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Bridging Discourse: Connections Between Institutional and Lay Natural Philosophical Texts in Medieval England

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BRIDGING DISCOURSE: CONNECTIONS BETWEEN INSTITUTIONAL AND LAY NATURAL PHILOSOPHICAL TEXTS IN MEDIEVAL ENGLAND

by

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ABSTRACT

Translations of works containing Arabic and ancient Greek knowledge of the philosophical and mechanical underpinnings of the natural world—a field of study called natural philosophy—were disseminated throughout twelfth-century England. During the twelfth and thirteenth centuries, institutional (ecclesiastical/university) scholars received and further developed this natural philosophical knowledge by reconciling it with Christian authoritative sources (the Bible and works by the Church Fathers). The subsequent discourse that developed demonstrated ambivalence towards natural philosophical knowledge; institutional scholars expressed both acceptance and anxiety regarding the theory and practice of alchemy, astrology/astronomy, and humoral/astrological medicine. While the institutional development and discourse surrounding natural philosophical thought is well-represented within medieval scholarship, an examination of the transmission and reception of this institutional discourse by broader sectors of English medieval society is needed. Examining fourteenth- and fifteenth-century Middle English public writings, texts, and copies of Latin works provides an important avenue of analysis when exploring the transmission and reception of institutional natural philosophical discourse to the laity. By comparing the similarities of discourse evident between the institutional and lay texts and the textual approaches the Middle English writers employed to incorporate this discourse, these works demonstrate that the spheres of institutional and lay knowledge traditionally separated by medieval historians overlapped as the clerics and laity began sharing a similar understanding of the philosophical underpinnings of the natural world.

This thesis is dedicated to my father, Stephen Ray Benson (1958 – 2007), whose impassioned discussions on the philosophical underpinnings of life and nature shaped my character, and to my mother, Nancy Benson, whose love of history inspired me and influenced my academic interests. I also dedicate this to my family, friends, and colleagues, whose patience, support, love, and encouragement made possible the completion of this thesis.

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CHAPTER ONE: INTRODUCING NATURAL PHILOSOPHICAL THOUGHT

In the twelfth century, the Crusades and growth of scholasticism fostered the dissemination of Arabic and ancient Greek knowledge of the natural world throughout the ecclesiastical and academic institutions of England. Beginning in the twelfth century with the translations of Arabic and Greek works by English scholars such as Adelard of Bath and Roger of Hereford, English scholars developed an understanding of the natural world that incorporated their comprehension of this revitalized knowledge and Christian thought. During the thirteenth century, English theologians such as Thomas Aquinas, Robert Grosseteste, and Roger Bacon further developed and reconciled Arabic and ancient Greek knowledge of the natural world, especially the works of Aristotle, with Christian theology. This led to a more scientific understanding of the natural world based on observation of natural and astronomical phenomena and rudimentary methods of experimentation.[1]

While the transmission, reception, and development of this more scientifically-inclined understanding of the natural world within English medieval ecclesiastical and academic institutions is well-documented and studied, historians have overlooked transmission, reception, and development of this knowledge throughout broader sectors of the English urban laity.[2] For example, due to its connections to medieval institutions and sectors of medieval society beyond the institutional walls, the reception of alchemical, astronomical/astrological, and medical theory

[1] David Knowles, *The Evolution of Medieval Thought* (New York: Random House, 1962), 185-192, 279.
[2] The laity is defined throughout this thesis as the non-cleric portion of medieval society. Clerics included deacons, sub-deacons, both the secular clergy, such as parish priests, and the regular clergy, such as friars, monks, and nuns. The laity includes nobility, such as royalty and barons, those below the nobility, such as knights and freemen. The literate portion of this population, discussed in Chapter Three, is the main focus of this thesis. However, public writings, such as works by Geoffrey Chaucer and John Gower, could have reached the illiterate population through public readings of the works.

and practice, and the subsequent transmission of this knowledge within English Middle English texts, provides an avenue to explore when determining the transmission of natural philosophical thought to broader sectors of English medieval society. Moreover, these texts demonstrate an understanding of not only the theoretical elements of natural philosophy further developed within the medieval institutions from Greek and Arabic sources, but also a knowledge of the institutional debates surrounding alchemy, astronomy/astrology, and medicine, and thus, incorporated this knowledge into works that reached this broader medieval audience.

The significance of this research, then, is that it demonstrates that institutional knowledge did travel from a proverbial medieval ivory tower to the laity beyond its walls. While the precise mechanisms of this transmission are beyond the scope of this thesis, the transmission did indeed occur, and the reception of this knowledge by the broader sectors of medieval English society can also be demonstrated. Furthermore, while historians focus on institutional medieval knowledge and the intelligentsia separately from the knowledge of the more general/lay population, this thesis argues that these assumedly separate spheres often overlapped, and by the later Middle Ages there was a continuum of institutional and lay ideas within the fields of alchemy, astrology/astronomy, and medicine. This thesis focuses on these three fields due to the familiarity of these fields within the medieval lay population—either though more popular alchemical practices, astrological readings by lay astrologers, or homeopathic medical practices within medieval households and villages. Since the laity was exposed to or practiced the more popular elements of these three fields,[3] an examination of the philosophical underpinnings of

[3] For a discussion on the popular practices of these fields, see: Marie Faye Getz, "The Pharmaceutical Writings of Gilbertus Anglicus," *Pharmacy in History* 34, no 1 (1992) : 17 – 25; Stanton J. Linden, *Darke Hierogliphicks: Alchemy in English Literature from Chaucer to the Restoration* (Lexington: The University of Chicago Press, 1996); Marijane Osborn, *Time and the Astrolabe in the Canterbury Tales* (Norman, OK: University of Oklahoma Press,

alchemy, astrology/astronomy, and medicine evident in Middle English texts provides an avenue of analysis for exploring the transmission of institutional natural philosophical ideas to the lay population.

Origins of Natural Philosophical Thought in England

Overview

During the twelfth century, medieval scholars translated scientific texts from Greek and Arabic into Latin, ushering a new era of thought centered on Aristotelian logic.[4] Amongst scholars, this thought centered on observation of natural phenomenon and a reconciliation of this observation with the tenets of the Church fathers. In England, where Oxford and Cambridge gravitated towards a greater focus on mathematics and the natural sciences, medieval natural philosophy flourished within the Church and academic institutions due to the writings of English natural philosophers and clerical scholars such as Adelard of Bath (c.1080 - c.1152), Robert Grosseteste (c.1175 – c.1253) bishop of Lincoln, and Roger Bacon (c. 1214 – 1294), a Franciscan friar, and the reconciliation of elements of natural philosophical thought by Thomas Aquinas (c.1225 – 1274), a Dominican friar.[5]

These natural philosophers wrote works that examined the natural world. These works encompassed different fields of study that extended from the Arabic and Greek works introduced

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2002); *Popular and Practical Medicine of Medieval England*, ed. Lister M. Matheson (East Lansing, MI: Colleagues Press, 1994); Wendy J. Turner, "The Legal Regulation and Licensing of Alchemy in Late Medieval England," *Law and Magic: A Collection of Essays*, Christine A Corcos, ed. (Durham, North Carolina: Carolina Academic Press, 2010).

[4] Knowles, *The Evolution of Medieval Thought*,185-192.

[5] Knowles, *The Evolution of Medieval Thought*, 279.

into western Europe and England, including treatises on esoteric (philosophical/theoretical) alchemy, astronomy/astrology, and humoral medicine.[6] These fields of natural philosophy eventually translated into broader sectors of medieval English society, meaning, beyond the institutional walls to the English laity, due in part to their practical applications, such astronomical/astrological theory for divination and humoral-based medicine to create practical pharmaceuticals.

Vernacular texts translated into Middle English from the Latin used in medieval institutions also emerged in England, and a more generalized scientific and medical knowledge spread from elite clerical practitioners to both university and non-university professionals. Representations of natural philosophy and natural philosophers became evident in the works of Middle English writers, such as Geoffrey Chaucer (c. 1343 – 1400) and John Gower (c.1330 – 1408) and in the vernacular (Middle English) copies of medical texts of John Somer, Nicholas of Lynn, and Gilbertus Anglicus, increasing the connection of natural philosophical thought beyond medieval institutional walls to educated non-professionals, and finally, broader medieval society and culture.

[6] Within a medieval institutional context, esoteric alchemy, astrology/astronomy, and humoral medicine represented the theoretical aspects of alchemy as developed from Arabic and ancient Greek sources. Further discussion on these three fields within a medieval institutional context is provided in Chapter Two.

