] Rye 2015.
[61] There are not different receptors for every chemical. Rather, a receptor can recognize a selection of chemicals. Although it is uncertain how receptors correspond to chemical stimuli, it is assumed that molecules with similar structures interact with the same receptors. del Mármol 2021.

information to determine that the smell is unpleasant. As animals interact with their environments, they begin to develop innate reactions to different stimuli, allowing animals to determine if smells and tastes are harmful or helpful.

Tracing the development of herbivores, omnivores, and carnivores and their interaction with food and their environment corroborates that olfaction and gustation evolved within each species based on its ecological environment and physiological needs.[62] Animals that are predisposed to avoiding a toxic plant and using a beneficial plant are more likely to survive and reproduce. Through this natural selection, chemoreceptors evolved to signal a positive feeling with beneficial plants. Applying this to the chimps, we can see natural selection shapes their interaction with botanicals. The chimps who eat the leaves whole or who peel back the bark of the branch will have a higher biological fitness: they have a greater chance of passing down traits that predispose their offspring to interact with the botanical in the same way. It is theorized that the taste of the V. amygdalina, while it would be bitter to humans, is an indicator to the chimps that the material will be beneficial.[63]

The rest of the animal kingdom mirrors the experience of the chimps. As animals evolve to enjoy the taste of foods beneficial to them, species begin to perceive their environment differently from each other. Carnivores enjoy the stimulus input of animal proteins, while herbivores and omnivores are attracted to foods containing sugars.[64] We see this distinction among the animals familiar to us: a dog would much rather eat a raw steak than an apple, while the opposite is true for a bunny or hamster. There is even evidence that there are differences in chemoreceptors between geographically distinct human populations.[65] Organisms have all

[62] Niimura 2009.
[63] Hart 2015.
[64] Beauchamp 2015.
[65] Hoover 2010.

evolved to find what benefits them as pleasurable and desirable, meaning that chemoreception for plants helpful to the creature will trigger strong reactions. Since animals rely on chemoreception for survival, it has become the basis for any animal's behavioral patterns when engaging with the natural world and botanicals.[66]

It should be noted, however, that we cannot expect a complete parallel between how animals and humans interact with the world. Every species is adapted to perceive their world in different ways; some organisms have senses we do not, such as birds and turtles that sense magnetic fields.[67] Mantis shrimp have twelve color receptors compared to our three. Some mammals have more tastebuds or olfactory receptors. The significance of these interactions with the world comes from the strong evidence that evolution has shaped these pathways unique to each species. Thus, we must define chemoreception specifically in terms of human physiology to apply it to magical thought.

Human chemoreceptors, shaped by evolution, allow us to perceive both high concentrations of non-volatile substances at a short distance (gustation) and low concentrations of volatile chemicals at a distance (olfaction).[68] Botanicals generally offer stimuli for both gustation and olfaction pathways to varying degrees, but some botanicals can be odorless or tasteless. Since chemoreception is critical to survival, the impacts of smell and taste are often more pronounced than the impacts of other senses. We avoid plants with a bad smell, and they can induce feelings of nausea. Humans, especially children, enjoy what we perceive as a sweet taste because it is associated with high nutrient value, drawing us to fruits and other sugar-dense foods.[69] Alternatively, the smell of spoiled foods generally elicits disgust and we often spit out

[66] Niimura 2009.
[67] Clites and Pierce 2017.
[68] Lundstrom, Boesveldt, and Albrecht 2001.
[69] Sarafoleanu, Mella, Georgescu, and Perederco 2009: 196–98.

foods that could be contaminated based on the taste. These universal reactions are not an anomaly but demonstrate clear evidence that our biological sensory pathways evolved in humans as a way to avoid toxic or poisonous substances. Humans that avoided foods that smell or taste "bad" were less likely to suffer food poisoning, and, without medical intervention, were more likely to survive.

While our sense of taste is strong, olfaction is arguably the strongest sense humans possess. Humans have between 350 and 400 unique olfactory receptors, but because smells are formed from a combination of receptors that code for a specific smell, humans can distinguish between over 100,000 different smells.[70] Unlike all other senses, olfactory nerves do not pass through the thalamus of the brain, which is responsible for processing information and regulating consciousness. All senses aside from olfaction enter the thalamus before the limbic system, and the thalamus determines the importance of the sensory input, allowing for greater regulation of stimuli. Instead, smells bypass the thalamus without the same regulation, allowing them a direct route to the limbic system, which stores memory and emotions.[71] We do not often realize it, but odors have a significant impact on our behavior and memory, invoking specific thoughts or physical reactions. With its ability to evoke strong reactions, smell becomes the perfect avenue for forming innate, potentially subconscious relationships with plants.

A statistical analysis of the botanicals in the magical papyri indicates that smell is a prominent component of botanical ingredients, as over 70% of the botanicals have aromatic properties.[72] Since some botanicals are unidentifiable, this estimate is likely higher. With 70% of the botanicals emitting a smell, it becomes clear that aromatic botanicals outnumber

[70] Cande, Prud'homme, and Gompel 2013: 152–58; Angelucci 2014.
[71] Mouly and Sullivan 2021.
[72] Table 1.

pharmacological ones. While the non-botanical ingredients were not cataloged for analysis, they too often appear in the spell as strong sources of odor. More research can be done to determine the percent of aromatic ingredients outside of botanicals, but the current data suggests that there is a high proportion of spells that create strong aromas, suggesting olfaction was a key component of botanical selection in the magical papyri.

Between botanical and non-botanical ingredients, many spells would have been incredibly pungent, and it is not difficult to find smelly spells. In *PGM* II.1-64, a spell for gaining knowledge, the spell requires a variety of fragrant botanicals to be ground together: "In a purified container burn myrrh and cinquefoil and wormwood; grind them to a paste, and use them. Take a sprig of laurel and Ethiopian cumin and nightshade, and grind them together." Combining burnt myrrh and wormwood with cumin to complete the spell would have made an aromatic environment. Similarly, in *PGM* XXXVI. 283-94*,* the magician, in hopes of having sex with a woman, grinds a crow egg, juice from a crowsfoot plant, and the gall of an eel with honey, to create what we can only presume was an unpleasant aroma.[73]

Notably, many of these spells call for manipulation of the botanical ingredients. Beyond ritual practice with an analogical or semiotic meaning, many spells call for botanicals to be crushed, ground, burned, or cooked. According to Theophrastus, an ancient Greek botanist, the botanical manipulations such as those present in the magical papyri would serve to increase odors. In his text *Concerning Odors,* Theophrastus discusses the impact of manipulating plants with bruising and heat:

> καὶ ἔνιά γε προσενεγκαμένοις, ἔνια δὲ καὶ τρίψεως προσδεῖται καὶ διαιρέσεως, τὰ δὲ καὶ πυρώσεως ὥσπερ ἡ σμύρνα καὶ ὁ λιβανωτὸς καὶ πᾶν τὸ θυμιατόν… ὅθεν διαιρούμενα καὶ κοπτόμενα πάντ᾽ εὐωδέστερα, τὰ δ᾽ ἄνθη κακωδέστερα τριβόμενα· τὰ μὲν γὰρ ἐκφαίνει τὸ οἰκεῖον τὰ δὲ προσλαμβάνει τὸ ἀλλότριον. ὁ δὲ λιβανωτὸς καὶ ἡ σμύρνα

[73] A crowsfoot today refers to either a member of the Diphasiastrum genus or Ranunculus genus. While the identity is not certain, it cannot be the Diphasiastrum, as Diphasiastrum is native to North America.

> πυκνοτέραν… προσδέονται πυρώσεως μαλακῆς, ἢ κατὰ μικρὸν ἐκθερμαίνουσα ποιήσει τὴν ἀναθυμίασιν.
>
> "[for] some of these [botanicals] the smell is only perceived when they are eaten, while some need even to be bruised and broken up, and others to be subjected to fire, as myrrh frankincense and anything that is burnt as incense…when [roots] are broken up or bruised, they are in all cases more fragrant, while, if flowers are crushed, they have a comparatively evil smell: for under such treatment roots give forth the property which belongs to them, but flowers acquire a property which is not their own. Again frankincense and myrrh… need a gentle application of fire, which, by gradually warming them, will cause the scent to be exhaled."[74]

In these lines, Theophrastus demonstrates that the smell of an ingredient can be changed or enhanced through manipulation, including burning and bruising. Many spells in the magical papyri call for burning, especially in relation to incense such as frankincense and myrrh - both of which Theophrastus states require heat to release their aroma. While burning myrrh is a logical way to create a strong scent, Theophrastus's arguments on crushing the ingredient are somewhat less intuitive. Theophrastus argues for bruising or crushing ingredients such as roots or resin to increase their smell but warns that these actions will make the smell of flowers evil. He describes crushing the botanicals with the word τρίβω, which is the most common word used to direct a magician to grind ingredients in the *PGM* and used in both spells discussed above, *PGM* II.1-64 and *PGM* XXXVI. 283-94.[75] While grinding the botanicals might seem like a magical ritual in the context of the magical papyri, considering the spells in tandem with Theophrastus suggests that the actions could be rooted in an attempt to increase the aroma of the spell.

Beyond seeking the presence of odor, smells in the magical papyri often appear to be employed in ways that seek either to elicit or prevent a reaction. *PGM* I. 222-31, a spell for invisibility, calls for the magician to combine "fat or an eye of a nightowl and a ball of dung

[74] Theophrastus, *Concerning Odors,* section 12. For both the text and English translations of Theophrastus *Concerning Odors,* see Hort 1916.
[75] Ibid: sections 12-13.

rolled by a beetle, and oil of an unripe olive." The resulting mixture is then spread across the magician's body. It is easy to imagine the strong smell that the eye of a bird, dung, and oil would create when mixed together. A magician could potentially feel dizzy or nauseous after spreading the mixture over his body. While this would not make the magician feel invisible, per se, the physical reaction to the spell could make them believe that the spell was having some effect on their body.

Conversely, *PGM* I. 247-62, *PGM* IV. 2145-2240, and *PGM* III. 1-164 demonstrate another common use of botanical ingredients. In these spells, botanicals appear to be purposefully selected to mask the bad aromas of other ingredients. *PGM* I. 247-62 calls for "an eye of an ape or of a corpse that has died a violent death and a plant of peony (he means the rose)." The magician then mixes these two ingredients with lily oil. Grinding up the eye of an ape or human would create a foul smell but mixing it with roses and lily oil would mask the stench. Similarly, in *PGM* IV. 2145-2240, a spell for divine assistance, the magician is instructed to burn a snakeskin with garlic. Later in the spell, it calls for an offering of blood mixed with myrrh and a bay leaf. While burning a snakeskin and making an offering of blood would be unpleasant to smell, by adding garlic and myrrh to the respective offerings, the magician would limit the bad odor created by the snakeskin and blood. *PGM* III. 1-164, where the magician drowns and buries a cat to change the outcome of a chariot race, the cat is fumigated with storax gum. When working with a deceased animal, fumigation would greatly decrease the foul smell that the magician must endure. Many other spells engage in this type of botanical use, suggesting that there was some conscious decision to use aromatic plants instead of an odorless plant, and it becomes even clearer that smell was a key factor in these spells.

Beyond showcasing the practical uses of botanicals, *PGM* I. 247-62, *PGM* IV. 2145-2240, and *PGM* III. 1-164 also demonstrates the mixing of aromas, a key method of manipulating odor discussed in Theophrastus' text. Theophrastus offers a variety of ways to mix ingredients for obtaining aromas, and his myriad of statements about mixing ingredients become difficult to follow. He differentiates between mixing solids and liquids and provides distinctive rules for mixing perfumes, spices, and wines respectively.[76] Many spells in the PGM offer recipe-like mixtures, calling for a series of ingredients consecutively for the magician to mix together:

> "This is also the composition of the ink: myrrh troglitis, 4 drams; 3 karian figs, 7 pits of Nikolaus dates, 7 dried pinecones, 7 piths of the single-stemmed wormwood, 7 wings of the Hermaic ibis, spring water. When you have burned the ingredients, prepare them and write."[77]

This recipe for ink is a common component of magical papyri spells, although the mixtures vary between spells.[78] Most of the spells with recipes for ink include myrrh, which is both fragrant and pharmacologically active, and they often list it as the first ingredient. Given the nuances that Theophrastus proposes, it would be difficult to delineate all the rules and apply them to the mixtures of the magical papyri. Still, Theophrastus demonstrates that mixing is a central component of controlling smell, and he notes that "the aim and object is not to make the mixture smell of some one particular thing, but to produce a general scent derived from them all" (ζητοῦσι δ' ἐν τούτοις καὶ σπεύδουσιν ὥστε μὴ ἑνὸς ἀλλὰ πάντων κοινήν τινα τὴν ὀσμὴν εἶναι).[79] Given the frequency of aromatic botanicals, and how common it is to mix them with

[76] Theophrastus, *Concerning Odors,* sections 7-8, 10, 17-18.
[77] *PGM* I. 232-47, a spell for memory.
[78] Examples of other ink spells include *PGM* II. 1-64, *PGM* IV. 3172-3208, and *PGM* IV. 3209-54.
[79] Theophrastus, *Concerning Odors,* section 57.

other aromatic materials, these spells again showcase methods that are not simply magical ritual, but means to manipulate odor.

While the magical papyri and Theophrastus verify that spells sought strong aromas, considering the smell of a plant in tandem with pharmacological properties can further expand the purpose of aromatic plant use. Humans can form associations between a particular effect and a particular aroma, but not all chemosensory markers are unique to a single plant species. Plants that are not pharmacologically active but smell similar to beneficial plants may still trigger the same positive association.[80] Understanding the pathways humans use to identify pharmacological botanicals aids in the understanding of nonpharmacological botanicals. Over time, pharmacological properties can be attributed to plants based on their odor, leading to an expansion of botanical biodiversity in magical texts.

There is evidence that the perception of a botanical stemmed from its odor in the writings of Theophrastus. Here, Theophrastus claims that each plant, animal, and material object has a specific smell, but humans cannot always differentiate them: "Every plant animal or inanimate thing that has an odour has one peculiar to itself: but in many cases it is not obvious to us because, one might almost say, our sense of smell is inferior to that of all other animals" (ἔχει δὲ ἕκαστον ὀσμὴν ἰδίαν καὶ ζώων καὶ φυτῶν καὶ τῶν ἀψύχων ὅσα ὀσμώδη. πολλὰ δ᾽ ἡμῖν οὐ φαίνεται διὰ τὸ χειρίστην ἔχειν τὴν αἴσθησιν ταύτην ὡς εἰπεῖν).[81] With this statement he acknowledges that humans are not always equipped to differentiate based on smell alone. His observation, while not stating that this can lead to incorrectly attributing traits to a plant, still demonstrates that there was an awareness of the limitations to our olfactory ability in identifying materials.