Methodology

Sources and Methods

Vital to an examination on the transmission of institutional thought to the laity is a discussion on the language used in the texts either written by or for the lay English population, as well as the methods used to demonstrate the reception and transmission of knowledge in a medieval context. During the fourteenth and fifteenth centuries, scientific texts began appearing in the vernacular—English—on a larger scale,[7] though translating ideas previously expressed only in Latin proved challenging, and the texts remained difficult for a more general public to completely comprehend.[8] Latin, therefore, remained the primary vehicle of institutional knowledge, while English generally "remained peripheral to written culture and was mainly used for interaction in more domestic and casual domains."[9]

As the vernacular, the general population primarily used English by the late Middle Ages, and it appeared in both public and intimate spaces.[10] A popular use of the vernacular in writing was pubic writings, or works written for a general rather than a specific audience. Public writings aimed for broader readership: men and women, poor and rich, and the laity as well as clerics. The content of public writings focused on commonplace matters of society and faith, instead of the concerns of the individual or a particular group. Much like the public murals found on parish

[7] Päivi Pahta and Irma Taavitsainen, "Vernacularisation of Scientific and Medical Writing in Its Sociohistorical Context," *Medical and Scientific Writing in Late Medieval English*, eds. Irma Taavitsainen and Päivi Pahta (Cambridge: Cambridge University Press, 2004), 1.
[8] Irma Taavitsainen, "Transferring Classical Discourse Conventions into the Vernacular," *Medical and Scientific Writing in Late Medieval English*, eds. Irma Taavitsainen and Päivi Pahta (Cambridge: Cambridge University Press, 2004), 37 – 72.
[9] Pahta and Taavitsainen, "Vernacularisation," 9.
[10] C. David Benson, *Public Pier's Plowman* (University Park, PA: The Pennsylvania State University Press), 115.

walls, public writings instructed their readers on the importance of doing good in the world. Authors set their public writings in public spaces; they often contained or allowed diverse genres and content, and featured different voices, which sometimes contested one another.[11]

Public writings provide an important source of analysis when analyzing the reception and transmission of institutional natural philosophical thought. In the case of alchemy and astronomy, these writings present a vehicle in which writers could digest and transfer philosophical topics to a general audience. This is because non-institutional Middle English translations of Latin natural philosophical works were often didactic compilations rather than commentaries, and were not as widely consumed as public writings. When translating the institutional Latin works into Middle English, translators omitted the more esoteric content and turned philosophical treatises into didactic texts. Compilations functioned as reference books; they provided readers with accessible authoritative passages that conveyed important opinions. Compilers, then, did not provide further insight or discussion of these passages.[12]

Conversely, commentaries, compiled by commentators, provided not only the text, for example, Aristotle's *Posterior Analytics*, but also researched-based comments on the findings of the author, in this example Aristotle, that contributed to the philosophical discussion of the original work. In this way, compilations "disseminate learning in an easily digestible way," and the medium used to transmit institutional discourse for more practical purposes, whereas commentaries were not often used for non-institutional vernacular works due to the complexity

[11] Benson, *Public Pier's Plowman*, 113-5.
[12] Taavitsainen, "Transferring Classical Discourse Conventions into the Vernacular," 37 – 72.

of thought.[13] This thesis, then, argues that public writings incorporated aspects of the more complex philosophical problems found in institutional natural philosophical works, thus providing a way in which institutional thought entered the public sphere.

Geoffrey Chaucer's *The Canterbury Tales* and John Gower's *Confessio Amantis*, emerged as examples of the most popular and widely circulated Middle English public writings in the later Middle Ages,[14] and as such provide an important source for analyzing the reception of institutional thought and its incorporation into works meant for a broader audience. In conjunction with public writings, this thesis also examines Middle English medical texts. Translations of medical writings, while also didactic compilations in many cases, became more complex and developed as the spheres between learned physicians and lay practitioners increasingly overlapped.[15] Due to this overlap, this thesis examines Middle English medical texts and calendars for evidence of natural philosophical ideas, as well as how a broader practitioner audience developed these ideas by incorporating them into their practice. By doing so, this study connects the separate spheres of institutional and lay understanding of the natural world.

In recognition of the difficulty facing modern readers when discerning reception and transmission of medieval ideas (or if either of these goals are possible), different literary analytical methods are also employed to facilitate medieval textual analysis. For example, this study incorporates partial use of patristic exegesis when connecting institutional works by Thomas Aquinas and Roger Bacon to the Middle English public writings of Geoffrey Chaucer and John Gower. This approach is based on the assumption of an unwavering adherence by

[13] Taavitsainen, "Transferring Classical Discourse," 42, 50-51.
[14] Benson, *Public Pier's Plowman*, 118.
[15] Irma Taavitsainen, "Transferring Classical Discourse" 42, 50-51.

medieval writers to the authoritative rhetoric of the Bible and Church fathers.[16] Though the approach is limiting, authoritative rhetoric shaped aspects of Middle English representations of natural philosophical ideas. This is particularly evident in the medieval art versus nature debate, which stems from reconciling Church authority with a newer understanding of the natural world through the introduction of Greek and Arabic texts. As chapter three will examine, the works of Geoffrey Chaucer and his contemporaries John Gower and William Langland defer to this authority in their reception of natural philosophical thought, which they transmit to their audience.

In addition to a partial patristic exegesis approach, the use of literary tropes by Middle English authors will also be examined when analyzing the reception of institutional natural philosophy by Middle English authors. For example, Chaucer incorporates elements of the medieval "puffer" trope when representing his alchemical anxieties in *The Canon's Yeoman's Tale*. The connections and relationships between medieval literary texts and how medieval texts work in an interconnected dialogue that shape and are shaped by other works, such as religious, historical, and philosophical texts (the concept behind intertextual analysis) is also used when analyzing the public writings and vernacular medical works alongside the institutional texts. These works demonstrate an interaction among texts via cultural symbols, cross-references, and echoed ambivalence.[17]

[16] Laurie A. Finke and Martin B. Shichtman, "Introduction: Critical Theory and the Study of the Middle Ages," *Medieval Texts and Contemporary Readers*, eds. Laurie A. Finke and Martin B. Shichtman (Ithaca: Cornell University Press, 1987), 2.

[17] This concept of intertextual analysis, discussed in Laurie A. Finke and Martin B. Shichtman, "Introduction: Critical Theory and the Study of the Middle Ages," is extended to an examination of public writings and medical in Chapter Three.

Both textuality and intertextuality emphasize an examination of a medieval text beyond the text itself to incorporate an analysis of how the text shaped (and continues to shape) its audience. Scholars who employ these interpretive methods argue that "medieval culture's valorization of tradition over originality, its method of producing texts, and the performative nature of even its most 'readerly' literature make the reader a pivotal figure, for it is in the act of reading that medieval texts are created."[18] The reader, therefore, functions as a collaborator rather than a passive consumer.[19] This concept is demonstrated in the connection between institutional alchemical theory and its representation in the works of Chaucer and Gower, and in the marriage of didactic concepts and tools, such as the Zodiac Man and Bloodletting Man, with natural philosophical medical theories within vernacular medieval medical texts. This thesis, then, also approaches Middle English works as an interconnected dialogue with the Latin institutional works.

The aforementioned "performative nature" notion stems from the observation that medieval literary structures blended oral and written elements, starting with mostly oral and then shifting slowly to written. This shift represented a cultural and societal change from a univocal, "logocentric" culture that, according to Claude Lévi-Strauss, characterized societies that transmitted cultural information orally, to a text-based culture that fostered individual interpretations and meaning of texts.[20] While oral communication allows for the transference of

[18] Laurie A. Finke and Martin B. Shichtman, "Introduction," 10.
[19] This reflects the idea of Roland Barthes in his piece "From Work to Text" regarding the role of the reader as a collaborator rather than consumer. Roland Barthes, "From Work to Text," *Textual Strategies: Perspectives in Poststructuralist Criticism*, ed. Josue V. Harari (Ithaca, NY: Cornell University Press, 1979), 73 – 81.
[20] Claude Lévi-Strauss, *The Raw and the Cooked*, trans. John and Doreen Weightman (New York: Harper, 1975), 1 – 32.

intent and meaning through the aid of voice and one-on-one interaction with the audience, this method of cultural communication limits originality in exchange for a cultural consensus.[21]

Text-based communication, however, allows for originality, and for the creation and transmission of divergent views outside of the cultural consensus. Culture, therefore, becomes mediated through writing. In the medieval literary context, however, the oral tone still exists within medieval texts, and writers, such as Chaucer and Gower, adopt writing styles that mimic the logocentric conventions of oral communications.[22] Medieval texts—the public writings and translated copies of Latin texts—therefore, incorporate elements of patristic exegesis when differing to the institutional representations of natural philosophical ideas. They transmit these representations by creating performative texts, meaning they adopt a logocentric "what everyone knows" univocal tones combined with common cultural tropes to transmit these ideas to a broader audience. In addition, there are intertextual interactions evident in these texts, for example, in their shared understanding and ambivalence towards natural philosophical ideas between institutional and public writers, as well as the incorporation of didactic elements to illustrate instructional natural philosophical medical theory by Middle English translators. Chapter Three, then, applies these literary analyses to the works of Middle English writers to trace the reception of the natural philosophical elements, and how they transmitted this reception to their audience.

[21] Laurie A. Finke and Martin B. Shichtman, "Introduction," 10.
[22] Marshall H. Leicester Jr., "Oure Tonges Différance: Textuality and Deconstruction in Chaucer," *Medieval Texts and Contemporary Readers*, eds. Laurie A. Finke and Martin B. Shichtman (Ithaca: Cornell University Press, 1987), 21-23.

Philosophical and Practical Alchemy

The first avenue to investigate regarding the transmission of natural philosophical ideas to broader sectors of medieval society is alchemy. Prior to a discussion of the transmission of natural philosophical ideas through alchemy, however, a connection between natural philosophy and alchemy is needed. As understood by medieval natural philosophers, alchemy was the "philosophical search for the agent of material perfection by the means of base materials."[23] The study and practice of alchemy developed more than a thousand years of history prior to the advent of Middle English literature, and divides into three phases: the Egyptian, the Islamic, and the medieval.

The origins of what developed into medieval alchemy are generally traced to the city of Alexandria in Egypt. The school of philosophy founded in Alexandria studied and promoted the philosophies of Plato and Aristotle, and tenets of this philosophies fostered the development of alchemy. These tenets included: hylozoism, the idea that all matter and the universe itself is animate; the related idea that animistic spirits precipitated and determined events in the universe; a connection between macrocosm and microcosm, which postulates a unified structure between man and the order of the universe; finally, the subsequent idea that events on a microcosmic level reflect what happens on the macrocosmic level (and the other way around).

Alchemical writers attached Aristotle's theory of the four elements—earth, water, air, and fire—and the four properties of matter—dry, cold, moist, and hot—to these principles. Plato's philosophy of forms also played an important role in shaping alchemical philosophy and

[23] Michela Pereira, "Alchemy and the Use of Vernacular Languages in the Late Middle Ages," *Speculum* 74, no. 2 (1999) : 336.

practice.[24] According to Plato, all matter remains a rudimentary form that is uniform, unknowable, and lacks any attributes until certain properties called "forms" impress upon matter. Once these "forms" contacts matter, the matter becomes knowable, distinct/individualized, and exhibits differentiable qualities. The Platonic idea of "forms" altering matter fostered the idea amongst future medieval alchemists that one could change the properties of elements.[25] The incorporation of Platonic and Aristotelian ideas into the construction of alchemical theory would become important to the reception of these theories by medieval institutions, as will become evident.

Beyond the development of the philosophical origins of alchemy, the practical applications of alchemy also developed in Egypt. Alchemical practice is thought to have originated in the workshops of Alexandrian dyers, in which the possibility of tinting metals different colors through chemical applications—similar to the applications used to dye cloth—was discovered. Over time, these metallurgical recipes became misinterpreted as processes for the transmutation of metals. From these recipes, sulfur emerged as one of the two fundamental sources necessary in the treatment of metals in alchemical practices (mercury serves as the second).[26]

The philosophical origins combined with the practical applications to form the basic alchemical theories of later alchemists. These theories postulated that through the gradual adjustment of the proportion of elements in metals from the most base to the most noble—the

[24] His idea that all matter remains a rudimentary form that was uniform, unknowable, and lacked any attributes until certain properties called "forms" impressed upon matter.
[25] Christine N. Chism, "I Demed Hym Som Chanoun For To Be," *Chaucer's Pilgrims An Historical Guide to the Pilgrims in The Canterbury Tales*, eds. Laura C. Lambdin and Robert T. Lambdin (Westport, Connecticut: Greenwood Press, 1996), 346.
[26] John Arthur Hopkins, *Alchemy: Child of Greek Philosophy* (New York: AMS Press, 1967), 48 – 49; Chism, "I Demed Hym Som Chanoun For To Be," 347.

rarefication of metals—alchemists could process baser metals into silver or gold. The elements were ranked based on their nobility, with Earth representing the basest element, then water, air, and fire. Likewise, metals were ranked based on their nobility and each had a corresponding planet. The earthly (and thus, basest) metals were copper (tied to Venus), iron (Mars), tin (Jupiter), and lead (Saturn). After the baser earthly metals came the transitional metal, Mercury, which, depending on its use, was tied to air and water. The highest metals, silver and gold, were associated with the moon and sun.[27]

The process of transmuting the baser metals into more noble metals required the combination of the body (the metal to be treated) with the elixir, ferment, or spirit (the substances used to treat the metals). This process was attempted in different stages in which the alchemist applied a different spirit to permeate the body to transmute it into a progressively more noble metal. The spirit would contain a portion of the noble metal to which the alchemist desired the baser metal to transform. For example, if the alchemist desired the metal to become silver, the spirit would contain a portion of silver that would permeate through the baser metal.

Islamic alchemists subsequently developed the idea of the Philosopher's Stone from this concept of spirits,[28] which is the concept of a super-spirit derived from Aristotle's concept of a fifth element called ether—the element of the stars.[29] Alchemists applied Plato's notion of primal matter, which is neutral, to their transmutation process. They oxidized metal with an alloy of copper, lead, iron, and tin to blacken the metal, thus creating an absence of color thought needed to make the metal neutral and better prepared to have more noble qualities impressed upon it.

[27] Chism, "I Demed Hym Som Chanoun For To Be," 347.
[28] Chism, "I Demed Hym Som Chanoun For To Be," 348.
[29] Robert T. and Laura C. Lambdin, "His Yeman Eek Was Ful of Curteisye," *Chaucer's Pilgrims An Historical Guide to the Pilgrims in The Canterbury Tales*, eds. Laura C. Lambdin and Robert T. Lambdin (Westport, Connecticut: Greenwood Press, 1996), 360.

Evident from the development of these processes is the concept that humans can improve upon nature. Once transmitted to the institutional walls of the medieval clerics and scholars, however, this concept would provide a source of tension, and the debates surrounding this tension would eventually reach a broader audience through its appearance in Middle English literature. These recipes and the idea of the transmutation of metals, particularly from baser to purer, would emerge as an important component to the artifice versus nature debate that would characterize alchemy's reception into medieval institutions, discussed in Chapter Two, and later by Middle English authors such as Geoffrey Chaucer, which will be examined in the third chapter.

Astronomy/Astrology

Like alchemy, astronomy/astrology presents another avenue of study when examining the transmission of natural philosophical ideas to the population outside the walls of the medieval institutions. These fields had shared philosophical origins that contributed a medieval understanding of the natural world; indeed, medieval natural philosophers did not share the same concrete distinctions between astronomy and astrology as modern scientists. Twelfth- and thirteenth-century scholars used the terms interchangeably, and the two fields will be discussed within this medieval context throughout this thesis.[30] Defined simply, astrology and astronomy make up the same body of knowledge regarding the movements of heavenly bodies; astrology

[30] Roger French, "Foretelling the Future: Arabic Astrology and English Medicine in the Late Twelfth Century," *Isis* 87, no. 3 (1996) : 454.

represents the practical facet to the mathematical astronomy.[31] Both stemmed from the observation of celestial objects. Astronomy involves measuring and explaining celestial movements and phenomena "in terms of celestial mechanics," whereas astrologers used those movements and phenomena to make predictions based on the idea that these celestial bodies influenced human life.[32] Astronomers, for example, studied the skies and created instruments to calculate time and for navigation, whereas astrologers studied the skies and created charts to predict future events.

Astrologers/astronomers practiced their celestial observations long before alchemists developed their craft, with the earliest observers originating from ancient Mesopotamia and ancient Egypt. The tables formed from the observations of the ancient Mesopotamians eventually reached the Greeks.[33] Elements of ancient Mesopotamian astrology helped shape Greek astrological doctrine, for example, planetary exaltations, the micro-zodiac, and the trine aspect; however, the Greeks invented cosmology as a discipline and merged it with natural philosophy, creating their own rationale of astrology that later scholars would build upon.[34]

Greek Pre-Socratic philosophers began the process of creating this rationale, but it was Plato, and then to a larger extent Aristotle, who defined the character of Greek cosmology. Aristotle's cosmological treatise *Book on the Heavens (De caelo)*, like other Greek natural philosophical works, was transmitted to Arabic scholars, whose translations and commentaries

[31] Cornelius O'Boyle, "Astrology and Medicine in Later Medieval England: The Calendars of John Somer and Nicholas of Lynn," *Sudhoffs Archiv*, Bd. 89, H.1 (2005) : 2.
[32] Marijane Osborn, *Time and the Astrolabe in the Canterbury Tales* (Norman, OK: University of Oklahoma Press, 2002), 12.
[33] Edward Grant, "Celestial Motions in the Late Middle Ages," *Early Science and Medicine*, 2, no. 2 (1997) : 129.
[34] F. Rochberg-Halton, Elements of the Babylonian Contribution to Hellenistic Astrology, " *Journal of the American Oriental Society* 108, no. 1 (1988) : 51.

then passed into the Latin West. Like the alchemical texts, Greek cosmological manuscripts were assembled at Alexandria, where the Arabic scholars, particularly Māshā' allāh in the Abbasid court at Baghdad, studied these works to develop Arabic astrology.[35] This was then developed more in line with Aristotle's cosmological model by the tenth century Arabic scholar, al-Bitruji.[36] By the end of the twelfth century, Aristotle's astrological/astronomical works (in conjunction with the astrological/astronomical works of Ptolemy and Arabic scholars like al-Bitruji) dominated institutional astronomical knowledge due to the translations of Greek works into Latin.[37]

The Aristotelian model originated from the twelfth book of Aristotle's *Metaphysics*, in which he divides the world into two different parts: the terrestrial or sublunar region and the celestial region. Within the terrestrial region, or the domain of predictable changes, bodies were composed of four elements capable of changing into one another—the four classical elements of earth, fire, air, and water. Within the celestial region, which encompassed the moon and beyond, a constant, enteral ether filled the universe. This ether was divided into a sequence of static spheres around which the seven planets (Saturn, Moon, Jupiter, Mercury, Sun, and Mars) traveled. Each planet, in turn, had its own accompaniment of concentric orbs, and these determined each planet's path around the earth, which represented the center of the cosmos.[38]

In his *De caelo* (*Book on the Heavens*), Aristotle connects the motions of the planets to the four elements (earth, fire, air, and water). He states that since earth is at the center of the

[35] David Pingree, "From Alexandria to Baghdad to Byzantium. The Transmission of Astrology*," International Journal of the Classical Tradition* 8, no. 1 (2001) : 3.
[36] Edward Grant, "Celestial Motions in the Late Middle Ages," *Early Science and Medicine* 2, no. 2 (1997) : 133.
[37] Grant, "Celestial Motions," 129.
[38] Grant, "Celestial Motions," 130.

universe, it must exist, and is therefore a fundamental element. The earth's opposite element, fire, then also has to exist, for an element cannot exist without an opposite. If those elements exist, then intermediate bodies must exist, creating the elements of water and air. From those elements, the generation of planets is possible.[39] The elements of the planets, then, dictate their motions regarding their concentric paths, "For if the natural motion is upward, it will be fire or air, and if downward, water or earth."[40] This connection of the elements of earth, fire, air, and water to the planets will shape the alchemical, astrological/astronomical and medical understanding and discourse of English medieval natural philosophers, as discussed in Chapter Two.