[80] For more discussion on this, see Hart 2005.
[81] Theophrastus, *Concerning Odors,* section 4.

Theophrastus further parallels the theory of overlapping chemosensory markers by associating traits with smells. When discussing the odor of plants, he states that the smell is based on the part of the plant (e.g. root, leaf, stem), and that "a good or evil odour follows according to the nature of that part" (καὶ τὸ εὐῶδες καὶ κακῶδες ἀκολουθεῖ κατὰ τὰς οἰκείας φύσεις).[82] This provides ample room for pharmacologically ineffective plants to be incorporated into the broader lexicon of magic botanical usage as placebos based on aroma. While it is difficult to reconstruct how a chemosensory marker could indicate a potential outcome in the *PGM*, Theophrastus offers examples of the phenomena:

> Δοκεῖ δὲ τὸ μεγαλεῖον ἀφλέγμαντον εἶναι παντὸς τραύματος· τὸ δὲ ῥόδινον ἄριστον πρὸς τὰ ὦτα. ταῦτα δ' οὐκ ἀλόγως. τοῦ μὲν γὰρ ἡ σύνθεσις ἐκ ῥητίνης κεκαυμένης, ὥσπερ ἐλέχθη, καὶ κασίας καὶ κιναμώμου καὶ σμύρνης, ἅπαντα δὲ ταῦτα στυπτικὰ καὶ ξηραντικά.
>
> Megaleion is believed to relieve the inflammation caused by any wound, and rose-perfume to be excellent for the ears. And this is probable enough. For the former is composed, as was said, of burnt resin, cassia, cinnamon and myrrh, and all these have astringent and drying properties.[83]

Theophrastus associates the power of the perfume megaleion to decrease inflammation on a wound with its odor. He states that megaleion would be useful for wounds because of the aromatic botanical ingredients: burnt resin, cassia, cinnamon, and myrrh. He then describes these botanicals as astringent (στυπτικὰ) and hot (ξηραντικά). Theophrastus does not specifically say that the astringent and drying properties are from the odor, but elsewhere he associates these descriptors with their smell: "Almost all spices and sweet scents except flowers are dry, hot, astringent and mordant" (τὰ δ' ἀρώματα πάντα σχεδὸν καὶ εὔοσμα πλὴν τῶν ἀνθῶν ξηρὰ καὶ

[82] Theophrastus, *Concerning Odors,* section 1.
[83] Theophrastus, *Concerning Odors,* section 35.

θερμὰ καὶ στυπτικὰ καὶ δηκτικά.)[84] He later attributes these qualities in more detail when discussing the benefits of iris-perfume: "This perfume acts as a laxative on the bowels because of its heating quality and because it astringes the passages leading to the bladder: for, when these are closed, the liquid collects in the bowels" (ἀλλὰ καὶ κοιλίας λυτικὴ διά τε τὴν θερμότητα καὶ διὰ τὸ ἀποστύφειν τοὺς ἐπὶ τὴν κύστιν πόρους· ἀποκλειομένων γὰρ τούτων εἰς τὴν κοιλίαν ἡ συρροή).[85] Theophrastus again describes the physical effects of an aromatic substances, increasing the correlation between materials with odor and the ability to impact the user. While Theophrastus does not state that the power of these materials is due to the smell, he does not offer any aromatic substances in his text *Concerning Odors* that cannot cause a physiological effect. The correlation between odor and power allows us to clearly see the importance of olfaction in human perception of beneficial plants and their decision to incorporate them in a spell.

Reviewing the various botanicals from the *PGM* and *PDM* offers moments where overlapping chemosensory markers could explain botanical use beyond simply attributing their use to olfaction in general. Myrrh is the most commonly found ingredient and has well-established medicinal properties, often being used as an anti-inflammatory and for increasing blood circulation.[86] Depending on the quality of myrrh, it can smell incredibly similar to figs, which are commonly found in the *PGM* and *PDM*. Yet, figs lack the medicinal properties of myrrh. Other grades of myrrh and certain grades of frankincense, which also has established pharmacological effects, can smell woody - even reminiscent of pine.[87] Pinecones or pine wood

[84] Ibid: section 21; In another instance from section 5, Theophrastus attributes astringency and heat to a taste based on odor: "things which have a good odour are generally of unpleasant, astringent or somewhat bitter taste" (ὡς δ' ἐπίπαν τὰ εὔοσμα, καθάπερ καὶ πρότερον ἐλέχθη, δύσχυμα καὶ στρυφνὰ καὶ ὑπόπικρα).
[85] Ibid: section 36.
[86] Cao, et. al., 2019: 3076.
[87] Niebler and Burttner 2015.

are often used throughout the *PGM* and *PDM* even though they lack any physiological effects. Given the aromatic similarities to botanicals with established pharmacological properties, the use of fig and pine could be included based on odor. Although burning fig or pine will not create the same pharmacological effects as myrrh and frankincense, the overlapping smell could elicit similar physiological responses based on the placebo effect and the emotions that the magician associates with the scent.

Turning to specific spells of the magical papyri, there are spells that suggest overlapping chemosensory markers are the root of the ingredient choice. In *PGM* XIII. 343-646, the magician is instructed to burn wood in place of incense to recreate the smell: "When the day is at hand, put aside for the sacrifice cypress wood or balsam wood - so that even without the incenses the sacrifice may give a pleasant odor." In this spell, the author states that the replacement of ingredients is based on odor, acknowledging that overlapping scents are at the root of the botanical selection. Similarly, in *PGM* XII. 201-69, the magician is primarily concerned with odor: "burn, with the birds, all sorts of incense." The incenses in the magical papyri are from tree resin, and while many cause tangible effects, not all are pharmacological. In *PGM* XII. 209-69, the concern is not with choosing a pharmacologically active botanical, but instead choosing an ingredient that would generate a pleasant woody smell.

The association between smell and benefit does not mean, however, that there is a strong correlation between a specific smell and a desired outcome. Rather, the wide applications of a single botanical, the advent of language, and increased social transmission obscure our ability to find a one-to-one correlation between smell and spell purpose.[88] Although a smell could be associated with the physiological impact it has, such as myrrh and frankincense creating feelings

[88] For more discussion on social transmission disrupting chemosensory patterns, see Hart 2005.

of relaxation, the application of such an impact is incredibly broad.[89] Perhaps some interpret the relaxation as a sign that the gods are present or listening to them, and others feel as though they have gained control over a stressful situation. Since there can be multiple interpretations of the same physiological effect, it is unlikely that there exists a specific correlation between smell and outcome.

Beyond the numerous ways of interpreting a single botanical, social transmission, and the advent of language muddy correlations between a smell and outcome. Again, these ideas can be seen in the animal kingdom. There are documented observations of animals seeing another animal eating a botanical or engaging with it will prompt them to do the same.[90] A similar phenomenon happens with humans, only to a greater extent thanks to language. Studies show that when a person is told that an object will have a certain effect, they are more likely to believe that it had the effect, even if the object was completely innocuous, leading to the placebo effect.[91] Scholars such as Benjamin Hart argue that because religious (and magical) practices rely heavily on verbal communications, the use of both medicinally effective and ineffective expectations creates a placebo effect.[92] Incorporating language into the hypothesis development of botanical usage creates more potential for a large variety of plants to be retained within magical rituals.

Within the context of the magical papyri, the authors of the spells create avenues for the placebo effect. Many spells state that the spell has been tested and will work. Some spells even attempt to persuade the magician that the outcome is possible, as in *PGM* I. 247-62, where the

[89] Cao et al 2019.
[90] This can happen at an interspecies level. There is a strong overlap between the botanicals that humans use and apes or chimpanzees use, leading researchers to think that some human botanical interactions were learned from the animal kingdom. Majid 2021.
[91] Finniss 2010.
[92] Hart 2005: 985.

author named the spell "tested spell for invisibility," opens the spell by describing it as "a great work," and then ends by reminding the reader "this works very well." Similarly, *PDM* xiv. 711-15 says that it is "a tested prescription if you wish to 'evil sleep,'" while *PGM* XXXVI. 35-68, a spell to gain someone's favor, tells the reader that "it works even against kings; no charm is greater." In these moments, a magician might begin to associate the plant with the desired outcome. Not only does *PGM* I. 247-62 advertise itself as a tested and proven spell, but it tells the magician that mixing the eye of an ape, roses, and lily oil will allow them to be invisible. While this would not actually happen, the magician might be more inclined to believe that these ingredients will lead to the desired outcome through social transmission.

Considering the scale of social transmission within ancient society, it becomes impossible to track why a certain plant might become incorporated into the magical lexicon. Between verbal communication, sending letters, and reading other spells, there are endless ways for a plant to be labeled pharmacological even if the plant cannot realistically create the desired outcome. This could even allow odorless plants to be seen as beneficial and incorporated into spells. While the placebo effect severely hampers our ability to fully understand the root of many spell ingredients, we are still able to determine that olfaction and pharmacology often played a hand in the selection, even if the properties of the botanical were twisted over time.

Turning from explanations of botanical types instead to discussing the reasons for specific botanical qualities, we can look to another evolutionary model based on human perception of dirt and purity to help explain the grades and qualities of ingredients and even clarify some rituals around preparing the botanicals. Throughout the *PGM* and *PDM*, there are descriptors that call for beautiful or untouched ingredients, hinting at a link between the purity of the ingredient and its use in the spell. Valerie Curtis, in her articles "Dirt, Disgust, and Disease:

Is Hygiene in our Genes?" and "Why Disgust Matters", discusses evolutionary behavior that shapes the status of ingredients sought.[93] Curtis focuses on the "forgotten emotion" that fuels aversion to disease: disgust, which she refers to as a "strong magic" itself.[94] Disgust, which Darwin labeled as one of the six major emotions of man and animal, allows disease prevention to become an "intuitive microbiology."[95] Many animals have an instinct to shun others who show any signs of disease or deformity, contagious or not. Curtis points to bullfrogs, fish, and chimps who will ostracize an individual for displaying deformities or signs of ailments because it catalyzes their disease-avoidant cognition.[96] She relates this to a feeling of disgust that evolved within organisms to stay away from what might be contagious and threatening to the health of others.

Studies have shown that humans have a hierarchical memory, meaning information pertinent to survival is most likely to be remembered.[97] In studies on adaptive memory, participants were better able to recall the names of objects that had been touched by those who were sick, and they were best able to recall words that defined types of infectious disease.[98] In other studies, participants were more likely to remember objects if they were told that the object had been touched by someone with an illness.[99] The memory studies enhance our understanding of purity by demonstrating that humans have an innate concern beyond tangible signs of contamination (smell, taste, sight) and demonstrate concern about the contamination of objects.[100]

---

[93] Curtis 2011; Curtis and Biran 2001.
[94] Curtis and Biran 2001: 22.
[95] Curtis and Biran 2001: 22.
[96] Curtis 2011: 3484.
[97] Nairne 2007.
[98] Henriques da Silva 2019: 2.
[99] Bonin 2019.
[100] Henriques da Silva 2019; Nairne 2007, Bonin 2019.

Concerns of contamination shape our behavior to this day. Throughout history, people who contracted Hansen's disease, commonly known as leprosy, a bacterial infection that causes lesions, discoloration, and unusual growths, were forced into isolation.[101] We still have a misconception that leprosy is highly contagious despite our modern knowledge that leprosy requires intimate and prolonged contact before transmission occurs. Our public understanding of deformity-inducing diseases, in tandem with memory studies, suggests that both memory and innate reactions evolved to elicit disgust towards something that might risk one's survival.

These perceptions of defilement appear in our relationship to botanicals. Globally, 1.3 billion tons of edible food are thrown out each year.[102] While there are many contributing factors to this, there is a growing understanding that the appearance of food plays a big role. Misshapen or irregular fruits and vegetables are often tossed by farmers and stores, and consumers overwhelmingly choose foods that appear pristine. It is often hypothesized that the willingness to overlook ugly foods stems from an evolutionary mechanism to avoid foods that are abnormal and therefore potentially harmful.[103]

Shunning deformities reflects the use of healthy and pristine plants and animals in spells, as an innate response tells them that the deformed or ill is dangerous and could hinder the outcome of the spell. The idea of purity and disgust is clear in the albeit relatively few descriptors of botanicals in the *PGM* and *PDM.* Aside from descriptions indicating the gender of plants, botanical descriptors include "beautiful" (καλός, *PGM* II. 1-64), "most beautiful" (κάλλιστος, *PGM* IV. 475-829), and "flourishing" (ζωοφυτῶν *PGM* IV. 475-829).[104] Even though these sorts of descriptors are relatively rare, it is still important to state that the magical

[101] For an overview of leprosy, see Fischer 2017.
[102] Hartmann 2021: 1.
[103] Block 2016: 296.
[104] The spells listed are examples and non-exhaustive.

papyri never call for a defiled or damaged botanical ingredient. Similar to animals that shun deformities or humans only picking foods with ideal appearances, the descriptors of botanicals are focused on an evolutionary need to avoid something potentially dangerous.

Sometimes the idea of purity is conveyed in actions around the botanicals instead of in their descriptors. In *PGM* V. 172-212 the spell directs the magician to cleanse the laurel plant at the beginning of the spell before using it. Notably, *PGM* IV. 2967-3006 includes a description of how to harvest a plant for magical purposes:

> "The herbalist first purifies his own body, then sprinkles with natron and fumigates the herb with resin from a pine tree after carrying it around the place 3 times. Then, after burning *kyphi* and pouring the libation of milk as he prays, he pulls up the plant while invoking by name the daimon to whom the herb is being dedicated and calling upon him to be more effective for the use for which it is being acquired…. , he rolls the harvested stalk in a pure linen cloth…"

PGM IV. 2967-3006 is full of allusions to purity. The magician is directed to first "cleanse" (καθαίρω) their body. In the same spell, the magician is also described as "washing" (νίζω) the botanicals he picks with resin. The collected botanicals are placed on a "pure" (καθαρός) linen. Throughout this spell, the intense focus on purity could be interpreted as resembling innate behaviors catalyzed by disgust as an evolutionary tactic. Things that are perceived as unclean trigger disgust and the magician must go to lengths to avoid them if he wants his magic to work.

Other times the purity of botanical ingredients is indicated more abstractly. Sometimes, they were described as "fresh; raw; uncooked" (ὠμός, *PGM* IV. 2140-2144, *PGM* IV. 2891-2942) or "untouched" (ἀναπτικός *PGM* IV. 3209-3254). Another descriptor, "uncut" (ἄτμητος *PGM* IV. 2441-2621), could fall into this category but is only seen in tandem with tree resins and likely refers to part of the harvesting practice rather than a term of cleanliness. These reflect an idea of purity in the sense that the ingredients are unaltered. They are in a natural, uncontaminated state. When describing the purity of botanical ingredients, they are not seeking

something made pure by nature but labeling an ingredient pure based on the amount of human contact. Botanicals might be considered pure by more subjective terms, but still reflect evolutionary ideas of disgust through the avoidance of contamination.