Development of Medieval English Medicine

Medicine in the natural philosophical sense is the final subject in this study on the transmission of natural philosophical ideas to larger sectors of English medieval society. Medicine emerged in Western thought through the Hippocratic corpus of texts, written between 430 and 300 BCE. This corpus became important to natural philosophical thought due to its focus on the rational causes of natural phenomenon and insistence that all diseases, therefore, had natural causes. Especially important to these texts was the development of humoral theory, which dictated that the human body was composed of four humors—yellow bile, black bile, phlegm, and blood—the balance of which being necessary for good human health and

[39] Aristotle, *On the Heavens* bk. 2, part 3, trans. J.L. Stocks in The Internet Classics Archive, http://classics.mit.edu/Aristotle/heavens.2.ii.html (accessed January 10, 2015).
[40] Aristotle, *On the Heavens*, bk. 1, part 2, trans. J.L. Stocks in The Internet Classics Archive, http://classics.mit.edu/Aristotle/heavens.2.ii.html (accessed January 10, 2015).

behavior.[41] Aristotle further developed this concept of the four humors and incorporated it into his understanding of the natural world. Galen, a Greek physician and philosopher, advanced the Hippocratic corpus and Aristotle's contributions, and his prolific writings on rational medicine, which ranged from anatomy, to surgery, to pharmacy, helped shaped Western medical thought as Arabic scholars translated his corpus, thus preserving Hippocratic and Aristotelian humoral knowledge.[42]

The twelfth century translations of Arabic medical texts, including the translations and commentaries on Galen's works, brought this medical knowledge to the West as it did for alchemical and astronomical knowledge. Furthermore, as astronomy/astrology shaped the philosophical aspects of alchemy, both astronomy/astrology and alchemy shaped aspects of English medieval medicine. Prior to these natural philosophical elements shaping this understanding of medicine, however, medicine enjoyed a long tradition in England. Those who practiced medicine prior to the Norman Conquest in 1066 were mainly elite clerical practitioners who focused on the healing miracles of Jesus of Nazareth and their pre-Aristotelian astrological practices. Though healing miracles became less prevalent after 1066, medicine remained the domain of holy men. Little of their practice was recorded in their works, which retained a mostly religious focus.[43]

The religious focus, however, did contain explanations based on natural phenomena, which lay within early English medicine the foundation needed for the understanding and incorporation of natural philosophical elements as these ideas entered into the English medieval

[41] Faye Getz, *Medicine in the English Middle Ages* (Princeton: Princeton University Press, 1998), 36.
[42] Ibid., 37-38.
[43] Getz, *Medicine,* 13-15.

institutions. The holy men who practiced medicine during this period and earlier used observation of the natural world and offered medical advice based on their understanding of ailments from their observations. Therefore, learned medicine developed as a way for these holy men practitioners to impose rational order on disease and death, and to project this order into God's design.[44] This became important to the development of a natural philosophical understanding of medicine after Arabic and ancient Greek texts entered the English scholastic discourse, as discussed in Chapter Two.

Historiography

Natural Philosophical Thought

The institutional origins of medieval natural philosophy, the scholars who contributed to natural philosophy, and its place within medieval thought have influenced debate amongst historians of medieval thought and historians of science since the nineteenth century. Andrew Dickson White's 1896 work *History of the Warfare of Science with Theology and Christendom* initiated the debate concerning the role of medieval thought in fostering or inhibiting the growth of more scientific thought.[45] His work argued that scholastic institutional thought stagnated the growth of scientific thought during the Middle Ages. Pierre Duhem's 1905 work *Les Origines de la Statique* responded to this critique of medieval institutional thought by arguing that the medieval church actively cultivated the growth of natural philosophy, which he links to scientific

[44] Ibid.,15.
[45] Dickson White, *History of the Warfare of Science with Theology and Christendom* (New York: D. Appleton and Company, 1898).

thought, within the medieval universities.[46] Later historians built upon Duhem's work to link medieval concepts of magic and experimental science to Christian thought,[47] and the role of twelfth-century scholars in translating and disseminating Greek and Arabic works on natural philosophy.[48] The decades after World War II witnessed a movement in the historiography towards positivist interpretations of the tradition of western science and its direct continuation from its origins in ancient Greece, to the Middle Ages, and into the Scientific Revolution. Works by historians such as Alistair Crombie focused on connecting medieval scholars, such as Robert Grosseteste and Roger Bacon, to the early modern concepts of science during the seventeenth century.[49]

Other scholars, such as Alexandre Koyré and Anneliese Maier challenged these interpretations, and argued against projecting modern intentions upon medieval scholars[50] and against the ability for scholastic Aristotelianism to foster modern scientific thought.[51] These arguments provided the fundamental base upon which scholars would analyze the various works of different medieval natural philosophers within the context of Church. These scholars argued either for or against a direct or indirect continuity between medieval natural philosophy and early

[46] Pierre Duhem, *Les Origines de la statique*, 1905 as cited in David C. Lindberg, "Medieval Science and Its Religious Context," *Osiris* 10, no. 2 (1995) : 62-63.
[47] Lynn Thorndike, *A History of Magic and Experimental Science During the First Thirteen Centuries of Our Era*, vol. 1 (New York: Columbia University Press, 1923), 1-2.
[48] Charles Homer Haskins, *Studies in the History of Mediaeval Science* (Cambridge: Harvard University Press, 1924).
[49] A.C. Crombie, *Robert Grosseteste and the Origins of Experimental Science, 1100 – 1700* (Oxford: The Clarendon Press, 1953, Reprinted, Oxford: Oxford University Press, 1962), 53.
[50] Alexandre Koyré, "Les Origines de la Science Moderne," *Etudes d'histoire de la pensée scientifique* (Paris: PUF, 1966), 48-72. As cited by Cohen, T*he Scientific Revolution*, 106-108.
[51] Annelise Maire, "Ergebnisse' der spatscholastischen Naturphilosphile," as cited in Cohen, *The Scientific Revolution*, 266.

modern science.[52] Largely ignored in the debates surrounding natural philosophy within the medieval institutions and its place within medieval intellectual history and the development of science, however, is the greater societal and cultural impact of natural philosophy beyond the English medieval institutions and to the English laity, and the possible methods of dissemination of this thought beyond the English institutional walls.

Alchemy, Astronomy/Astrology, and Medicine

Historians of medieval thought also analyzed individual fields of medieval natural philosophy (which some scholars use interchangeably with medieval science), such as alchemy, astrology/astronomy, and humoral medicine (which is often linked to alchemy and/or astrology/astronomy) via the "Clagett Program." This program, named for historian Marshall Clagett, emphasized the study of texts, particularly Latin texts, to better understand the contributions of medieval natural philosophy to medieval thought.[53] Regarding alchemy, for example, historians differed on the direct continuity or discontinuity of alchemy to modern

[52] Edward Grant's 1971 *Physical Science in the Middle Ages* provided an important contribution to the discontinuity debate; though he would later argue for a relative continuity in his 1996 work, *The Foundations of Modern Science in the Middle Ages*. The current trend in this historiography oscillates between arguing for relative discontinuity and relative continuity approaches. Relative continuity scholars argue that a direct connection between medieval natural philosophy and modern science is not evident in the texts. Their argument that recognizes the contributions of medieval natural philosophers, though dismisses their contributions as harbingers of science, as evident in Margaret Olser's 2011 work *Reconfiguring the World: Nature, God, and Human Understanding from the Middle Ages to Early Modern Europe*. Those who argue for a relative continuity approach recognize the limitations of natural philosophical thought, but argue that when the historical context of the scientific texts are considered, they exhibit the development of more scientific thought that would lay the foundation for the Scientific Revolution. James Hannam's 2009 *The Genesis of Science: How the Christian Middle Ages Launched the Scientific Revolution* exemplifies this approach.