The ability to map descriptors and their emphasis on hygiene onto a well-established evolutionary biological theory helps support the overall hypothesis that these ingredients, and their uses, are derived from instinctive behaviors that evolved over time via natural selection. While it would strengthen the hypothesis to show that a deformed ingredient led to a negative outcome, the magical papyri never calls for a misshapen or impure ingredient. Instead, the focus is solely on purity. Just as we pick the pristine, picturesque apple in the grocery store, the magicians called for pure, unblemished ingredients for the spells.

If we accept that botanical ingredients were primarily chosen for the odor, it leads us to ask if there was a conscious acknowledgment of odor itself as a component of magic, requiring us to consider the physical properties of odors. Olfaction is unique from other senses, not just because it more directly triggers memory and emotion, but because it is the only sense that is automatically shared by all those present. Vision requires two people to look at the same object, taste requires two people to ingest the same substance, and feel requires two people to physically touch the same object. Not only is it communal, but it is an *inescapable* sharedness: aromas are automatically sensed by those present, and a person cannot cease smelling something as they could avoid their eyes or cover their ears. Everyone present at the casting of a spell would have no choice but to experience the aromas present.

Odor's ability to create an inescapable shared experience for those present places it as a potential avenue for communication. Derek Collins points out that a significant purpose of magic is communication, and I argue olfaction is a strong means by which this communication can take

place.[105] From the analysis of the botanicals, their descriptors, and the methods used to manipulate them, the magicians appear to consciously create a specific aroma. By crafting the odor of the spell, they are also crafting a shared experience. Other components of a spell do not always lend themselves to communication. Writing is often burned before anyone reads it, and the ritualistic actions often happen where no one sees it. While incantations are clearly a form of communication as well, there is no requirement that anyone must hear them or listen the way they are compelled to keep breathing and smell the air.

Understanding olfaction in magic as a means of communication raises another question: communication with whom? Potential audiences for this communication include other magicians, the targets of the spell, or the divinities that are invoked to do the magician's bidding. It could also be a form of self-communication, trying to trigger specific memories or emotions with a specific scent. It is possible that in certain instances magicians who were performing a spell in a group found reassurance in the spell's efficacy through experiencing the same aroma, but it is often assumed that magic is performed in private.[106] This makes other magicians an unlikely candidate (or at least not the most regular candidate) to be the receiver of the magical communication. Similarly, the target of a spell often would not always know that a magician was casting a spell on them.[107] In other instances, a spell has no human target; the magician is strictly trying to gain knowledge from a god.

With so many spells seeking favor or knowledge of an immortal, the gods are most likely the intended recipients of communication in spells.[108] Most spells in the magical papyri address

---

[105] Collins 2008: 5-7.
[106] Edmonds 2019: 58.
[107] In some instances, it would be clear that a spell was cast. *PDM* xiv. 716-24 requires that the magician feed the aromatic ingredients to the target, making it clear that the aroma was shared between magician and target.
[108] Magical communication with the gods will be considered more thoroughly in chapter 3.

one or more gods, making them an essential audience to the spells. The need to communicate with the gods underscores the need for olfaction as a method of communication. In his work on divine odors, Ashley Clements argues that while the earth belonged to humans and heavens to the gods, air resembles the intersection of the two realms.[109] With its nebulous nature, fragrance is perceived by all who are near the source of the odor and, when burning incense, the Greeks could envision that the gods were sharing a similar experience. As aromas fill the space where the spell is being practiced, this allows magicians to imagine the gods themselves are experiencing the smell and listening to the wish of the magician.

Beyond a means of communication, olfaction can also be an analogy for magic.[110] Some of the aromatic botanicals impact an individual after being inhaled. It would be easy for a magician to recognize that they feel the benefits of myrrh when burning it and smelling it, making it probable that magicians considered aromas themselves to have power. Theophrastus's *Concerning Odors* supports that the ancient Greeks perceived odor to have its own powers as he attributes physical effects to odors. He claims that megaleion both relieves inflammation and induces headaches.[111] In one instance, he suggests agency might lay with odor when he specifics that perfume (μύρα) has medicinal power (φαρμακώδη… δύναμιν).[112] The choice of the word δύναμις suggests that the odors have pharmacological properties themselves. Considering perfume as having pharmacological properties along with the plethora of aromatic ingredients that he correlates with physiological powers supports the idea that magicians might have considered odor to be an avenue for magical power.

[109] Clements 2014: 48.
[110] Ager 2016: 1-2.
[111] Theophrastus, *Concerning Odors,* sections 35 and 42.
[112] Ibid: section 59.

While the ancients likely conceived of smell as powerful, odors cannot be seen or touched, but are inevitably perceived by those present, giving it the traits necessary to be considered a vein for magical power. Not only is it impossible to avoid perceiving odor, but by perceiving an aroma the odor has already been inhaled and entered the lungs. Here, our perception of odor entering the body could differ from those of the ancient Greeks. Theophrastus stated that iris perfume "acts as a laxative on the bowels" since the odor "astringes the passages leading to the bladder."[113] His statement indicates that odor did not stop in the lungs but was able to inflict physiological changes throughout the body, including the passages leading to the bladder. Considering odor as an intangible, invasive, and inescapable power strongly suggests that magicians considered it a method of power.[114]

Having established olfaction as a key component of botanical ingredients and a possible avenue for communication and magical power, it is important to fit my ideas about olfaction within the other theories of magic. While I have already incorporated pharmacological theories into my olfactory approach, I will now turn to bridging the gap between olfaction and the analogical theories presented in chapter one and then offer an examination of a spell from the magical papyri in light of olfaction.

Beyond providing reasoning for descriptors and some ritual practice, the evolutionary aversion to contagions can be mapped onto Frazer's arguments about sympathetic magic. Sympathetic magic was composed of two parts: homeopathic magic, where like produces like, and contagious magic, where once objects are in contact, they can continue to act on each other even after physical contact is severed. Humans have adapted to see physical contact as a manner

[113] Ibid: section 36.
[114] Olfaction cannot be labeled the only pathway of communication or power, as it is ubiquitous throughout all *PGM* and *PDM* spells.

of transmitting illness.[115] Innate behaviors are often paralleled in various parts of life; humans did not avoid an object touched by something contagious due to an understanding of germs. Those who avoided illness survived. Without the explanation of bacteria and viruses as a pathway for illness, it appears almost like magic to fall ill after being around a source of contamination. This thought process could be the basis for contagious magic and assuming that some connection remained after contact has been severed. In some ways, this could be interpreted as misconstruing cause and effect, which forms the basis for Frazer's idea that magic is a false science.

Moving to the analogical semiotic theories of thought, my olfaction theory serves as a complement, not a substitute to the analogy-based anthropological theories as outlined by Frazer, Evans-Prichard, and Tambiah. An analogical theory could provide a potential explanation for certain traits of a botanical ingredient or ritual actions based on the desired outcome. If the spell directs the magician to burn an offering so that their lover will burn with desire, an analogical approach will explain the actions of the spell but might not be able to explain which botanical was chosen to burn. To fill the gap, we can employ a semiotic approach, looking for how the author of the spell could have interpreted the chosen botanical in relation to context of the spell or an invoked god. These explanations are then supplemented by considering possible pharmacological properties of the botanical to create an even more interdisciplinary understanding. Finally, an olfactory approach can be layered onto the explanation, and considering the aroma of the plant can itself be a reason for ingredient selection. Olfaction can also help explain, in tandem with an analogical approach, how and to whom the spell might be communicated, and through what medium the magician hoped the spell to be executed.

---

[115] Henriques da Silva 2019; Bonin 2019.

Applying the Olfactory Theory: A *PGM* Case Study

PGM XII. 14-95 Eros as assistant. / A ritual of Eros: "consecration and preparation (among his operations, he sends dreams or causes sleeplessness; and he releases from an evil spirit, if you use him in a proper and holy manner, for he can perform every operation). Take [wax] of Etruria and mix with it [every] kind of aromatic plant. Then make a statue of a torch-bearing Eros that is eight dactyls high and has a large base to support it. Put a bow and arrow in [his left] hand, and fashion a Psyche of the same sort as Eros.

When you have completed all this, conduct a three-day consecration. You are to present to Eros fresh fruits of every kind and 7 cakes, 7 pinecones, every kind of sweetmeat, 7 lamps not colored red; also, [three] daggers, votive tablets, a bow and arrow, dates, a bowl mixed with honey wine.

After you make the statues and the presentation as indicated, next place your Eros on a table laden with the fruit and holding both the 7 lamps, ablaze with clear olive oil, and all else listed so as to win the favor of wondrous Eros.

On the first day, after you put him on the table and arrange things as prescribed -- and I described its form in full for you, that you may understand and lack no detail -- build a pure altar; that is, take two unbaked bricks and form them into 4 horn-shaped objects, on which you lay fruit-bearing branches. Take also on the first day 7 living creatures and strangle them: one cock, a partridge, a wren, a pigeon, a turtledove, and any two nestlings you can get hold of. Do not make a burnt offering of any of these; instead, you are to take them in hand and choke them, all the while holding them up to your Eros, until each of the creatures is suffocated and their breath enters him. After that, place the strangled creatures on the altar together with aromatic plants of every variety.

On the second day, strangle a male chick before your Eros and burn it as a whole offering.

On the 3rd day, place another chick on the altar; while conducting this portion of the ritual, consume the chick by yourself, allowing no one else to be present. I assure you, if you perform the above actions in a holy and pure manner, you will have complete success.

First formula to be spoken while making the burnt offering: "I call upon you, who are on the couch of beauty, who are in the mansion of desire: serve me and, no matter where I send you, always bear the message I give you, likening yourself to some god (or goddess) such as men and women there worship, announcing all that is written out or imparted to you in speech, quickly…"

PGM XII. 14-95 is a spell to invoke Eros so that he may do the magician's bidding. The purpose of the spell is multivalent, stating that Eros can perform every kind of operation, with the possibilities ranging from the aggressive, such as the sending of dreams and interrupting sleep (*oneiropompeia*), to the curative, such as the releasing from an evil spirit. Since the spell involves the creation of a figurine of Eros, the god of love, it is likely that the spell is a type of erotic binding spell.[116] The spell can be divided into preparation and incantation. I submit that during the preparation, olfaction serves three distinct functions: communication, a pathway for magical forces, and a more pragmatic purpose of covering up less pleasant smells. These three functions are illustrative of the breadth of uses that olfaction can provide in ancient magic.

PGM XII. 14-95 begins by directing a magician to craft a fragrant figurine of Eros using all types of aromatic flowers, which would create a pleasant aroma. Instead of asking for a set of definite flowers, the author places the emphasis on the strength of the scent and not the specific type of floral aroma. The figurine is an excellent example of Frazer's ideas on homeopathic magic, as the Eros figurine is given a bow and arrow and placed next to a similarly fragrant Psyche figurine. Beyond the physical attributes that Frazer discusses in his theory, the strong floral scent could be a method of increasing the resemblance between the figure and the god. A semiotic approach might suggest that the flowers symbolize love, as floral and sweet smells are often affiliated with love and seduction, an association I will delineate further in the next chapter.

Using olfaction as a means of increasing resemblance is not unique to *PGM* XII. 14-95, and other spells in the magical papyri demonstrate a similar methodology. *PGM* III. 283-407 employs the same tactic by crafting a figurine of Apollo out of laurel wood, a common symbol of Apollo. The figurine of Apollo would share a greater connection to the god when it not only

[116] Erotic magic often carries connotations of binding a lover and forcing them to return your feelings. Often these spells are accompanied by a form of binding ritual. For more on erotic binding magic, see Collins 2008.

resembles the god in shape but smells of the plant most associated with him. In these instances, olfaction serves as a means of creating similarities between a figurine and the intended audience of the spell. As the similarities create an avenue for the magic to take place within the theory of homeopathic magic and for the magician to connect with the god, the fragrant figurine functions both as a form of communication and power.

The fragrant figurine could also serve as a means of power outside of homeopathic magic. The spell is asking Eros to complete the desired outcome, and in the process creating an aromatic Eros. If the figurine of Eros is a stand-in for the god who executes the spell, increasing the figurine's fragrance could increase the perceived power of Eros. Because odor is an invisible yet powerful force, adding fragrance to the Eros figurine would add an invisible yet powerful force to the god himself. In many spells, such as *PGM* III. 467-77 or *PGM* XII. 121-43, a figure is drawn using myrrh ink which would carry the smell of myrrh, at least while writing, if not transferring the smell onto the paper as well;[117] the potency of the myrrh smell would depend on the mixture of the ink. In these instances, the figure, which cannot physically interact with the world, can still offer an impact on the magician through its scent, in turn giving the figure a form of power.

Following the creation of the aromatic wax Eros, the magician attempts to "win the favor of wondrous Eros'" by presenting him offerings of fruits, pinecones, dates, and honey wine. All of these botanicals and botanical byproducts carry strong aromas, and, since the spell stipulates "fresh fruits of all kind," it again seems that the strength of the odor takes place over the type. Although the odor would be stronger if the fruits were crushed or bruised as the flowers would

[117] The figures drawn in many spells in the *PGM* are not of gods. Often the figures do not have explanations within the spell, and the magician is instructed to draw the figure and manipulate the papyrus on which the magician drew the figure.

have been when they were mixed with wax to craft the Eros figurine, leaving them on a table for multiple days would increase their fragrance over time.

In addition to the various fruits, the other aromatic ingredients, except the pinecone, are all part of the ancient Greek diet making them easily accessible to the magician. The pinecone, while not part of the diet, would still have been an easily accessible ingredient depending on the magician's location. The pinecone could potentially be a substitute for myrrh or frankincense, as many erotic spells include incense.[118] The magician could have considered the correlation between love spell and incense to mean that a woody scent is necessary for a spell concerning Eros. While the botanical ingredient choice clearly rests on availability in this spell, the magician still chose a set of aromatic botanicals out of all the ingredients he would have had available, suggesting the ingredient choice lies within a combination of fragrance and accessibility.

By considering aroma a key factor in the ingredient choice within *PGM* XII. 14-95, we can expect the aroma of the offerings to contribute to the desired outcome of the spell. The most likely role of these ingredients is communication. The fruits and other botanicals sit next to the figurine, surrounding the wax Eros with their aroma for multiple days. The magician could imagine that Eros, who is connected to the wax figurine in shape and scent, is meant to smell these ingredients throughout the course of the spell. As the perishable ingredients are left out for multiple days, the smell would have increased over the course of the spell. The wax Eros, on the table next to the ingredients, would be exposed to the increasingly aromatic scene.

---

[118] While a statistical analysis of woody scents in love magic has yet to be executed, many magical papyri spells concerning love include a woody scent. Examples include:
PGM IV 1265-1274 which includes frankincense;
PGM IV 1496-1595 which includes myrrh;
PGM IV 1716-1870 which includes storax gum, frankincense, myrrh, and figs;
PGM IV 2441-2621 which includes storax, myrrh, frankincense, myrtle, fig, and juniper;
PGM IV 2891-2942 which includes myrrh and vinewood.