[53] *Mathematics and Its Applications to Science and Natural Philosophy in the Middle Ages: Essays in Honor of Marshall Clagett*, eds. Edward Grant and John E. Murdoch (Cambridge: Cambridge University Press, 1987), ix-x; David C. Lindberg, "Medieval Science and Its Religious Context," *Osiris* 10, no. 2 (1995) : 69.

science through an analysis of alchemical treatises and their contributions to modern chemistry. Some argued that alchemy bridged natural philosophy and modern science by initiating laboratory experimentation,[54] while others, such as Marie Boas and Alan Chalmers, placed alchemy within the discontinuity argument, arguing that alchemy represented the "otherworldly medieval mind-set" rather than an early modern, scientific mindset.[55]

Other interpretations, such as William Newman's earlier work, took the middle ground approach, arguing that esoteric alchemy facilitated the advancement of a philosophy of technology due to the alchemists arguing that man could improve upon nature .[56] He also recognized the absence within the historiography of the larger questions surrounding alchemy within medieval society, especially regarding its legality and legitimacy as a field of knowledge amongst medieval scholars.[57] In his study, Newman, like the historians of medieval thought before him, primarily focuses on the reception of these ideas within the medieval institutions and academic treatises, and how these ideas connect to the emergence of modern scientific experimentation and ideas.

In the wake of the socio-cultural analyses of courtly love poetry in the 1960s and 1970s, during which scholars explored the relationship between medieval courtly society and

[54] William R. Newman, *Atoms and Alchemy: Chymistry and the Experimental Origins of the Scientific Revolution* (Chicago: University of Chicago Press, 2006).
[55] For approaches that dismiss the connection between alchemy and modern chemistry, see Marie Boas, *Robert Boyle and Seventeenth-Century Chemistry* (Cambridge: Cambridge University Press, 1958) and Alan Chalmers, "Boyle and the Origins of Modern Chemistry: Newman Tried in the Fire," *Studies in History and Philosophy of Science*, 41 (2010) : 1-10.
[56] Though, in 2002 Newman would embrace the argument that there is a direct connection between alchemy and modern chemistry. See William R. Newman and Lawrence M. Principe, *Alchemy Tried in the Fire: Starkey, Boyle, and the Fate of Helmontian Cymistry* (Chicago: University of Chicago Press, 2002).
[57] William Newman, "Technology and Alchemical Debate in the Late Middle Ages," *Isis* 80, no. 3 (1989) : 423.

literature,[58] scholars began analyzing literary representations of alchemy and astrology/astronomy within Middle English literature. While W. C. Curry analyzed Geoffrey Chaucer's command of astrology as evident in the *Canterbury Tales* as early as 1926,[59] his work did not focus on the representations of its practitioners within Chaucer's work. After the cultural turn, however, historians began to examine the satirical nature in which Chaucer and other Middle English writers represented natural philosophers and their practices.[60] Historians have since acknowledged the importance of studying texts that are "representative of the kind of general scientific and medical knowledge available to a reasonably educated but non-specialist audience" when attempting to discern the broader reach of natural philosophy in England.[61] Though some examination of the general "scientific" concepts, particularly medical concepts (discussed below) emerged during the late twentieth and early twenty-first centuries, lacking within this developing historiography is a connection between the institutional and lay philosophical understanding of the natural world, and how Middle English writers understood and incorporated these institutional philosophies into their more popular works.

In the late twentieth century, scholars pushed for a linguistic analysis of Middle English medieval and scientific texts, and launched projects to improve bibliographical tools for easier and more accurate research. These culminated into a trend in the twenty-first century to publish electronic catalogues of Middle English scientific writings, such as Linda Voigts and Patricia

[58] Ursula Peters, "From Social History to the Poetics of the Visual: Philology of the Middle Ages as Cultural History," *Journal of English and Germanic Philology* 105, no. 1 (2006) : 186-7.
[59] Walter Clyde Curry, *Chaucer and the Mediaeval Sciences* (New York: Oxford University Press, 1926), xix.
[60] Stanton J. Linden, *Darke Hierogliphicks: Alchemy in English Literature from Chaucer to the Restoration.* (Lexington: The University of Chicago Press, 1996); Peggy A. Knapp, "The Work of Alchemy," *Journal of Medieval and Early Modern Studies* 30, no. 2 (2000) : 575-599.
[61] *Popular and Practical Science in Medieval England*, ed. Lister M. Matheson (East Lansing, Michigan: Colleagues Press, Inc., 1994), xi.

Kurtz's 2000 complication *Scientific and Medical Writings in Old and Middle English Writings; An Electronic Reference*, and Irma Taavitsainen, Paivi Pahta, and Martti Makinen's 2004 project, the electronic *Corpus of Middle English Medical Texts* (*MEMT*) to facilitate a better understanding of medieval scientific thought as evident in the development Middle English writings.[62]

This demonstrates a growing trend within the historiography to understand the development of scientific thought beyond its philosophical theories to its more practical interpretations and applications amongst the vernacular-speaking laity. The scholarship began to study the link between medieval alchemical and medical texts and the increased use of the popular vernacular in place of institutional Latin in written works.[63] Though these studies facilitated a better understanding of how lay practitioners incorporated institutional medical ideas into their practice, the scholars examining these texts focus more on the challenges faced by compilers of Latin institutional texts when translated these concepts into Middle English, and the linguistic development resulting from the solutions to these challenges.[64] Furthermore, scholars who discussed the inclusion of institutional medical concepts within vernacular works beyond their linguistic repercussions focused more on the compilation process of these concepts by

[62] Päivi Pahta and Irma Taavitsainen, "Vernacularisation of Scientific and Medical Writing in Its Sociohistorical Context," *Medical and Scientific Writing in Late Medieval English*, eds. Irma Taavitsainen and Päivi Pahta (Cambridge: Cambridge University Press, 2004), 7.
[63] Michela Pereira. "Alchemy and the Use of Vernacular Languages in the Late Middle Ages." *Speculum* 74, no. 2 (1999) : 336-356.
[64] In, "What's the Word? Bilingualism in Late-Medieval England," 71, no. 4 (1996), for example, Linda Ehrsam Voigts focuses on code mixing evident in English medical texts; in addition, Taavitsainen's 1998 article "Vernacularisation of Medical Writing in English" examines the mechanics of transferring scholastic textual models to English medical writings.

translators from institutional Latin sources.[65] Lacking in this focus is a discussion on the institutional natural philosophical ideas underlying these concepts, as well as the possibility that lay practitioners consumed these natural philosophical ideas when reading these texts and disseminated elements of them to their patients.

Medieval scholars have studied the transmission of medieval thought to broader sectors of medieval society; however, religious medieval thought is at the center of these studies, with natural philosophical societal transmission lacking in the historiography. These scholars focus on popular perceptions of institutional religion (i.e. the Catholic Church) and the dissemination of popular heresy,[66] and the impact of vernacularized Church works and the publication and subsequent public access of these works on medieval popular perception and religious movements.[67] Likewise, an emerging trend in the twenty-first century scholarship of "practical" or "popular" lay versus "learned" institutional sciences, evident in the works of Michela Pereira and Cornelius O'Boyle, is the examination of these sciences—specifically astrology/astronomy, medicine, and alchemy—as blended, rather than distinct, bodies of knowledge.[68] These scholars identified a need to investigate how natural philosophers connected philosophy to practical applications, rather than the prevailing scholarship, which largely separates learned natural philosophy from more popular medieval sciences. This thesis helps address that need, for

[65] The focus of Irma Taavitsainen, "Transferring Classical Discourse Conventions into the Vernacular, Medical and Scientific Writing in Late Medieval English, eds. Irma Taavitsainen and Päivi Pahta (Cambridge: Cambridge University Press, 2004), 37-72.
[66] Examined in the seminal work R.I. Moore, *The Origins of European Dissent* (Allen Lane, 1913; repr.,Toronto: University of Toronto Press, 2005).
[67] Fiona Somerset, *Clerical Discourse and Lay Audience in Late Medieval England* (Cambridge: Cambridge University Press, 1998).
[68] Michela Pereira, "Alchemy and Hermeticism: An Introduction to this Issue," *Early Science and Medicine* 5, no. 2 (2000) : 115-120; Cornelius O'Boyle, "Astrology and Medicine in Later Medieval England: The Calendars of John Somer and Nicholas of Lynn." *Sudhoffs Archiv*, Bd. 89, H. 1 (2005), 1-22.

example, by highlighting the inclusion of tools used by lay practitioners, such as the bloodletting man in translated institutional medical works.[69]

Though there is an emerging shift in the scholarship from an analysis of institutional natural philosophy treatises and their implications solely within medieval institutions to a focus on the practical applications of natural philosophy in medieval society, the bridging of institutional philosophical thought into broader sectors of English medieval society and culture is lacking in the historiography. This thesis helps fill that gap by examining how Middle English authors and texts connected the institutional discourse on alchemy, astronomy/astrology, and medicine to the English laity.

Chapter Outline

"Chapter Two: Institutional Natural Philosophical Discourse," examines the transmission and reception of natural philosophical thought by clerics within medieval English institutions. This section traces how the natural philosophical fields of alchemy, astronomy/astrology, and humoral-based medicine entered into medieval institutions, and how medieval scholars, such as Thomas Aquinas, Robert Grosseteste, and Roger Bacon, reconciled these Aristotelian ideas within an authoritative context, and how by doing so further shaped and developed these ideas.

[69] The bloodletting man was an illustration of a naked man with labels specifying which veins should be opened for different medical conditions. Lay medical practitioners, such as barber-surgeons, most commonly did minor surgeries, such as bloodletting, within medieval English society. See Cornelius O'Boyle, "Astrology and Medicine in Later Medieval England: The Calendars of John Somer and Nicholas of Lynn," *Sudhoffs Archiv* 89, H.1 (2005) : 6-9. This is also further discussed in Chapter Three.