The magician does not address Eros or ask for his favor until three days have passed, other fragrances have been added to the table and a burnt offering is made. Perhaps the magician was waiting for the aroma to reach a point where it was strong enough to secure communication with the god. It is made clear that nothing is to be burned until the incantations are spoken. Other spells in the magical papyri instruct the magician to create an aromatic scene, to cover themselves in an aromatic ingredient, or to burn an offering either before or during their verbal incantation.[119] Considering the pattern in the magical papyri, it appears the magician in *PGM* XII. 14-95 is waiting until the scene is aromatic before attempting to speak to the god.

The use of strong aromas most likely has a more pragmatic function as well, namely, to cover the smells of rotting flesh. On the first day, seven birds are to be strangled and left on the altar. Leaving bloody, dead birds on an altar for multiple days would create an overwhelming smell. The magician is also to place all aromatic plants on the altar with the animals, which would have aided in covering up the odor. Combining fragrances to achieve a more pleasant smell parallels Theophrastus's extensive discussions on mixing odors and, as discussed earlier in the chapter, is seen across the *PGM*. *PGM* IV. 2622-2707, which is also a love spell with the power to send dreams or cause attraction, grinds together a mouse, beetles, a crab, goat fat and dung, and ibis eggs. These ingredients are quickly followed by storax, myrrh, crocus, galingale, frankincense, and an onion. The magicians in these spells are attempting to prevent a foul odor, which would likely elicit reactions of disgust, nausea, or headaches.

As we revisit ideas of disgust and evolution within magic, it is notable that *PGM* XII. 14-95 calls for fresh fruits and clear olive oil and demands that the offering happens on a pure altar. The spell suggests that in order for the spell to work, the fruit cannot be spoiled or rotten, and the

[119] Examples include *PGM* I. 262-347, *PGM* II.64-183, *PGM* III.187-262, *PGM* IV. 1331-89, *PGM* IV. 1872-1927.

olive oil must be high quality and without any impurities that would discolor it. The author of the spell emphasizes how essential purity is to the outcome of the spell by saying "I assure you, if you perform the above actions in a holy and pure manner, you will have complete success." The statement reaffirms the need for purity as an essential component to the outcome of the spell, which in turn contributes to the placebo effect. The phrasing of the statement on purity seeks to convince the magician that the spell will certainly work if done properly, thus insinuating that the botanical ingredients and their aromas will have a tangible effect. The spell's attempt to persuade the magician into believing the spell will work would increase the chances of the magician *believing* the spell working despite the actual outcome. While this does not alter the interpretation of the spell, it supports my previously presented hypothesis that evolutionary feelings of disgust shape the rituals and the ingredient quality for the magical papyri and helps us to understand why botanical ingredients could be perceived as effective.

Bringing together the various functions of olfaction in *PGM* XII. 14-95 helps demonstrate how the theorized uses of odor can work together alongside anthropological and semiotic theories, supporting the overall significance of smell in magical texts. Instead of applying the theory to more spells of the magical papyri, I will now pose an investigation of fragrance within the *Homeric Hymn to Aphrodite* and two poems of Sappho. These poems tap into the association between scent and seduction, but I argue that odor is not just used symbolically, but as a method of seduction and persuasion to assist in the desired outcome Demonstrating the significance of olfaction outside of strictly magical texts will help cement olfaction as a prominent avenue of communication, power, and persuasion.

Chapter 4: Olfaction and Persuasion in Archaic Poetry and Beyond

Fragrance plays a unique role in literature beyond magical texts, often going unnoticed but subtly impacting the narrative. In some instances, the fragrance is more overt, and the author continually references odor to accentuate its importance. Within Archaic Greek poetry, the *Homeric Hymn to Aphrodite* and two fragments of Sappho's poetry stand out with their repetition of words about fragrance and the impact fragrance poses on the poems. The *Homeric Hymn to Aphrodite* is an anonymous Greek hymn from the Archaic period detailing the events that lead to Aphrodite conceiving Aeneas with Anchises.[120] The *Hymn* includes six references to fragrance, five of which are cognates. All mentions of odor are concentrated in the eight lines where Aphrodite prepares to seduce Anchises. Sappho, who wrote in roughly the same era, demonstrates repetition of fragrance best in Sappho 2 (Voigt), an invocation to Aphrodite, and in Sappho 94 (Voigt), a conversation between a lover and her departing beloved.[121] In Sappho 2, fragrance fills the poem, while in Sappho 94, only the fond memories of love include fragrance. Although Sappho's repetition employs more unique words referring to fragrance than the *Hymn,* the continued mentions of aroma in the poems suggest fragrance is a crucial aspect of the text. To best understand the role of fragrance in the texts, I will analyze the repetition of references to fragrance and how it promotes odor as a method of communication and persuasion.

These three texts have different narratives, but their repetition of fragrance functions in a similar way. To help understand the significance of the frequent references to fragrance, Howard Porter offers insight by breaking down the aspects of poetic repetition and creating a system for analyzing recurring words and sounds.[122] By modifying Porter's framework and applying it to

[120] See Richardson 2010: 1-9 and 27-33 for background on the *Homeric Hymn to Aphrodite.*
[121] Budelmann 2018: 7.
[122] Porter 1949.

the poems, the repetition of fragrance in the *Hymn* suggests the aroma is not limited to the nouns being described, but impacts the entirety of Aphrodite's preparation, thus associating Aphrodite's desirability with scent. Within Sappho's poetry, the framework shows that fragrance is tied to love and communication, persuading another to fulfill the narrator's wish. While fragrance has well documented connotations in antiquity, comparing erotic scenes across Greek and Roman literature suggests that fragrance possessed the power to aid in seduction, furthering the significance of fragrance in these lyric poems. Other uses of fragrance in tandem with the divine highlight Aphrodite as a goddess, emphasizing the juxtaposition between her and the mortal Anchises in the *Hymn* and reinforcing the use of fragrance as a method of divine communication in Sappho 2. Through the framework and textual comparisons, aroma becomes a reflection of the poems and their themes of persuasion and eroticism.

Section I: Framework

Fragrance in the *Hymn,* Sappho 2, and Sappho 94 is emphasized by repetition. To fully understand the impact of fragrance in these Greek lyric poems, there needs to be a consistent measure of repetition and its impact. Howard Porter, in his article *"*Repetition in the *Homeric Hymn to Aphrodite*," provides a framework to determine the impact of repetition on the *Hymn* that proves useful. Porter initially attempts to devise a formal classification system to label instances of repetition, labeling fragrance as thematic repetition in the process, but ultimately decides it is most practical and less subjective to examine each occurrence by distinguishing different aspects of repetition.[123] Porter suggests analyzing the ways repetition 1) alters the tone of the poem through repetition of sounds, 2) creates organization by repeating phrases during the opening and closing of scenes, and 3) underlines similarities or differences between words

[123] Porter 1949.

through assonance or consonance. Porter considers repetition to impact organization when phrases are repeated to mark the transition from one scene to another (conclusive) or to indicate the end of a digression and return to a previous narrative (resumptive).[124] He gives examples such as ἔργα ("deeds" or "tasks") in lines 1 and 6 marking lines 1-6 as a discrete section. The breakdown of repetition's impact not only helps to understand how the author might have wanted to characterize sections of their writing, but the strategic breakdown that Porter offers aids in comparing repetition between unrelated texts.

While useful, his structure overlooks certain areas of repetition. Porter does not consider anaphora either in his framework or elsewhere in his article. The oversight is addressed by Ann Bergren in her work "*The Homeric Hymn to Aphrodite*: Tradition and Rhetoric, Praise and Blame."[125] Within the context of fragrance in the *Hymn,* anaphora refers to the repetition of a word at the beginning of a line. While anaphora is not the sole topic of the paper, Bergren recognizes it as a significant form of repetition, although she does not discuss the implications of repetition on fragrance in the *Hymn.* Further, Porter does not address the importance of location and context within each instance of repetition. Still, the placement of words pertaining to fragrance at specific points in the Hymn (as is also the case for Sappho 2 and Sappho 94) and the context of their location can impact the role and thematic importance of odor. While Porter might not indulge in a discussion of these points, the context and location will prove critical for the analysis of repetition within the poems.

To fully analyze the repetition of fragrance in these Greek lyric poems, I propose amending Porter's framework to include anaphora, location, and context. Repetition of fragrance

[124] Porter 1949: 261.
[125] Bergren 1989: 9.

in the *Homeric Hymn to Aphrodite,* Sappho 2, and Sappho 94 will be evaluated according to the following list:

1. Impact of repetition on tonality
2. Impact of repetition on the organization of the poem
3. Impact of location and context on repetition (can be an extension of organization)
4. Impact of repetition through consonance or assonance on surrounding words
5. Impact of anaphora to tie lines together

By understanding these five components of repetition in relation to fragrance, the impact of odor in each poem will be easier to interpret. A standard framework for analysis will enable a better comparison of the significance of fragrance across the poems and allow theories that justify the inclusion of fragrance to easily be applied and evaluated in each poem.

Section II: Poetic Structure in the *Homeric Hymn to Aphrodite*

The *Homeric Hymn to Aphrodite* is the story of Aphrodite and Anchises conceiving Aeneas. In the *Hymn,* Aphrodite has continually made other immortals (aside from Athena, Artemis, and Hestia) look foolish, forcing them to mate with humans. Zeus, angered at Aphrodite's actions, forces her to desire mortal Anchises as a form of revenge. All mentions of fragrance occur close together during Aphrodite's preparation to seduce Anchises in lines 58-66. Filled with lust, Aphrodite immediately goes to her temple in Cyprus to bathe and dress in ornate clothes before seducing her target (words and phrases pertaining to fragrance bolded):

ἐς Κύπρον δ᾽ ἐλθοῦσα **θυώδεα** νηὸν ἔδυνεν,
ἐς Πάφον: ἔνθα δέ οἱ τέμενος βωμός τε **θυώδης**.
ἐνθ᾽ ἥ γ᾽ εἰσελθοῦσα θύρας ἐπέθηκε φαεινάς: 60
ἔνθα δέ μιν Χάριτες λοῦσαν καὶ χρῖσαν ἐλαίῳ
ἀμβρότῳ, οἷα θεοὺς ἐπενήνοθεν αἰὲν ἐόντας,
ἀμβροσίῳ ἑδανῷ, τό ῥά οἱ **τεθυωμένον** ἦεν.
ἐσσαμένη δ᾽ εὖ πάντα περὶ χροῒ εἵματα καλὰ
χρυσῷ κοσμηθεῖσα φιλομμειδὴς Ἀφροδίτη 65

σεύατ᾽ ἐπὶ Τροίης προλιποῦσ᾽ **εὐώδεα** Κύπρον…[126]
(*H. Ap* 58-66)

Going to Cyprus, to Paphos, she went to her **fragrant** temple,
there [is] her sacred precinct and **fragrant** altar.
There she, entering, shuts the shining doors:
there the Graces bathe her and anoint her with ambrosial oil,
the sort that is on the immortal gods,
[**oil] ambrosial** and sweet, **filled with sweet smells.**
Having nicely wrapped pretty robes around all her skin,
Laughter-loving Aphrodite, adorned with gold,
she rushed to Troy, leaving **fragrant** Cyprus.[127]

Over the span of eight lines, there are four uses of θυώδης ("fragrant") and its cognates (bolded in the above text, *H. Ap.* lines 58, 59, 63, and 66), creating repetition of meaning and repetition of sound through consonance and assonance. Within the same set of lines, there is one use of ἀμβρόσιος ("ambrosial" or "divine," bolded in the above text, *H. Ap.* line 62).[128] While ἀμβρόσιος is not a direct mention of fragrance, the adjective quantifies the oil used to anoint Aphrodite as similar to ambrosia, a fragrant substance particular to the gods. A cognate of ambrosia, ἄμβροτος, which means divine or immortal, is used in line 61, creating an anaphora. The anaphora between ἄμβροτος and ἀμβρόσιος follows two other anaphora, utilizing repetition to give the lines a decorated appearance (instances of anaphora are underlined).[129] After Aphrodite leaves Cyprus, fragrance and ambrosia are seemingly forgotten, and no reference to odor appears in the remaining lines.

The repetition of fragrance in the *Hymn* does not necessarily alter the tone of the poem, but it offers some organization in a unique way. Aphrodite's preparation scene is not only marked by her movement to and from Cyprus in lines 58 and 66 respectively. Fragrance further

[126] *Homeric Hymn to Aphrodite* text is reproduced from Richardson 2010.
[127] All translations in this paper are my own.
[128] One other mention of ambrosia occurs in the *Hymn* (ἀμβροσίῃ, *H. Aph.* line 232), but it does not allude specifically to fragrance.
[129] Bergren 1989: 9.

frames the preparation scene as fragrance appears first in line 58 and last in line 66. Fragrance, however, is continually mentioned throughout lines 58 to 66, making fragrance a marker of the beginning, duration, and end of Aphrodite's preparation. The precise alignment of fragrance with Aphrodite's cosmetic efforts to entice Anchises not only delineates the lines as the preparation scene but forces the reader to associate fragrance with increasing one's desirability.

The connection between fragrance and the *Hymn* becomes most clear when considering the context and location. The use of odor and ambrosia is strictly limited to lines 58-66, stretching the entirety of Aphrodite's dressing scene. The scene happens immediately after "terrible desire seized her heart" (ἔκπαγλος δὲ κατὰ φρένας ἵμερος εἷλεν).[130] Zeus instilled a sexual desire in Aphrodite, and the high concentration of references to fragrance begin in the following line. By positioning fragrance directly after Aphrodite is filled with lust, Aphrodite's desire and eroticism are intertwined with fragrance. Before analyzing the more nuanced aspects of repetition, it is clear that fragrance functioned in the *Hymn* as a symbol of eroticism and seduction.

The *Hymn* exemplifies the use of consonance to connect words, and it proves to be the most sophisticated yet subtle aspect to the repetition of fragrance in the *Hymn*. In lines 58-66, there is not only repetition of *words* with fragrant connotations, but the *sounds* in the poem also become inextricably linked with fragrance.[131] The ἐλθοῦσα θυώδεα in line 58 is echoed again two lines later with εἰσελθοῦσα θύρας (*H. Ap.* line 60). Both lines contain "ἐλθοῦσα θυ-," and, in between the two lines, θυώδης appears in line 59, adding to the repeated *θυ* sound. The *θ* sound alone has continued consonance with other words in the lines. Line 60 is the only line in the

[130] H. Ap. line 57.
[131] Porter 1949: 268 is the first to point out the connection between ἐλθοῦσα θυώδεα in line 58 and εἰσελθοῦσα θύρας in line 60 and the high repetition of *θ*.

Hymn to contain four unique words with a *θ*. Given the use of θυώδεα and θυώδης in quick succession at the beginning of the consonantal collection, the *θ* sound becomes intertwined with fragrance as soon as the repetition starts.

By creating lines with extensive repetition stemming from the sounds of θυώδης, the poet assigns fragrance to a more significant role than it first appears. The poet simultaneously emphasizes fragrance outwardly through the repeated use of θυώδης and its cognates and subtly extends fragrance into the surrounding words through assonance and consonance. The association between repeated *θ*'s and fragrance connects aroma with Aphrodite even when the words for fragrance are not directly associated with Aphrodite. In line 58, when she "leaving, enters the fragrant temple" (ἐλθοῦσα θυώδεα νηὸν ἔδυνεν), θυώδεα is not modifying Aphrodite, but her νηὸν, or temple. Still, the repeated *θ* sound connects θυώδεα to ἐλθοῦσα, a participle modifying Aphrodite. Even before the Graces anoint her with ambrosial oil in lines 62-63, a lust filled Aphrodite is heavily linked to fragrance.

While the consonantal links might be subtle, the anaphora in lines 58-63 offers a very explicit instance of repetition: lines 58 and 59 both start with ἐς followed by an accusative location, lines 60 and 61 begin with ἔνθ' and ἔνθα respectively, and lines 62 and 63 start with ἀμβρότῳ and ἀμβροσίῳ respectively. Bergren rightly argues that the anaphora in lines 58-63 is decorative, symbolizing the "cosmetic nature of perfume, as well as … foreshadow[ing] its transformation into verbal seduction."[132] These lines depict Aphrodite preparing to seduce Anchises by bathing and donning ornate clothes. The symmetry and extravagance of three consecutive anaphora could easily resemble Aphrodite's cosmetic activities. Beyond the cosmetic impact, the anaphora of lines 62 and 63 reiterates and alters the significance of the

[132] Bergren 1989: 9.

fragrance, which the poet focused on in the preceding lines. The anaphora is constituted of ἀμβρότῳ, a dative adjective meaning immortal or divine, and its cognate ἀμβροσίῳ. Also a dative adjective, ἀμβροσίῳ similarly can mean divine or immortal, but can also be ambrosial, since it is directly derived from ἀμβροσίη, meaning ambrosia. In both instances, the adjectives describe the oil that the Graces use to anoint Aphrodite, indicating that Aphrodite's oil was made of ambrosia.

Ambrosia is clearly associated with the gods and fragrance: sometimes as the food of the gods (while nectar is the drink of the gods), and sometimes as an ambiguous sweet-smelling oil that creates magical effects.[133] Lilja contends that ambrosia could initially refer to either food, drink, or perfume of the gods and became more refined in meaning over time.[134] No matter the exact meaning, ambrosia is characterized as "a very sweet smell" (ἡδὺ μάλα πνείουσαν)[135]. Some suggest that the drink was pure fragrance,[136] an idea reinforced by a fragment of Democritus suggesting that ambrosia is a vapor by using the word ἀτμίδας ("vapor" or "gas." fr. 25.2 Diels and Kranz). Line 63 in the *Hymn,* and, by extension, *Il*. 14.172, where the line is reproduced, describes the ambrosial oil as τεθυωμένον (filled with sweet smells) confirming that the *Hymn*'s poet considered ambrosia a divine fragrance. Considering the properties of ambrosia, the anaphora accentuates the immortal and aromatic quality of the oil anointed on Aphrodite: she is not just fragrant but fragrant in a way unique to the gods.

While some consonance and repetition could be coincidental, comparing lines 58-66 with Aphrodite and Ares's affair in the *Odyssey* suggests the poet of the *Hymn* was consciously trying to create repetition of sound and extend fragrance beyond the nouns it modified. In the *Odyssey,*

[133] See Lilja 1972: 19-30 for a catalog of ambrosia and its uses.
[134] Ibid:19-20.
[135] Homer *Od*. 4.446.
[136] Querci 1938: 12; Lilja 1972: 20.

Hephaestus catches Aphrodite in bed with Ares, and Aphrodite then flees to Cyprus and completes bathing and dressing rituals similar to the *Hymn.* Lines 59, 61, and 62 of the *Hymn* resemble lines 363-366 of the *Odyssey* book 8 (parallel lines bolded):

ἡ δ᾽ ἄρα Κύπρον ἵκανε φιλομμειδὴς Ἀφροδίτη,
ἐς Πάφον: ἔνθα δέ οἱ τέμενος βωμός τε θυήεις.
ἔνθα δέ μιν Χάριτες λοῦσαν καὶ χρῖσαν ἐλαίῳ
ἀμβρότῳ, οἷα θεοὺς ἐπενήνοθεν αἰὲν ἐόντας,
ἀμφὶ δὲ εἵματα ἕσσαν ἐπήρατα, θαῦμα ἰδέσθαι.
(*Od.* 8.362-366)[137]

ἐς Κύπρον δ᾽ ἐλθοῦσα θυώδεα νηὸν ἔδυνεν,
ἐς Πάφον: ἔνθα δέ οἱ τέμενος βωμός τε θυώδης.
ἐνθ᾽ ἥ γ᾽ εἰσελθοῦσα θύρας ἐπέθηκε φαεινάς:
ἔνθα δέ μιν Χάριτες λοῦσαν καὶ χρῖσαν ἐλαίῳ
ἀμβρότῳ, οἷα θεοὺς ἐπενήνοθεν αἰὲν ἐόντας,
ἀμβροσίῳ ἑδανῷ, τό ῥά οἱ τεθυωμένον ἦεν.
(*H. Aph.* 59-63)

Laughter-loving Aphrodite went to Cyprus, to Paphos, **there [is] her sacred precinct and fragrant altar. There the Graces bathe her and anoint her with ambrosial oil, the sort that is on the immortal gods,** they placed lovely garments around her, marvelous to behold.

Going to Cyprus, to Paphos, she went to her fragrant temple, **there [is] her sacred precinct and fragrant altar.** There she, entering, shuts the shining doors: **there the Graces bathe her and anoint her with ambrosial oil, the sort that is on the immortal gods,** [oil] ambrosial and sweet, filled with sweet smells.

The *Hymn*'s deviations from the *Odyssey* serve to increase the repetition in numerous ways. Porter points out that in the *Odyssey* book 8, line 363 matches line 59 of the *Hymn* aside from one word*:* the *Hymn to Aphrodite* uses θυώδης in line 59, instead of θυήεις in the *Odyssey* 8.363..[138] The use of θυώδης allows for repetition of sound with both τεθυωμένον in line 63 and εὐώδεα later in line 66. The ability to extend the repetitive sounds outlined above in lines 58-60 to two more instances of words for fragrance cement fragrance as the central component of Aphrodite's powers of seduction.

Porter, however, does not discuss the significance of the lines in the *Hymn* that are not present in the *Odyssey.* The *Hymn* remolded line 362 in the *Odyssey* and added two new lines to allow for anaphora, a feature notably lacking in the *Odyssey* excerpt[139]. Additionally, the changes

[137] Greek is reproduced from Loeb Library.
[138] Porter 1949: 268.
[139] I will not enter into the tangled issue of the chronology of the Homeric Hymn to Aphrodite and the Homeric texts. For one interpretation, see Currie 2016

between line 362 in the *Odyssey* and line 58 in the *Hymn* add another reference to fragrance with θυώδεα*,* increasing the repetition of fragrance and putting fragrance towards the beginning of the many *θ*'s, solidifying the *θ* sound's connection to fragrance in the lines. The addition of line 60 in the *Hymn* includes four words with *θ*'s, increasing the fragrance-filled consonantal collection. While we cannot assume that the *Homeric Hymn to Aphrodite* was composed after the *Odyssey* and used it as a direct reference*,* the differences between the *Hymn* lines 58-63 and *Odyssey* 8.362-366 strongly indicate that the author of the *Hymn* intentionally used repetition to create an emphasis on fragrance within Aphrodite's preparation to seduce Anchises.[140]

Section III: Poetic Structure in Sappho 2 and 94 (Voigt)

Unlike the *Homeric Hymn to Aphrodite,* Sappho 2 offers repetition throughout the whole poem using unique words that all refer to the same concept: sweet smells. In the poem, the narrator is invoking Aphrodite, asking her to come near to the temple. The narrator describes a fragrant scene in their attempt to draw Aphrodite near (words and phrases suggesting fragrance are bolded):

δεῦρύ μ' ἐ<κ> Κρήτας πρ[ ]ναῦον (1)
ἄγνον ὄππ[αι]χάριεν μὲν **ἄλσος**
μαλί[αν], βῶμοι †δ ενι **θυμιάμε-**
νοι [λι]βανώτωι·
ἐν δ' ὕδωρ ψῦχρον κελάδει δι' ὔσδων (5)
μαλίνων, **βρόδοισι** δὲ παῖς ὸ χῶρος
ἐσκίαστ', αἰθυσσομένων δὲ φύλλων
κῶμα †καταιριον†·
ἐν δὲ λείμων ἰππόβοτος **τέθαλε**
†**τῳτ...ριννοισ**† **ἄνθεσιν**, αἰ δ' ἄηται (10)
μέλλιχα πνέοισιν <
>
ἔνθα δὴ σὺ ἔλοισα Κύπρι
χρυσίαισιν ἐν κυλίκεσσιν ἄβρως
ὀμμεμείχμενον θαλίαισι **νέκταρ** (15)
†ωνοχοαισον†

[140] See Richardson 2010: 1 and 30 for discussion on the date of the *Homeric Hymn to Aphrodite.*

Sappho 2 (Voigt)[141]

(Come) here, to Cyprus, to your sacred temple,
where the graceful **grove of apple trees** (is),
in there the altar is being filled with **smoke**
from frankincense

In there, cool water resounds over
apple branches, the whole place is shaded
by **roses**, from shaking leaves
sleep fell.

In there, a horse grazed meadow **blooms**
With (lovely) flowers, and the winds
gently blow

In that place you, Aphrodite, taking up the
golden wine cup gracefully,
pour the **nectar** having been mixed
with good cheer.

The narrator is filling Aphrodite's temple with the sweet smells of frankincense (lines 3-4) and places the temple in an apple grove (Sappho 2, line 2-3). The second stanza contains more fragrant words, as roses shade the scene (Sappho 2, line 6) and the meadow is blooming with flowers (Sappho 2, line 9-10). The beginning on line 9 is uncertain but is believed to describe the flowers as lovely flowers.[142] The last stanza then includes a reference to nectar, which like ambrosia, would have been quite fragrant.[143]

The repetition of words suggesting fragrance has a significant impact on the tone of the poem. Sappho's use of apple groves, roses, and blooming meadows create a vivid outdoor setting. The narrator, asking Aphrodite to visit, entices Aphrodite by describing how pleasing the location is. In the *Hymn,* the fragrance did not play a fundamental role in crafting the environment. In Sappho 2, however, the pleasantness of the location appears to rest heavily on the scent. The temple itself is in an apple orchard shaded by roses. In line 6, the narrator

[141] Sappho 2 reproduced from Budelmann 2018.
[142] See Budelmann 2018*:* 125 for information on the reconstruction of Sappho 2, line 10.
[143] See Lilja 1972: 19-30 for the fragrance of nectar.

emphasizes the extent of the roses by stating that they shade the whole place (παῖς ὸ χῶρος). The narrator is not simply mentioning that there are sources of fragrance nearby but characterizing the entire space as under the impact of roses. Similarly, the narrator chose to use the word λείμων (Sappho 2, line 9), meaning meadow, as the subject of τέθαλε (Sappho 2, line 9), meaning to bloom or flourish, and specifies that the meadow blooms with ἄνθεσιν (Sappho 2, line 10). The noun λείμων creates a mental image of a larger grassy field, implying the presence of innumerable flowers. By using words such as παῖς ὸ χῶρος or λείμων, the narrator stretches fragrant objects to make a scene overflowing with fragrance, creating a strong association between aroma and persuading Aphrodite.

While the repetition in the poem is not of the same word or cognates, it still provides organization, as the different fragrances align with the movement of the narrative. In this particular poem, it makes the most sense to examine organization in light of the context and location of each instance of fragrant words. In the beginning, the fragrance is the frankincense that fills Aphrodite's altar. Altars are normally described with aromas that come from incense.[144] The description of the altar comes after what scholars assume is an imperative, telling Aphrodite to come to the location.[145] As the poem moves away from describing the altar, to describing the surrounding environment, the types of odors follow suit. The second and third stanza describe the outside world, utilizing natural sources of fragrance, such as roses and other flowers. The last stanza does not include references to a fragrant temple or the natural world. Instead, it includes nectar, a fragrant drink of the gods. The poem hints that Aphrodite has listened to the narrator's prayer, as the next stanza starts with the words "in this place, you…" (ἔνθα δὴ σὺ).[146] The verb

[144] See Clements 2014: 46-60 for fragrance in relation to immortals, including altars. Also see Lilja 1972: 37-47.
[145] See Budelmann 2018: 123 for information on the reconstruction of Sappho 2, line 1.
[146] Clements 2014: 48.

that follows is an imperative, meaning that the narrator is still asking Aphrodite to perform an action, but the introduction to the stanza suggests she is present, and the narrator is asking for another action, this time pouring nectar. Now that Aphrodite is present, the fragrance of the poem becomes a divine fragrance. The shift in fragrance following the narrative indicates that fragrance is aiding in the organization of the poem, qualifying the stanzas with fragrance that resembles the storyline.

Although there is no significant consonance, assonance, or anaphora, the repetition should not be discounted. Sappho employs more diverse language than the Homeric poems and does not often repeat words or phrases in the same manner. Instead, she emphasizes concepts through unique words that refer to the same idea. Since the repetition in Sappho 2 manifests as repeated meaning with unique words, it is unsurprising that there is no consonance, assonance, or anaphora. Still, fragrance, in various capacities, fills the poem, providing a change in tone and organization, two of the three aspects that Porter defined in his framework. While there is not lovemaking as there is the *Hymn,* the fragrance is still tied to eroticism and seduction. The poem centers around Aphrodite, goddess of love and beauty, and persuades her to come near. As Aphrodite draws near after the narrator lists off the aromatic surroundings, the poem clearly connects fragrance to persuasion while subtly associating it with eroticism.