The third chapter, "Representations of Institutional Discourse in Middle English Literature," analyzes the reception of the institutional natural philosophical ideas discussed in Chapter Two by fourteenth and early fifteenth-century Middle English writers, and how these writers incorporated, and in some cases further developed, these ideas within their texts. This chapter provides a close reading of Middle English public and medical texts alongside natural philosophical institutional texts, and applies different methods of literary analysis to discuss the connections between the vernacular and institutional texts.

The conclusion, "Bridging Discourse: Connections Between Institutional and Lay Texts" recapitulates the connections between the natural philosophical knowledge of institutional and vernacular scholars. This chapter underscores the functionality of vernacular public writings and medical texts as bridges for the laity to institutional natural philosophical knowledge, while also highlighting the ways in which these separate spheres overlapped.

CHAPTER TWO: INSTITUTIONAL NATURAL PHILOSOPHICAL DISCOURSE

Before an examination on how institutional natural philosophical discourse reached the English laity can occur, a discussion on how institutional scholars received and discussed natural philosophical ideas is needed. During the twelfth and thirteenth centuries, medieval clerics received ancient Greek and Arabic natural philosophy texts as Latin translations of this knowledge entered their institutions. Throughout this period, these clerics reconciled this knowledge with their own understanding of the world from Christian authoritative texts—the Bible and works by the Church Fathers, particularly Saint Augustine of Hippo. Therefore, as clerical knowledge of Greek and Arabic natural philosophy developed, Aristotle, Hippocrates, Galen, and other sources emerged as authorities on the natural world. This section examines the institutional discourse shaped by clerical understanding and reconciliation of ancient Greek and Arabic natural philosophical texts on alchemy, astronomy/astrology, and humoral-based medicine.

Transmission and Scholastic Reception of Natural Philosophy

Alchemy

The alchemical processes outlined in Chapter One were preserved and developed further by Islamic scholars who translated Greek, Roman, and Egyptian manuscripts. Jabir ibn Hayyan,

known as Gerber,[70] and his successors Razi Ibn Sina (Avicenna), and Maslama ibn Ahmad—Islamic scholars whose works particularly shaped European understanding of natural philosophy—contributed to the study of alchemy a sharper focus on the generation of metals using mercury and sulfur and employing experimentation to improve the process.[71]

Their alchemical ideas entered medieval Western thought via the reconquest of Islamic Spain and through the translation of the Arabic *De compositione alchemiae* (*Book of the Composition of Alchemy)* in 1144 by the English scholar, Robert of Chester.[72] More translations of Arabic alchemical works soon followed, including translations by Gerald of Cremona, Dominic Gundissalinus (who linked alchemy to physics in his 1150 *De divisione philosophiae*), Adelard of Bath, and Michael Scot.[73] These treatises contributed to the thought of thirteenth century natural philosophers, including Robert Grosseteste, bishop of Lincoln, who posited in his *De artibus liberalibus* and *De generatione stellarum* the feasibility of the transmutation of metals.[74]

It was during this century that alchemy more widely entered the consciousness of medieval scholars, due in part to compilations by encyclopedists such as Vincent of Beauvais, Thomas of Cantimpré, and Bartholomew the Englishman.[75] In the third book of his *De mineralbius*, Albertus Magnus (Albert the Great), a Dominican friar and bishop of Regensburg,

[70] Gerber remains a controversial figure due to the improbable amount of alchemical treatises—about five hundred—attributed to him. Two Gerbers, one from the eighth century and another working under the same name form the thirteenth century, are thought to have existed. For a fuller discussion on the controversy surrounding Gerber, see Chism, "I Demed Hym Som Chanoun For To Be," 349.
[71] Will H. L. Ogrinc, "Western Society and Alchemy from 1200 to 1500," *Journal of Medieval History* 6, no. 1 (1980) : 104.
[72] Ibid.
[73] Ibid.
[74] James McEvoy, *The Philosophy of Robert Grosseteste* (Oxford: Clarendon Press, 1982), 164-5.
[75] Will H. L. Ogrinc, "Western Society and Alchemy," 104.

placed alchemy among the arts, and demonstrated a knowledge of its laboratory practices. He, like Grosseteste, also believed that the transmutation of alchemy was feasible, if difficult—a belief echoed by his student Thomas Aquinas, a Dominican friar and master at the University of Paris, in his *Summa theologica*[76].

Anxiety: Art versus Nature

Despite its growing place in the Western medieval consciousness, alchemy was excluded from medieval university curricula and was not taught at the institutional level until the early seventeenth century.[77] This was due, in part, to institutional anxiety that surrounded the artificial nature of alchemically-produced gold versus natural gold. This anxiety reflects one of the central debates on the natural world within medieval institutions—the art versus nature debate. The debate had its origins in Greek philosophy, stemming partly from Aristotle and dictates that the mechanical arts (artifice/art) originated from humans copying natural processes (nature). In the twelfth century, scholars interpreted the mechanical arts as an adulteration of nature. This attitude towards mechanical arts continued in mainstream scholastic thought, and some scholars equated alchemy, with its laboratory attempts to transmute baser metals into gold, as an attempt by humans to improve upon nature, and ultimately, God's work.[78]

The translation of Avicenna's *The Book of Remedy* proved a large contribution to the art versus nature debate surrounding alchemy, due in large part to the incorrect attribution of the

[76] Thomas Aquinas, *Summa theological*, 2.2.77, trans. Fathers of the English Dominican Province in *The Summa Theologica of St. Thomas Aquinas*, 2nd ed (1920), online from New Advent, http://www.newadvent.org/summa/3077.htm (accessed January 19, 2015).
[77] Newman, "Technology and Alchemical Debate," 425.
[78] Ibid., 424.

work to Aristotle. In the work, "Aristotle" (Avicenna) attacked the transmutation process as false.[79] Medieval scholars attributed at least eighteen alchemical treatises to Aristotle. As the primary ancient authority regarding the medieval understanding of the natural world, natural philosophers gave strong consideration of these works when discussing alchemy.[80]

"Aristotle's" stance on alchemy contributed to a mounting ambiguity on the legitimacy of alchemical theory and practice. Though the other works by Aristotle seemed to legitimize alchemy, this falsely attributed treatise—though describing the qualities of metals and the composition of these metals in varying degrees of purity, the central tenets to alchemical theory—denounced the possibility of metallic transmutation. He does this by stating that artificial and natural products are irreconcilably different and that art is innately inferior to nature and cannot be its equal. Thus, art cannot be used to change baser metals to purer ones. He argues that it is impossible for humans to determine species characteristics of metal because these characteristics fall below the level of human sense. Therefore, it is impossible for humans to transmute metal because they cannot know the characteristics that need to be manipulated.[81]

In addition, though Thomas Aquinas, unlike "Aristotle," accepted the possibility of the transmutation of baser metals into more noble metals, his *Summa theologica* contributed the anxiety generated by the art versus nature debate:

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[79] Newman, "Technology and Alchemical Debate," 427; Interestingly, as mentioned above, Avicenna was often cited as a source for alchemy, and he did write treatises on the subject. However, since his commendation was attributed century to Aristotle, medieval writers canonized him as a great alchemical scholar. For a discussion of this issue, see Chism, "I Demed Hym Som Chanoun For To Be," 349.

[80] Newman, "Technology and Alchemical Debate," 425. Though we now know that Aristotle did not write on alchemy, this knowledge was not available to medieval scholars.

[81] *Avicennae de congelatione et conglutinatione lapidum*, edited and translated by E. J. Holmyard and D. C. Mandeville (Paris: Geuthner, 1927), 1-11. For this, I rely on William Newman's interpretation of this translation, which he provides in Newman, "Technology and Alchemical Debate," 427.

> Hence if the gold or silver produced by alchemists has not the true specific nature of gold and silver, the sale thereof is fraudulent and unjust, especially as real gold and silver can produce certain results by their natural action, which the counterfeit gold and silver of alchemists cannot produce. Thus the true metal has the property of making people joyful, and is helpful medicinally against certain maladies. Moreover real gold can be employed more frequently, and lasts longer in its condition of purity than counterfeit gold. If however real gold were to be produced by alchemy, it would not be unlawful to sell it for the genuine article, for nothing prevents art from employing certain natural causes for the production of natural and true effects, as Augustine says of things produced by the art of the demons.[82]

Aquinas takes issue with the production of gold and silver through the manipulations of metals, which he argues violates their true nature. Due to this adulteration of nature, he describes alchemical production as the "art of the demons." He echoes this comparison in his *Scriptum super libros sententiarum magistri Petri Lombardi episcopi Parisiensis* (*Commentary on the Sentences of Peter Lombard*), stating that the art of creating alchemical gold is akin to the method of art used by demons to perform false and ephemeral illusions.[83]

Reconciling Alchemical Anxiety

As criticism of the legitimacy of alchemy mounted, a response to this criticism in defense of alchemy also grew in the thirteenth century. While Avicenna and the scholastic scholars who adopted his arguments against alchemy employed Aristotelian natural philosophy as an authority to legitimize their points, the proponents of alchemy also used Aristotelian natural philosophy to

[82] Thomas Aquinas, *Summa theological* 2.2.77, trans. Fathers of the English Dominican Province in *The Summa Theologica of St. Thomas Aquinas*, 2nd ed (1920), online from New Advent, http://www.newadvent.org/summa/3077.htm (accessed January 19, 2015).
[83] A portion of this translated work is provided in William Newman, "Technology and Alchemical Debate in the Late Middle Ages," *Isis* 80, no. 3 (1989), 438.

discuss the potential of alchemy to enhance human life and its understanding of the natural world.[84] One of the most important scholastic defenders of alchemy to emerge during this time was Roger Bacon.

In his 1266 *Opus tertium*, a treatise to Clement IV that is a part of a trilogy encompassing the *Opus maius* and *Opus minus*, Bacon outlined his ideas regarding how the sciences could reform studies. He highlights the importance of alchemy in the movement to reform scholastic science, and he connects the practice to Aristotelian natural philosophy. He writes to Clement IV:

> The generation of humors from elements, the due proportion in humors, the generation of inanimate things from humors are treated: especially the generation of metals, as this is required in the sixth sin of study. All this subject [of alchemy] is of the greatest importance. Then I showed the application of this science to the exposition of the Holy Scripture.[85]

Bacon connects the elements involved in the generation of celestial bodies, as Aristotle outlines in *De caelo*, to the generation of metals. He underscores this by stating "great questions of natural philosophy and medicine, about digestions, humours, etc., are treated in philosophical language, though they are closely connected with alchemy," positing that through experimentation with these elements, alchemy "not only procures wealth, but, in conjunction with experimental science, it can prolong life."[86] In this way, he defends alchemy in the art versus nature debates by arguing for the superiority of art as a method to improve upon nature.

He asserts that alchemy can contribute to human knowledge beyond Aristotle's teachings by teaching people knowledge beyond Aristotle's scope, such as "the precise generation of

[84] Newman, "Technology and Alchemical Debate," 429.
[85] Roger Bacon, *Opus tertium*, in *Part of the Opus tertium of Roger Bacon*, ed. and trans. A.G. Little (Aberdeen: The University Press, 1912), xlvi.
[86] Ibid.

minerals, pigments, precious stones, and humors from the elements."[87] He postulates that since alchemy represents a science of the elements, a foundational concept for both natural philosophy and medicine, then alchemy represents the "most basic of the sciences."[88] Important to his reconciliation of the practice, however, is that he stresses to Clement IV "These secrets [of alchemy] must not be revealed to the vulgar."[89] For alchemy to reach its true potential—which is to better understand the natural world and how to improve human health and life—the "vulgar" (i.e. lay population) must not understand the true philosophical underpinnings of alchemy. Thus, by the fourteenth century, scholastic writers either characterized alchemy as a pseudoscience, a potentially sinful artifice, or an extension of Aristotelian natural philosophy that must remain the domain of the learned clerics. How these debates were received by those not fully immersed within the English medieval institutions, and how writers chose to represent these debates and ideas surrounding alchemy, will be examined in the third chapter.

Astronomy/Astrology

While the thirteenth-century English scholars contended with alchemy and the art versus nature debate, they also discussed the three dominant astronomical models mentioned in Chapter One (the Aristotelian, Ptolemaic, and the al-Bitrujian). Uncovering issues in the models, Aristotelian natural philosophers delved into the Philosopher's astrological/astronomical theories to reconcile the models. Robert Grosseteste, bishop of Lincoln, struggled with the superior mathematical logic of the Ptolemaic system over the fundamental physical principles of the

[87] Newman, "Technology and Alchemical Debate," 432.
[88] Ibid.
[89] Roger Bacon, *Opus tertium*, xlvi.

Aristotelian system outlined in *De caelo*.[90] Believing that the Aristotelian model stood as the only satisfactory model of the celestial movements, he still used the Ptolemaic epicycles and eccentrics in his *Comptus* to construct tables and to calculate the correct length of the year. He was also familiar with al-Bitruji's model, noting that the model reconciled some of the issues with the Aristotelian model without the addition of Ptolemy's epicycles and eccentrics, however, Grosseteste thought ultimately that the unaltered Aristotelian model worked only in imagination, and not in nature.[91]

Though Grosseteste found issues with the Aristotelian model, he, as most scholastic scholars who consumed the Greek and Arabic translations of astronomical/astrological works, accepted the natural philosophical underpinnings of that model as described in Aristotle's *De caelo*. In his comprehensive treatise, *De sphera*, Grosseteste discusses the Aristotelian connections of planetary motions to the four classical elements of earth, fire, air, and water, and uses this concept to reconcile the (as he saw it) flawed Ptolemaic and Aristotelian systems to the Arabic models.[92]

The book gave an "account of the whole organization of the heavens from the circle of the fixed stars down through the orbits of the seven planets to the circles of the four elements with earth at the center."[93] Using this Aristotelian concept, Grosseteste combines his astrological and alchemical beliefs in his *De Artibus Liberalibus*, in which he postulates how the qualities of the planets described in Aristotle's *De caelo* combined to produce metals. Moreover, in a

[90] A. C. Crombie, *Robert Grosseteste and the Origins of Experimental Science, 1100-1700* (Oxford: Oxford University Press, 1962), 97.
[91] Crombie, *Grosseteste*, 97.
[92] R.W. Southern, *Robert Grosseteste: The Growth of an English Mind in Medieval Europe*, 2nd ed, (Oxford: Clarendon Press, 1992), 142-3.
[93] Ibid., 143.

different treatise titled *De Cometis*, Grosseteste describes how these fundamental concepts of cosmological theory can be used to predict future events. These predictions did not center on divining outcomes for individual humans; instead, predictions surrounding natural outcomes could be ascertained through observation and an understanding of natural philosophy. For example, from a comet's appearance, one can predict future events by understanding that "the comet is fire sublimated by the virtue of a star or planet and assimilated to its proper nature."[94] The connection of the Aristotelian understanding of planetary motions and the natural world to astrological predictions is not unique to Grosseteste. Indeed, medieval institutional scholars used this connection to better understand the mechanics of the observable natural world and its philosophical underpinnings.

While natural philosophers contended with understanding the structure of the known universe, they also addressed a pressing concern: When is practicing astrology lawful in terms of Church authority? Furthermore, are the divinations made from astrological practice valid, and is it possible for man to understand God's plan through astrological divinations?

Thomas Aquinas's *Summa theologica* reconciled astrology, like he did with other branches of knowledge concerning the natural world; however, he qualified his acceptance and reconciliation on the validity of astrological predictions. When addressing the question "Whether Divination by the Stars is Unlawful," Aquinas consulted works by Dionysius, Aristotle (referred to as "the Philosopher" throughout his *Summa*), and St. Augustine of Hippo. From these works, Aquinas acknowledges the possibility of astrological divination in certain circumstances, but discredits its use when predicting the fortunes of people.

[94] As translated and interpreted by James McEvoy in *The Philosophy of Robert Grosseteste* (Oxford: Clarendon Press, 1982), 164-5.

Citing Aristotle's *De anima* (*On the Soul*), Aquinas states that because "no [celestial] body can make an impression on an incorporeal body [human will or soul]," it is then "impossible for heavenly bodies to make a direct impression on the intellect and will." Due to this, celestial bodies cannot directly impact the free-will operations of people.[95] However, Aquinas does present conditions for when celestial bodies can affect human activity. This is accomplished when the celestial bodies act on humans' corporeal bodies, specifically human organs. Natural philosophy dictates that celestial bodies impacted human bodies in different ways, which shaped medieval medical practices (outlined below). Therefore, Aquinas qualifies the possibility of astrological divinations in two ways:

> First, because a great number of men follow their bodily passions, so that their actions are for the most part disposed in accordance with the inclination of the heavenly bodies: while there are few, namely, the wise alone, who moderate these inclinations by their reason. The result is that astrologers in many cases foretell the truth, especially in public occurrences which depend on the multitude. Secondly, because of the interference of the demons. Hence Augustine says: "When astrologers tell the truth, it must be allowed that this is due to an instinct that, unknown to man, lies hidden in his mind. And since this happens through the action of unclean and lying spirits who desire to deceive man for they are permitted to know certain things about temporal affairs.[96]

In this passage, Aquinas explains that human passions invite the influence of celestial bodies. Bodily appetites governed passions and dictated the lower faculties, and it is the earthly/corporeal bodies that the heavenly bodies can influence. The influence of these heavenly bodies is limited, however, to material objects; they cannot control man's intellect. They can have an indirect effect, however, if the person permits their influence, leading Aquinas to state

[95] Aquinas, *Summa Theologica, Ad Tertium* I.I.115.4. http://www.summatheologica.info/summa/questions/?q=328&a=1708 (accessed January 23, 2015).
[96] Ibid.

that "the wise man rules the stars," an opinion held by learned astrologers.[97] In other words, free will triumphs over inclinations felt on the mortal body when a person is governed by his mind rather than his passions.[98]

Medicine

During the thirteenth century, medicine enjoyed the same treatment as alchemy and astrology/astronomy as English medieval scholars applied their new knowledge of Aristotelian natural philosophy to the philosophy of medicine. Text-based medical learning shifted from the monastic settings of the holy men to the new universities of Cambridge and Oxford, with Merton College in Oxford becoming notable for its natural philosophers and physicians. As learning became increasingly institutionalized, so did the study of medicine. The physician also became more institutionalized, and these physicians established themselves within the church and medieval courts. Likewise, due to the foundation of the aforementioned English universities, by the fourteenth century physicians became English-educated, rather than studying at one of the continental schools.[99]

Important to the transmission of natural philosophical ideas vis-à-vis their role in the development of institutional medicine is that different types of practitioners practiced English medicine. These types included the ordinary practitioners, or tradespeople, who commonly used popular remedies such as herbal recipes in their practice, and the elite practitioners, or the courtly

[97] "The wise man rules the stars," the astrologers' creed, is attributed to Ptolemy. Marijane Osborn, *Time and the Astrolabe in the Canterbury Tales* (Norman, OK: University of Oklahoma Press, 2002), 199.
[98] Aquinas, *Summa Theologica*, *Ad Tertium*, I.I. 115.4.
[99] Getz, *Medicine*, 17.

and clerical, who practiced institutionalized humoral medicine. In addition, these two types did not practice in separate spheres; rather tradespeople sometimes adopted the methods of the clerical practitioners, and vice versa.[100] This will be seen in the discussion of the production and ownership of surgical texts in Chapter Three. Furthermore, the practice of medicine in return for payment "is found on all social levels throughout the medieval period," and practitioners often had more than one role within medieval society.[101] In addition, traditionally, many institutional medical writers did not practice medicine, but instead studied and wrote on the topic using Aristotelian natural philosophical texts.[102] Their incorporation of these Aristotelian texts helped shape the institutional discourse on medicine, which would in turn transfer to the medicine practiced by tradesmen and clerical practitioners.