Sappho uses fragrance in a new way in Sappho 94. Sappho 94 is told from the perspective of a person longing for a former beloved. The beloved states that they have no choice but to leave, and the narrator begs them to remember the good times the two shared. Upon describing the shared memories, the narrative suddenly centers around fragrance:

> χαίροισ᾽ ἔρχεο κἄμεθεν
> μέμναισ᾽, οἶσθα γὰρ ὥς σε πεδήπομεν·
>
> αἰ δὲ μή, ἀλλά σ᾽ ἔγω θέλω

ὄμναισαι [. . . .] . [. . .] . . αι (10)
[ ] καὶ κάλ᾽ ἐπάσχομεν·

πο[λλοις γὰρ στεφάν]οις **ἴων**
καὶ **βρ[όδων κρο]κίων** τ᾽ ὔμοι
κα..[ ] πὰρ ἔμοι περεθήκαο

καὶ πό[λλαις ὐπα] **θύμιδας** (15)
πλέκ[ταις ἀμφ᾽ ἀ]πάλαι δέραι
ἀνθέων ἔ[βαλες] πεποημμέναις

καὶ πολλωι[ ]. **μύρωι**
βρενθείῳι. [ ]ρυ[..]ν
ἐξαλείψαο κᾳ[ὶ **βασ]ιληίωι** (20)

καὶ στρώμν[αν ἐ]πὶ μολθάκαν
ἀπάλαν πα.[ ]...ων
ἐξίης πόθῳ[ν].νίδων

Sappho 94, 7-23 (Voigt)[147]

Farewell, go, and remember me,
for you know how we loved you

if you do not, I wish
to remind you …
of good things we experienced.

You placed many crowns of **violets**
And roses and (crocuses)
together beside me.

You put around my soft neck
Many **garlands of flowers**.

You anoint with **costly and rich**
perfume, having been made…

and on soft, delicate beds
you might satisfy desire

The narrator, in telling their beloved to remember their past moments together, includes numerous references to fragrance. She recalls when the beloved wove garlands of roses and violets and placed them on the narrator. She repeats this moment again in a shorter sentence, stating this time that the beloved placed wreaths of flowers around her (the narrator's) neck.

[147] All further Greek and Latin texts are reproduced from Loeb Classical Libraries.

Following this, the narrator describes fragrant perfume, although it is hard to determine the object of the perfume's application.[148] The perfume is described as royal (βασιλήϊωι, Sappho 94, line 20) and possibly rich (βρενθείῳι, Sappho 94, line 19) although the meaning of the word is uncertain. Following these lines, the poem becomes mostly unintelligible save a few words. These extant lines, however, demonstrate the significance of fragrance in the poem.

The fragrance throughout Sappho 94 makes the poem more vivid, but in a way fundamentally different from the use of fragrance in Sappho 2. As the narrator in Sappho 94 recalls their memories with the beloved, she takes care to describe the flowers and the scent of the perfume, creating a strong mental picture. The mental picture would be even stronger for the beloved who had witnessed these moments; the mention of the fragrances could evoke the feelings and thoughts that they associated with those scents. While the fragrance is used to enrich the story in both Sappho poems, the divergence between the poems demonstrates the wide range of impacts that fragrance can have on tone. In Sappho 2, the aromas alter the tone by making the environment pleasing and inviting, the perfect place for Aphrodite to visit and connects fragrance to beauty and persuasion. In Sappho 94, however, the narrator is using odor to make the characters and their past love more vivid instead of making the setting richer. With the repetition of fragrance, the memories have a stronger undertone, using the aroma to accentuate the intensity of their love.

Sappho 94 strategically places fragrance to aid in organization of the poem. As with Sappho 2, it makes the most sense to consider the location and context of the repetition with the organizational impact that fragrance has. All mentions of scent, from the extant parts of the poem, are relegated to the narrator telling of her memories. There is a sudden shift once the

[148] Campbell translates it as "anoint yourself;" Campbell 1982: 117.

narrator begins talking of the past, as the story suddenly becomes full of sweet smells. The fragrance makes the memories contrast starkly with the introduction where fragrance is absent. The fragrance helps organize with the contrast creating a clear mark between the conversation and the narrator's memory. Only the moments of love are fragrant, strengthening the connection between eroticism and scent in the poem.

As with Sappho 2, Sappho 94 does not include repetition in the form of consonance, assonance, or anaphora, as Sappho's rich language avoids repetition of sounds. Instead, the impact of repetition is felt through repeated meaning, altering the tone, and giving the poem organization. The location of the repetition indicates that it is performing a similar function as fragrance in Sappho 2: communication and persuasion. As in Sappho 2, the description of fragrance in Sappho 94 comes right after the use of an imperative in lines 7 and 8: ἔρχεο κἄμεθεν/ μέμναισ' ("go, and remember me"). The imperatives followed by fragrance accentuate the role of odor as a means of persuasion. These two poems are both attempting to convince another person through descriptions of sweet aromas. Sappho 94 additionally characterizes the memory of love, strengthening the relationship between scent and eroticism hinted at in Sappho 2. The connection between fragrance, communication, and persuasion is reinforced by the use of fragrance in the *Hymn,* suggesting a larger trend of fragrance as more than a prop in classical literature.

Section IV: Role of Fragrance in the *Hymn*, Sappho, and Beyond

The established relationship between sex and scent in antiquity corroborates the use of fragrance as a method of highlighting Aphrodite's desirability and persuading others. While not exclusive to sex and seduction, erotic connotations of scent are easy to find in both Greek and Roman literature. In a preparatory scene that resembles lines 58-66 of the *Homeric Hymn to*

Aphrodite, Hera is anointed with fragrant ambrosial oil before seducing Zeus in the *Iliad*.[149] Calypso, who attempted to seduce Odysseus, has a sweet-smelling home and gives Odysseus' fragrant clothes in the *Odyssey*.[150] Moving past Homeric literature, the erotic nature of scent becomes more common. Apollonius Rhodes wrote of nymphs sent by Hera, spreading sweet-smelling linens over Jason and Media's marital bed.[151]

Not only is fragrance present in many erotic scenes, but occasionally, love is explicitly said to follow fragrance. In Plato's *Symposium* Agathon states that Eros, or love, goes to whatever place smells sweet: "but wherever a place is blooming and sweet-smelling, there [Eros] goes and remains" (οὗ δ' ἂν εὐανθής τε καὶ εὐώδης τόπος ᾖ, ἐνταῦθα δὲ καὶ ἵζει καὶ μένει).[152] While these examples are a subset of the erotic scenes that include sweet aromas, they serve as confirmation that the two were linked. Verifying an acceptance of the ties between scent and sex amplifies the impact of fragrance in the *Hymn* and the Sappho poems. The respective poets, tapping into an already established association between fragrance and sex, intentionally evoked fragrant settings to increase the sense of eroticism and lust in the lines.

While the erotic nature of sweet smells is well established in modern scholarship, many of these examples indicate something more. Scent is present not just in erotic contexts but is often mentioned either before or during seduction scenes, similar to a magician creating a fragrant scene before the verbal incantation, and even acts as a medium for seduction.[153] Zeus, in Moschus' poem *Europa,* deceives Europa with his divine scent: "love arose in all the maidens to go near and touch the lovely bull whose divine smell from afar surpassed the sweet smell of the

[149] Homer, *Il.* 14.162-186.
[150] Homer *Od.* 5.59-66 and 5.264-265.
[151] Apollonius Rhodes *Argonautica* 4.1152-55.
[152] Plato *Symp.* section 196b.
[153]See Lilja 1972: 90-92 and Butler 2010 for fragrance as a means of seduction.

meadow" (πάσῃσι δ' ἔρως γένετ' ἐγγὺς ἱκέσθαι/ ψαῦσαί θ' ἱμερτοῖο βοὸς τοῦ τ' ἄμβροτος ὀδμή/ τηλόθι καὶ λειμῶνος ἐκαίνυτο λαρὸν ἀυτμήν).[154] Aelian's *Varia Historia* describes Aphrodite bestowing scented oil on Phaon, making him so irresistible that many women had affairs with him, and he was ultimately executed.[155] Lucretius, in his *De Rerum Natura,* details a lovesick man placing flowers on the doorstep of his beloved and anointing the doorposts with marjoram oil in an attempt to catch the beloved's attention.[156] Lucretius' statement resembles Sappho 94, where the lover brings up fragrance while trying to win back her beloved. In Lucretius, however, once the beloved smelled the true scent of the lover, they fled. Although we do not know what the lover smelled of, it indicates that odor has the power to both attract and repulse, increasing the power tied to fragrance.

Although the aphrodisiac nature of sweet smells is not as explicit as Phaon's scented oil or anointing doorposts, the use of fragrance within the *Homeric Hymn to Aphrodite* goes beyond a simple erotic connotation and implies Aphrodite's fragrance to have lust-inducing powers. The poet relegates all repetition related to fragrance to the preparatory scene: Aphrodite dons the fragrance before she begins to persuade Anchises to have sex with her. Although fragrance is not mentioned again in the poem, it is assumed present, paralleling many magical papyri spells here the practitioner creates an aromatic scene that we presume is present for the rest of the spell. Anchises notes Aphrodite's clothes and jewelry when he first sees her (*H. Ap.* lines 86-90), and the details of her adornment are repeated when he takes off her garments (*H. Ap.* lines 162-164). However, there is no mention of fragrance leaving her. Aphrodite could not remove fragrance as she can her clothes, and, considering ambrosia is a potent divine aroma, the fragrance would

[154] Moschus *Europa* 2.90-91.
[155] Aelian *Varia Historia,* book 12, chapter 18.
[156] Lucretius *De Rerum Natura* 4.1177-79.

likely not dissipate by the next scene. Of all Aphrodite's preparations, fragrance is the only part that conceivably remains during her intercourse with Anchises, even if it is not explicitly stated in the poem.

Sappho 2, however, is not as overt a reference to seduction, yet it is clearly using olfaction as a means of persuasion. Cora Sowa, in her book on oral poetic traditions in the *Homeric Hymns,* makes a distinction between seduction and simple sex, as seduction involves deceit or persuasion.[157] Sappho 2 combines eroticism and persuasion, using a pleasing location to persuade Aphrodite. While the narrator is not seducing Aphrodite, they are attempting to persuade her, a key component of Sowa's definition of seduction. By strengthening the connection between seduction and aroma, the plea to Aphrodite in Sappho 2 becomes stronger as well, even if not a direct example of seduction.

Conversely, Sappho 94 suggests a clear use of fragrance as a means of seduction. The narrator is pleading with the beloved by using fragrant memories. Interestingly, the use of fragrance in the memory is opposite of that in the *Hymn.* In the *Hymn,* Aphrodite is making herself fragrant to seduce Anchises. In Sappho 94, the beloved makes the narrator fragrant. The narrator then uses the memory of the beloved giving her fragrant garlands as a plea to the beloved. Perhaps the narrator's inability to move on from the beloved has to do with the beloved using fragrance to seduce the narrator in the memory. Now, the narrator is trying to use the same power to convince the beloved to remember the benefits of their relationship, but does not actually employ fragrance, only the concept of it. The lack of real fragrance in the scene could be a reason why the beloved appears so resolute in the poem. The ending of the poem, however, is not preserved and it is unknown if the beloved ultimately changed her mind.

---

[157] Sowa 1984: 70; Ibid, 71-92 for broad discussion on seduction in Homeric literature.

By viewing fragrance as a method of communication and seduction, fragrance becomes a reflection of the overarching themes in the poems. Within the *Hymn,* fragrance as justification for accepting a lover's advances and the positioning of fragrance after Aphrodite is filled with lust indicates that fragrance has the power of seduction and deceit. Among other things, the *Hymn* centers on lust, seduction, and deceit. The poem continually emphasizes Aphrodite's ability to persuade and trick others into lovemaking. Zeus takes such great issue with her deceitful ways that he forces her to succumb to lust for a mortal. Considering scent as a means of inducing lust makes the repetition surrounding fragrance a symbol of the overarching themes in the *Hymn.* The fragrance not only represents Aphrodite's beauty and desirability but her tendency to deceive others and force them to feel sexual desire. Similarly, fragrance in Sappho 2 and Sappho 94 relate back to the main themes of the respective poems. Sappho 2 is an attempt to persuade Aphrodite, goddess of love. Considering fragrance's ties to eroticism, creating a temple filled with incense in an aromatic location to entice Aphrodite, demonstrates Aphrodite's fondness for sweet smells. Fragrance furthers the idea of persuasion, as it is clearly used as a method to coax Aphrodite to the temple. Conversely, Sappho 94 focuses on unrequited love. Fragrance in Sappho 94 is relegated to the portion of the poem where the love is thriving in the memory told by the narrator while begging the beloved to stay. Engaging with fragrance, which has erotic and seductive connotations, emphasizes the intensity of the love and the desire of the narrator for the beloved to stay.

Beyond themes of persuasion and deceit, fragrance in the *Hymn* and Sappho 2 use a divine scent, allowing fragrance to resemble more than seduction. Throughout antiquity, many instances of seductive fragrance are qualified ἄμβροτος and ἀμβρόσιος, divine and ambrosial. Since ambrosia and nectar are specific to the gods, they appear to have divine powers. The

ambrosia Eidothea put under their noses had a strong enough fragrance to save Menelaus and his men from the stench of dead seals, and Thetis drips ambrosia and nectar onto Patroclus' body to stop it from decaying.[158] Given that both Eidothea and Thetis place the divine substances under the nose, it is strongly implied that the power of ambrosia and nectar comes from the scent. In erotic contexts, fragrances that are described as divine appear potent, overwhelming, and irresistible. When Zeus deceives Europa, it is with "divine odor" (ἄμβροτος ὀδμὴ).[159] While used by the gods, ambrosia appears to affect gods just as it does mortals. In the *Iliad*, when Hera, out of spite, decides to seduce Zeus, she covers herself in ambrosial fragrance, and Zeus is immediately filled with lust when he nears her. Qualifying scent as ambrosial seemingly makes the seduction foolproof. Moments where seduction failed, as when Odysseus did not stay with Calypso and return her passions, do not qualify their fragrance as ambrosial. Clearly, the strength of fragrance's power is variable depending on the source.

Understanding ambrosia as possessing its own unfailing divine power highlights the significance of anaphora with ἄμβροτος and ἀμβρόσιος in line 62 and 63 in the *Homeric Hymn to Aphrodite.* The repetition underscores that Aphrodite's aroma will make her irresistible. The divine quality of the powerful aroma foreshadows Aphrodite's successful seduction of Anchises and simultaneously reminds the reader of a prominent theme in the poem: an inability to control lust. The ambrosial anaphora also adds irony to the situation. Aphrodite is applying a divine fragrance to herself so that Anchises has no choice but to fall for her when she herself is unable to resist the desires that Zeus placed upon her. Thus, repetition of fragrance, through θυώδης, qualified by ἀμβρόσιος, furthers fragrance's relationship to themes of deceit and coercion in the *Hymn.*

---

[158] Homer *Od.* 4.465-466 and Homer *Il.* 19.38-39.
[159] Moschus *Europa* 2.91.

The descriptors relating to ambrosia additionally accentuates the connection between the gods and mortals and the ability of olfaction to be a method of communication. Ambrosia, while always originating in the divine realm, is not limited to only gods. Gods continually use its fragrant power to interfere with mortals. In the *Homeric Hymn to Demeter,* Demeter anoints mortal Demophon to make him "equal to a god" (δαίμονι ἶσος).[160] In Theocritus' 15th *Idyll,* Aphrodite uses ambrosia to change a mortal, Bernice, to immortal.[161] Ambrosia is still particular to the immortals; Tantalus was punished for attempting to distribute it to other mortals.[162] Mortals can feel the effects of ambrosia but cannot employ it themselves. By qualifying fragrance—which can already symbolize a human connection to the gods—as ambrosial, the poet of the *Hymn* further accentuates the theme of mingling with the divine.

Comparing fragrance in the *Homeric Hymn to Aphrodite* with other Homeric scenes reinforces that scent as a method of power and seduction is a plausible trope for the genre and lyric poetry of the time. The most substantial parallels to the *Hymn* occur with Hera's seduction of Zeus in the *Iliad* and Aphrodite's affair with Ares in the *Odyssey*.[163] Hera's preparations in the *Iliad* mirror and reinforce the role of fragrance in the *Hymn* as a means of seduction. Line 60 in the *Hymn* appears unadulterated in *Il.* 14.169, and both Aphrodite and Hera are anointed with ambrosial oil before seducing their target. In Hera's preparation scene, there is not an anaphora with ἄμβροτος and ἀμβρόσιος as in the *Hymn,* but greater repetition of ambrosia throughout her preparation scene. After bathing and being anointed with ambrosial oil, Hera's robe and hair are described as ambrosial. The fragrance of Hera's ambrosial scent is magnified when Homer states "with the oil moving among the bronze house of Zeus,/ the scent would reach land and heaven

[160] *H. Dem*. 235.
[161] Theocritus *Idyll* 15.106-108.
[162] Pindar *Olympian Ode* 1.1.60-64.
[163] For more information about Hera's seduction of Zeus, see Janko 1985:168-179.

alike" (τοῦ καὶ κινυμένοιο Διὸς κατὰ χαλκοβατὲς δῶ/ ἔμπης ἐς γαῖάν τε καὶ οὐρανὸν ἵκετ᾽ ἀϋτμή).[164] Similar to the *Hymn to Aphrodite*, fragrance is not mentioned again after the preparation scene. Yet, the heavy emphasis on fragrance in the preparation scene lingers in the reader's mind. As with Aphrodite, it would be the only part of her cosmetic activities that remained during intercourse.

Scent does not always take on such agency in Homeric seduction scenes. In the story of Aphrodite and Ares's affair, Aphrodite leaves for Cyprus to her fragrant temple where the Graces anoint her and dress her in her beautiful clothes after they have intercourse.[165] As outlined earlier, the language of these lines heavily resembles the *Homeric Hymn to Aphrodite.* This scene, however, appears after both Ares and Aphrodite have left, Hephaestus having caught them in bed and ridiculed them in front of the other gods. Although scent was not used here as a means for seduction, that does not lessen the ability of fragrance as a means of seduction in the *Homeric Hymn to Aphrodite.* Aphrodite was not attempting to persuade or trick Ares, and there was no need for scent to be present before their intercourse.

Other seduction scenes in Homeric literature do not display any focus on fragrance at all. Sowa labels the reunion between Penelope and Odysseus and the affair between Helen and Paris as notable Homeric seduction scenes..[166] In the reunion between Penelope and Odysseus, Odysseus undergoes a preparatory scene where he bathes and is anointed with oil, but the oil's fragrance is not mentioned. In this scene, the male prepares himself, not the woman, suggesting that the preparation is specific to the one attempting to persuade. Fragrance is absent, but fragrance is not needed. Once Penelope recognizes her husband, she requires no additional

[164] Homer *Il.* 14.172-174.
[165] Homer *Od.* 8.363-366.
[166] Sowa 1984: 68.

persuasion to have sex with him. She only needed to be persuaded that the man she was conversing with was indeed her husband. Similarly, Paris does not need fragrance to seduce Helen; Aphrodite had already threatened Helen, and she relented to his advances quickly. Fragrance only is necessary to the scene if there is a need to seduce, persuade, or overwhelm.

Section V: Literary References to Fragrance in Light of the Magical Papyri

Through these Homeric scenes, the connection between eroticism and fragrance becomes more nuanced. Fragrance is tied specifically to persuasion within the realm of love, making the aspect of fragrance as a method of communication becomes more significant when evaluating the overall meaning of odors. As we consider fragrance in magical and non-magical texts, it becomes evident that odor functioned in similar ways, offering a method of communication and power. In all three poems discussed, fragrance was tied to love in some manner, but was mostly used to communicate and coax the object of desire into the narrator's wishes, successful or not, within contexts related to love.

The same properties that give olfaction its power and communicative roles in magical texts apply to these literary examples of fragrance as well. The ability to induce memories makes it a perfect fit for Sappho 94, where the narrator begs the beloved to remember their fragrant love. In *the Homeric Hymn to Aphrodite,* inclusion of fragrance before Aphrodite seduces Anchises suggests that his ability to smell the ambrosia could contribute to Aphrodite's power over him. The *Hymn* also highlights the communicative properties of olfaction, as the sharedness of odor is highlighted by the recurrent mingling of gods and mortals. The *Hymn* describes Zeus's anger toward Aphrodite who forced gods and goddesses to sleep with mortals. The poet uses the word συνέμιξε, meaning to mix together, when describing gods having intercourse with mortals (line 39, 50, and 250). Aphrodite herself "mixes" with a mortal, making the mingling of mortal and immortal a central theme of the poem. Fragrance, specifically ambrosia, reiterates the

mingling of the realms. As the aroma fills the air, the space between the heavens and earth, the fragrance connects the immortals with the mortals.

Sappho 2 uses fragrance in a manner similar to many spells found in the magical papyri, where fragrance's role of power and communication begin to blend together. The narrator is using fragrance from earth to summon Aphrodite, presumably from the heavens. The smoke from the frankincense would drift upwards and could be perceived as coming into contact with the heavens. As Aphrodite is assumed to visit the narrator, fragrance highlights communication between gods and mortals and the mingling of their domains while simultaneously suggesting that the fragrance had the power to persuade Aphrodite to visit. The use of fragrance in a combination of communicating and persuading is evident in numerous magical papyri spells, where the magician makes a fragrant environment to presumably communicate with the gods and convince them to execute the spell's desired outcome.

While repetition is frequent in Greek lyric poetry, the repetition surrounding fragrance in the *Homeric Hymn to Aphrodite,* Sappho 2, and Sappho 94 are unique. By analyzing the occurrences of fragrance with a modified version of Porter's framework and the context surrounding the scene, it is apparent that fragrance is more than a factor in the setting. Repetition allows fragrance to fill Aphrodite's preparation scene, the entirety of Sappho 2, and the memory in Sappho 94. As repetition makes sweet aromas critical to Aphrodite's preparation, fragrance is implied to hold its own power of persuasion. Fragrant persuasion is solidified as it is employed to persuade Aphrodite in Sappho 2 and the narrator of Sappho 94 attempts to persuade a beloved to remember a past relationship. The trend is corroborated by other uses of scent in conjunction with sex, in both seduction scenes specific to Homeric texts and wider Greek and Roman texts. By demonstrating the significance of olfaction outside of magical texts, we can clearly see that

odor has strong connotations of power and communication in ancient life. Understanding olfaction's ubiquitous role in communication and persuasion makes the olfactory theories for botanicals in the magical papyri stronger and suggests that odor plays a role in literature and magic far more important than previously thought.

Chapter 5: Conclusion

Throughout the Greek Magical Papyri and the Demotic Magical Papyri there are over 600 mentions of botanicals or botanical byproducts without a cohesive explanation for their use. Theories offered by Frazer, Evans-Pritchard, and Tambiah provide explanations for significant portions of the spells through theories of homeopathic magic and persuasive analogy. Still, Anthropological theories, often focusing on rituals and incorporating semiotic approaches that explain ingredient symbolism, leave a gap in our understanding of botanical ingredients included in the spells. These concepts might help explain the reason a magician chose a particular ingredient, but a problem arises when there are multiple plants that could fit the symbolic needs of a spell. Out of the innumerable plant species at their disposal, ancient magicians only used about 155 species of plants in the entirety of the *PGM* and *PDM*.

Certain spells can be more fully explained by supplementing an anthropological theory with ideas presented by Professors Sumler and Scarbrough. These scholars focus on the pharmacological effects of botanical ingredients. Some ingredients appear to rely completely on pharmacology, as when mandrake root is employed in spells for deep sleep.[167] Yet, only 30.9% of the spells utilize pharmacologically active botanicals in a way that could feasibly include a physiological effect, creating a need for more explanation. The other 70% of the time, the ingredients either failed to have a pharmacological impact, or would not have been inhaled, ingested, or otherwise used to achieve a psychoactive effect.

[167] Chidiac et al. 2012; *PDM* xiv 716-724.

While pharmacology cannot explain all the botanical ingredients, understanding the root of human interaction with medicinal and otherwise beneficial plants can aid in our understanding. Evolutionary studies of our perception of the world indicate that we rely on chemoreception, specifically olfaction, to guide our interactions with plants. Approximately 70% of the botanicals used were aromatic. Considering this percentage does not include the aroma of non-botanical ingredients, which would have increased the overall aroma of spells, it is clear that magic was a pungent endeavor. By examining chemosensory markers, the prevalence of aromatic botanicals, and the proportion of botanicals with physiological effects, evolutionary biology offers an explanation that bridges the two theories and better explains botanical use.

Incorporating evolutionary biology, especially the impact of olfaction, bridges the gap between anthropological, semiotic, and pharmacological theories, creating a cohesive explanation. The botanicals selected for a symbolic use in a persuasive analogy could have been selected, even if unconsciously, through their smell. Olfaction, our oldest and arguably strongest sense, invokes memories, emotions, and alters behavior. Instead of selecting a botanical purely on its ability to symbolize the desired outcome, a magician's selection of botanicals likely would have taken into account varying parts: conscious reasoning made based on symbolism, availability of ingredients, cultural beliefs about particular botanicals, the placebo effect, and a subconscious and innate reactions to chemosensory markers.

While it is evident that olfaction leads humans to make assumptions about botanical ingredients, there are numerous components that obscure our ability to label a smell to a specific outcome. Aside from overlapping chemosensory markers that can introduce botanicals with no tangible effects into magical texts, the wide application of a medicinal plant makes it difficult to trace why certain smells might have been associated with specific outcomes. Finally, the advent

of language and social transmission allows for greater retention of placebos, as the spells often attempt to persuade the magician that the spell and its ingredients will lead to the desired outcome. Magicians who expect the outcome will happen are more likely to believe that the outcome took place, allowing innocuous plants to be considered magical.

Beyond incorporating evolution into our understanding of botanical selection, we can begin to understand olfaction in terms of magical thought. Olfaction, as it alters the atmosphere of the room and creates a shared experience by all present, is a form of communication, no matter if the communication is with a god, a client, or oneself. It also qualifies as an invisible, intangible force that resembles magical power. Explanations of odor as a source of power are supported by the writings of ancient Greek botanist Theophrastus, who continually associates odor with the power to create tangible effects. Theophrastus further demonstrates that many methods of manipulating botanical ingredients were understood to increase the aroma of the ingredient, suggesting that magicians were actively seeking to alter or increase the scent of their spell.

Other forms of literature that describe fragrance often position it as a source of power or avenue for communication, as seen in the *Homeric Hymn to Aphrodite,* Sappho 2 and 94, and various other Greek and Roman sources. Comparing the role of olfaction within and outside of the context of magic garners more support for an evolutionary basis for aromatic ingredients in spells. If the inclusion of smelly plants was not based in evolution and instead unique to magic, we would not expect to see the use of olfaction take such a significant role outside of the magical papyri.

Still, the information presented in this thesis is not exhaustive on the topic of olfaction in the *PGM* and *PDM.* Further philological and cultural study of each plant would reaffirm the

exact species or variety of botanical used, lending a stronger understanding of the presence or absence of pharmacological properties. It is important that when myrrh or mandrake are used in these spells, they are consistently referring to the same species. Analysis of ancient botanical catalogs such as the descriptive botanical catalogs of Theophrastus and Dioscorides, would help determine the potential understanding and classification of botanicals in the ancient world, which could shed more light on the uncertainty in the identity of some botanical ingredients. In addition, understanding ancient conceptions of pharmacology and ascertaining the intended usage of each botanical will help provide a structure for determining whether a particular botanical, in a given case, was being used symbolically, pharmacologically, due to overlapping chemosensory markers, or a combination of these approaches.

Appendix A

This appendix contains a list of the most frequent botanical mentions in the *PGM* and *PDM.* This table does not combine botanicals from the same plant as the statistical analysis did (e.g., olive tree and olive oil are listed separately here). Botanicals are only listed if they are mentioned three or more times throughout the *PGM* and *PDM.*

myrrh	83
wine	49
frankincense	36
oil	31
olive tree	22
wormwood	21
laurel	20
olive oil	14
rose	14
incense	12
reeds	12
date palm	11
palm tree	11
lotus	10
pinecones	9
flax	8
vetch	8
cinnamon	7
garlic	7
juniper	7
pepper	7
vinewood	7
cumin	6
flowers	6
ivy	6

storax	6
fig	5
fruit	5
lily	5
mulberry	5
onion	5
saffron	5
styrax	5
wheat	5
apples	4
barley	4
cassia	4
cypress	4
grape	4
marjoram	4
myrtle	4
rue	4
sesame	4

Works Cited

Ager, Britta. "Magic Perfumes and Deadly Herbs: The Scent of Witches' Magic in Classical Literature." Preternature 8, no. 1 (2019): 1-34.

Al-Harrasi, Ahmed, Abdul Latif Khan, Sajjad Asaf, and Ahmed Al-Rawahi. *Biology of Genus Boswellia*. Cham: Springer International Publishing, 2019.

Atkin, Albert, "Peirce's Theory of Signs", The Stanford Encyclopedia of Philosophy (Summer 2013 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2013/entries/peirce-semiotics/>.

Bergren, Ann L. T. "The Homeric Hymn to Aphrodite: Tradition and Rhetoric, Praise and Blame." Classical Antiquity 8, no. 1 (1989): 1-41.

Betz, Hans Dieter. *The Greek Magical Papyri in Translation: Including the Demotic Spells*. Chicago, Ill.: University of Chicago Press, 1986.

Block, Lauren G., Punam A. Keller, Beth Vallen, Sara Williamson, Mia M. Birau, Amir Grinstein, Kelly L. Haws, et al. "The Squander Sequence: Understanding Food Waste at Each Stage of the Consumer Decision-Making Process." Journal of Public Policy & Marketing 35, no. 2 (2016): 292–304. https://doi.org/10.1509/jppm.15.132.

Bonin, Patrick, Gaëtan Thiebaut, Arnaud Witt, and Alain Méot. "Contamination Is 'Good' for Your Memory! Further Evidence for the Adaptive View of Memory." Evolutionary Psychological Science 5, no. 3 (2019): 300–316. https://doi.org/10.1007/s40806-019-00188-y.

Budelmann, Felix. *Greek Lyric Selection. Cambridge Greek and Latin Classics*. Cambridge: Cambridge University Press, 2018.

Butler, Shane. "The Scent of a Woman." Arethusa 43, no. 1 (2010): 87-112.

Campbell, David. *Greek Lyric, Volume I: Sappho and Alcaeus*. Harvard University Press, 1982.

Cande, Jessica, Benjamin Prud'homme, and Nicolas Gompel. "Smells like Evolution: the Role of Chemoreceptor Evolution in Behavioral Change." Current Opinion in Neurobiology 23, no. 1 (2013): 152–58. https://doi.org/10.1016/j.conb.2012.07.008.

Cao, Bo, Xi-Chuan Wei, Xiao-Rong Xu, Hai-Zhu Zhang, Chuan-Hong Luo, Bi Feng, Run-Chun Xu, et al. "Seeing the Unseen of the Combination of Two Natural Resins, Frankincense and Myrrh: Changes in Chemical Constituents and Pharmacological Activities." Molecules 24, no. 17 (2019): 3076. https://doi.org/10.3390/molecules24173076.

Chidiac, Elie J., Romeo N. Kaddoum, and Samir F. Fuleihan. "Special Article: Mandragora: Anesthetic of the Ancients." Anesthesia and Analgesia 115, no. 6 (May 14, 2012): 1437–41. https://doi.org/10.1213/ane.0b013e318259ee4d.

Clements, Ashley. “Divine Scents and Presence.” In *Smells and the Ancient Senses in Antiquity*, edited by Mark Bradley. London: Routledge, 2014, 46-60.

Clites, Benjamin L., and Jonathan T. Pierce. “Identifying Cellular and Molecular Mechanisms for Magnetosensation.” Annual Review of Neuroscience 40, no. 1 (2017): 231–50. https://doi.org/10.1146/annurev-neuro-072116-031312.

Collins, Derek. *Magic in the Ancient Greek World*. Malden: Blackwell Publishing, 2008.

Currie, Bruno. *Homer's Allusive Art.* Oxford University Press, 2016.

Curtis, Valerie, and Adam Biran. “Dirt, Disgust, and Disease: Is Hygiene in Our Genes?” Perspectives in Biology and Medicine 44, no. 1 (2001): 17–31. https://doi.org/10.1353/pbm.2001.0001.

Curtis, Valerie. “Why Disgust Matters.” Philosophical Transactions of the Royal Society B: Biological Sciences 366, no. 1583 (2011): 3478–90. https://doi.org/10.1098/rstb.2011.0165.

del Mármol, Josefina, Mackenzie Yedlin, and Vanessa Ruta. “The Structural Basis of Odorant Recognition in Insect Olfactory Receptors.” Nature 597 (August 4, 2021): 126–31. https://doi.org/10.1101/2021.01.24.427933.

Dieleman, J. 2005. *Priests, Tongues, and Rites: The London-Leiden Magical Manuscripts and Translation in Egyptian Ritual* (100-300 CE). Leiden.

Dieleman, Jacco. "Chapter 13 The Greco-Egyptian Magical Papyri.” In *Guide to the Study of Ancient Magic*, edited by David Frankfurter. Leiden, The Netherlands: Brill, 2019. doi: https://doi.org/10.1163/9789004390751_014.

Edmonds, Radcliffe G. *Drawing down the Moon: Magic in the Ancient Greco-Roman World.* Princeton: Princeton University Press, 2019.

Evans, Luke, Aaron, Ralph (2016) “Recipes for Love: A Semiotic Analysis of the Tools in the Erotic Magical Papyri,” Durham theses, Durham University. Available at Durham E-Theses Online: http://etheses.dur.ac.uk/11454/.

Evans-Pritchard, E.E. *Witchcraft, Oracles and Magic among the Azande*, Oxford: Claredon Press, 1937.

Finniss, Damien G, Ted J Kaptchuk, Franklin Miller, and Fabrizio Benedetti. “Biological, Clinical, and Ethical Advances of Placebo Effects.” The Lancet 375, no. 9715 (2010): 686–95. https://doi.org/10.1016/s0140-6736(09)61706-2.

Fischer, Marcellus. “Leprosy - an Overview of Clinical Features, Diagnosis, and Treatment.” JDDG: Journal der Deutschen Dermatologischen Gesellschaft 15, no. 8 (2017): 801–27. https://doi.org/10.1111/ddg.13301.

Frazer, James George, and Georges Roth. *Sir James George Frazer: Selected Passages from His Works*. Paris: Librairie Hatier, 1924.

Graf, Fritz. *Magic in the Ancient World*. Cambridge, MA: Harvard University Press, 1997.

Haluszka, Adria. "Sacred Signified: The Semiotics of Statues in the 'Greek Magical Papyri.'" Arethusa 41, no. 3 (2008): 479–94. http://www.jstor.org/stable/44578289.

Hart, Benjamin L. "The Evolution of Herbal Medicine: Behavioural Perspectives." Animal Behaviour 70, no. 5 (2005): 975–89. https://doi.org/10.1016/j.anbehav.2005.03.005.

Hartmann, Theresa, Benedikt Jahnke, and Ulrich Hamm. "Making Ugly Food Beautiful: Consumer Barriers to Purchase and Marketing Options for Suboptimal Food at Retail Level – a Systematic Review." Food Quality and Preference 90 (2021): 104179. https://doi.org/10.1016/j.foodqual.2021.104179.

Henriques da Silva, Risoneide, Washington Soares Ferreira Júnior, Patrícia Muniz de Medeiros, and Ulysses Paulino Albuquerque. "Adaptive Memory and Evolution of the Human Naturalistic Mind: Insights from the Use of Medicinal Plants." PLOS ONE 14, no. 3 (2019). https://doi.org/10.1371/journal.pone.0214300.

Hoover, Kara C. "Smell with Inspiration: The Evolutionary Significance of Olfaction." American Journal of Physical Anthropology 143, no. S51 (2010): 63–74. https://doi.org/10.1002/ajpa.21441.

Huffman, Michael A. "Self-Medicative Behavior in the African Great Apes: An Evolutionary Perspective into the Origins of Human Traditional Medicine." BioScience 51, no. 8 (2001): 651. https://doi.org/10.1641/0006-3568(2001)051[0651:smbita]2.0.co;2.

Janko, Richard. *The Iliad, a Commentary*. Vol. IV, Books 13-16. Cambridge: Cambridge University Press, 1985.

Jendza, Craig. "Supplemental Persuasive Analogies in PGM V.70–95." Archiv für Religionsgeschichte 15, no. 1 (2014): 247–68. https://doi.org/10.1515/arege-2013-0016.

LiDonnici, Lynn R. "Single-Stemmed Wormwood, Pinecones and Myrrh: Expense and Availability of Recipe Ingredients in the Greek Magical Papyri." Kernos, no. 14 (2001): 61–91. https://doi.org/10.4000/kernos.770.

Lilja, Saara. *The Treatment of Odours in the Poetry of Antiquity*. Helsinki: Societas Scientiarum Fennica, 1972.

Lundström, Johan N., Sanne Boesveldt, and Jessica Albrecht. "Central Processing of the Chemical Senses: An Overview." ACS Chemical Neuroscience 2, no. 1 (2010): 5–16. https://doi.org/10.1021/cn1000843.

Majid, Asifa. “Human Olfaction at the Intersection of Language, Culture, and Biology.” Trends in Cognitive Sciences 25, no. 2 (2021): 111–23. https://doi.org/10.1016/j.tics.2020.11.005.

Mouly, Anne-Marie and Regina Sullivan. “Memory and Plasticity in the Olfactory System: From Infancy to Adulthood.” In *The Neurobiology of Olfaction*, edited by Anna Menini. Boca Raton, FL: CRC Press/Taylor & Francis, 2010.

Nairne, James S., Sarah R. Thompson, and Josefa N. Pandeirada. “Adaptive Memory: Survival Processing Enhances Retention.” Journal of Experimental Psychology: Learning, Memory, and Cognition 33, no. 2 (2007): 263–73. https://doi.org/10.1037/0278-7393.33.2.263.

Niebler, Johannes, and Andrea Buettner. “Identification of Odorants in Frankincense (Boswellia Sacra Flueck.) by Aroma Extract Dilution Analysis and Two-Dimensional Gas Chromatography–Mass Spectrometry/Olfactometry.” Phytochemistry 109 (2015): 66–75. https://doi.org/10.1016/j.phytochem.2014.10.030.

Niimura, Yoshihito. “Evolutionary Dynamics of Olfactory Receptor Genes in Chordates: Interaction between Environments and Genomic Contents.” Human Genomics 4, no. 2 (2009): 107. https://doi.org/10.1186/1479-7364-4-2-107.

Olmstead, R.G., and L. Bohs. “A Summary of Molecular Systematic Research in Solanaceae: 1982-2006.” Acta Horticulturae, no. 745 (2007): 255–68. https://doi.org/10.17660/actahortic.2007.745.11.

Peirce, Charles S., and Charles Hartshorne. *Collected Papers of Charles Sanders Peirce.* Bristol: Thoemmes Press, 1998.

Porter, H. N. "Repetition in the Homeric Hymn to Aphrodite." American Journal of Philology 70, no. 3 (1949): 249-72.

Querci, Giuseppe M. I profumi nell’ antica Roma. Rome: Biblioteca dei Curiosi, 1938.

Richardson, Nicholas. *Three Homeric Hymns*. Cambridge: Cambridge University Press, 2010.

Rye, Connie, Yael Avissar, Vladimir Jurukovski, Samantha Fowler, Robert Wise, Rebecca Roush, Jung Choi, et al. “17.3 Taste and Smell.” *Concepts of Biology 1st Canadian Edition.* BCcampus, May 14, 2015. https://opentextbc.ca/biology/chapter/17-3-taste-and-smell/.

Sarafoleanu, C., Mella, C., Georgescu, M., Perederco, C. “The Importance of the Olfactory Sense in the Human Behavior and Evolution.” Journal of Medical Life, (April 15, 2009): 196–98.

Saussure, F. De, and Charles Bally. F. *De Saussure: Course in General Linguistics.* London: Gerald Duckworth & Co. Ltd., 1983.

Scarborough, John. “Adaptation of Folk Medicines in the Formal "Materia Medica" of Classical Antiquity” Pharmacy in History 55, no. 2/3 (2013): 55-63.

Scarborough, John, and Andrea Fernandes. “Ancient Medicinal Use of Aristolochia: Birthwort’s Tradition and Toxicity.” Pharmacy in History 53, no. 1 (2011): 3–21. http://www.jstor.org/stable/23645794.

Scarborough, John. “Drugs and Drug Lore in the Time of Theophrastus: Folklore, Magic, Botany, Philosophy and the Rootcutters.” Acta Classica 49 (2006): 1–29. Http://www.jstor.org/stable/24595423.

Scarborough, John. "The Pharmacology of Sacred Plants, Herbs, and Roots," in *Magika Hiera* edited by C.A. Faraone & D. Obbink, (New York, 1991).

Scarborough, John. “Theophrastus on Herbals and Herbal Remedies.” Journal of the History of Biology 11, no. 2 (1978): 353–85. https://doi.org/10.1007/bf00389304.

Sowa, Cora Angier. *Traditional Themes and the Homeric Hymns*. Chicago: Bolchazy-Carducci, 1984.

Sumler, Alan. “Ingesting Magic: Ingredients and Ecstatic Outcomes in the Greek and Demotic Magical Papyri.” Arion: A Journal of Humanities and the Classics 25, no. 1 (2017): 99. https://doi.org/10.2307/arion.25.1.0099

Tambiah, S. J. “Form and Meaning of Magical Acts: A Point of View.” HAU: Journal of Ethnographic Theory 7, no. 3 (2017): 451–73. https://doi.org/10.14318/hau7.3.030.

Tylor, Edward. *Primitive Culture.* London: John Murray, 1871.

Ancient Sources

Aelian. *Historical Miscellany.* Translated by Nigel G. Wilson. Loeb Classical Library 486. Cambridge, MA: Harvard University Press, 1997.

Apollonius Rhodius. *Argonautica.* Edited and translated by William H. Race. Loeb Classical Library 1. Cambridge, MA: Harvard University Press, 2009.

Budelmann, Felix. *Greek Lyric Selection*. Cambridge Greek and Latin Classics. Cambridge: Cambridge University Press, 2018.

Homer. *Iliad, Volume I: Books 1-12.* Translated by A. T. Murray. Revised by William F. Wyatt. Loeb Classical Library 170. Cambridge, MA: Harvard University Press, 1924.

Homer. *Iliad, Volume II: Books 13-24*. Translated by A. T. Murray. Revised by William F. Wyatt. Loeb Classical Library 171. Cambridge, MA: Harvard University Press, 1925.

Homer. *Odyssey, Volume I: Books 1-12*. Translated by A. T. Murray. Revised by George E. Dimock. Loeb Classical Library 104. Cambridge, MA: Harvard University Press, 1919.

Homer. *Odyssey, Volume II: Books 13-24*. Translated by A. T. Murray. Revised by George E. Dimock. Loeb Classical Library 105. Cambridge, MA: Harvard University Press, 1919.

------ *Homeric Hymns.* Homeric Apocrypha. Lives of Homer. Edited and translated by Martin L. West. Loeb Classical Library 496. Cambridge, MA: Harvard University Press, 2003.

Lucretius. *On the Nature of Things*. Translated by W. H. D. Rouse. Revised by Martin F. Smith. Loeb Classical Library 181. Cambridge, MA: Harvard University Press, 1924.

Plato. Lysis. *Symposium*. Gorgias. Translated by W. R. M. Lamb. Loeb Classical Library 166. Cambridge, MA: Harvard University Press, 1925.

Pindar. *Olympian Odes. Pythian Odes*. Edited and translated by William H. Race. Loeb Classical Library 56. Cambridge, MA: Harvard University Press, 1997.

Richardson, Nicholas. *Three Homeric Hymns*. Cambridge Greek and Latin Classics. Cambridge: Cambridge University Press, 2010.

Sappho, Alcaeus. *Greek Lyric, Volume I: Sappho and Alcaeus*. Edited and translated by David A. Campbell. Loeb Classical Library 142. Cambridge, MA: Harvard University Press, 1982.

Theocritus, Moschus, Bion. *Theocritus. Moschus. Bion*. Edited and translated by Neil Hopkinson. Loeb Classical Library 28. Cambridge, MA: Harvard University Press, 2015.

Theophrastus. *Enquiry into Plants, Volume II: Books 6-9. On Odours. Weather Signs*. Translated by Arthur F. Hort. Loeb Classical Library 79. Cambridge, MA: Harvard University Press, 1916.