An English scholastic physician who both studied and practiced medicine was Gilbertus Anglicus (c.1180 – c.1250). His best-known work, the *Compendium Medicinae* (*Compendium of Medicine*), provided a comprehensive overview of scholastic medical knowledge drawing from the ancient authoritative medical writings of Hippocrates, Galen, Aristotle, and Avicenna.[103] The work "is one of the longest medical texts remaining from the Christian middle ages," and is one the first medical texts to include the teachings of Islamic physicians. [104] In terms of its

[100] Getz, *Medicine*, 6.
[101] Getz, *Medicine*, 6-8.
[102] Cornelius O'Boyle, "Astrology and Medicine in Later Medieval England: The Calendars of John Somer and Nicholas of Lynn," *Sudhoffs Archiv*, Bd. 89, H. 1 (2005) : 14-15. Getz, *Medicine*, 16.
[103] Getz, *Medicine*, 1, 39.
[104] Faye Marie Getz, "The Pharmaceutical Writings of Gilbertus Anglicus," *Pharmacy in History* 34, no 1 (1992) : 17.

complexity and influence on scholastic discourse, scholars have compared the *Compendium* to Aquinas's *Summa theologica*.[105]

Gilbertus divided his work into seven chapters, providing numerous and detailed commentary throughout the work. He incorporated Aristotelian natural philosophical ideas into his explanation of medical ailments and their cures. For example, in his chapter on fevers, Gibertus posits that fevers are an infliction of the soul, reflecting knowledge of the relationship between the corporeal body to the soul found in Aristotle's *De anima*.[106] Likewise, he incorporated the Hippocratic medical concept of humors into the medical recipes in his work. He describes all diseases as being cold, hot, moist, or dry (reflecting the qualities of the humors), and prescribes cures based on balancing the humors. A hot headache, for example, should be treated using cooling remedies.[107] His work also demonstrates the inextricable connection between astrology and medicine in medieval institutional discourse; many of the remedies instruct the reader to use lunar prognostications prior to treating certain illnesses, and connect the qualities of celestial bodies (hot, moist, dry, cold) to their corresponding humors when discussing possible treatments.[108]

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[105] C.H. Talbot, *Medicine in Medieval England* (London: Oldbourne, 1967), 73; Getz, *Medicine*, 41.
[106] Getz, *Medicine*, 40.
[107] Getz, "Gilbertus Anglicus," 19-20.
[108] Taken from Faye Getz's description of the Latin text in *The Middle English Gilbertus Anglicus*, in *Healing and Society in Medieval England: A Middle English Translation of the Pharmaceutical Writings of Gilbertus Anglicus*, ed. Faye M. Getz (Madison: The University of Wisconsin Press, 1991), lix, 29, https://books.google.com/books?id=MZy81Wyt_FUC&pg=PR4&lpg=PR4&dq=Healing+and+Society+in+Medieval+England&source=bl&ots=8bL63XzPCR&sig=ZFhGFN8Ue2uqMGiVboJNJ5hQrgM&hl=en&sa=X&ei=w2B0Ve3cMomkgwS2y4HYCQ&ved=0CEMQ6AEwBg#v=onepage&q=humour&f=false (accessed April 19, 2015).

Astrology and Medicine

As Aquinas's reconciliation and Gilbertus Anglicus's use of astrology demonstrates, astrological philosophy helped shape medieval notions of the body and medicine. During the twelfth century, as translations of Greek and Arabic works influenced the medieval Latin West's understanding of the natural world, the dissemination of Arabic astrological treatises led scholars to connect "Aristotle's physical principles and its technical content on the interpretation of Hippocratic texts offered by Galen" to the astrological ideas in the Arabic treatises.[109] Twelfth-century Latin translations by Roger of Hereford of the ninth-century Muslim Abū Ma 'shar's astrological/medical treatises *Introductorium* proved particularly influential in this regard. In the work, Abū Ma 'shar links the qualities used to categorize the humors of the body to celestial influences, and he viewed medicine as a "specialized form of astrology."[110]

Due to the *Introductorium* translations, Abū Ma 'shar became one of the most cited authors in Latin astrologies. He explains Aristotle's concept of the four elements acting upon the planets. He then extends that concept to the human body by connecting it to the four bodily humors that dictate human health. Each humor, he explains, has a pair of elementary qualities (hot and cold, moist and dry) that correspond to celestial influence. The physician's task, then, is to balance the four humors to attain the good health of their patients, which is accomplished through understanding of elements and their celestial governors and how this corresponds to a planet's control of particular organs of the body.[111]

[109] Roger French, "Foretelling the Future: Arabic Astrology and English Medicine in the Late Twelfth Century," *Isis* 87, no. 3 (1996) : 455-458.
[110] Ibid., 456.
[111] Ibid.

The fields of astrology/astronomy and medicine, therefore, became intertwined within scholastic medieval thought. This is further demonstrated in works such as the ecclesiastical calendars of John Somer and Nicolas of Lynn. Created the at the request of English royalty in 1380 by John Somer in Oxford, and by Nicholas of Lynn in 1386, also at Oxford, the calendars were commonly used in medieval institutions and served several purposes.[112] More than the charting of days of the month, calendars functioned as almanacs, provided charts for calculating sunrises and sunsets, the phases of the moon on any day of the year, as well as shadow lengths at any given hour.[113]

Due to the complicated manner used to calculate the dates for Easter, medieval scholars required the creation and continuous updating of astronomical tables. In England, Roger Bacon drew up these tables from the period of 1254 to 1329, which were updated by the Oxford Benedictine Walter of Evesham between 1292 to 1367, and later by the Cambridge scholar Walter of Elveden between 1330 to 1386.[114] These tables had an ecclesiastical focus centered on the dates of important Christian feasts determined by the date of Easter, such as Lent, Ascension, and Pentecost. The content and focus of the tables somewhat changed, however, when the task of once again updating the tables fell to John Somer and Nicholas of Lynn, respectively. What were once tools used institutionally to calculate important ecclesiastical dates, now became tools designed to make astrological calculations and to serve a medical purpose.[115] These calendars quickly became so popular that between 1387 to around 1462, English authors referred to them

[112] Cornelius O'Boyle, "Astrology and Medicine," 1.
[113] Osborn, *Time and the Astrolabe*, 15-16.
[114] O'Boyle, "Astrology and Medicine," 1-2.
[115] Ibid., 2-3, 5.

simply as "the new calendar," which was understood by their audience to mean the calendars of John Somer and Nicholas of Lynn.[116]

Regarding the ecclesiastical content, Somer's and Lynn's calendars contain the Christian feast days for each month along with month-by-month calendars, the days of the month in Roman form, and the number used for calculating the date of Easter on a given year. In addition to the ecclesiastical portion of the calendars is the astronomical information. This information includes columns that denote the daily times of sunrise and sunset, dawn and dusk, new and full moons, as well as methods for the user to calculate the time of day.[117]

The calendars also included astronomical information—tables for calculating the moon's position in the zodiac—for astrological and medical purposes. This inclusion reflects the medieval belief in the moon's ability to influence bodily fluids such as blood. This belief stemmed from the observed effects the moon has on tides, and the apparent effects it has on menstruation. In addition to the moon's zodiac-centric positions, the calendars included tables indicating the reigning and dominant planet for each hour, which reflects to the notion that planets influenced human behavior by governing and affecting the temperaments and humors basic to natural objects. [118] Therefore, one cannot discuss medieval medicine without discussing medieval astronomical/astrological ideas; this knowledge was necessary for predicting the outcome of an illness and for knowing the most favorable time for carrying out numerous medical treatments.

[116] Ibid., 1.
[117] O'Boyle, "Astrology and Medicine," 4.
[118] Ibid., 5.

Conclusion: Scholastic Reception and Development of Natural Philosophy

To understand the transmission and reception of institutional natural philosophical ideas by the laity, a discussion on how the institutional scholars received and discussed those natural philosophical ideas is needed. During the twelfth and thirteenth centuries, institutional scholars reconciled and developed the fields of alchemy, astrology/astronomy, and medicine with Aristotelian natural philosophy and other ancient Greek and Arabic sources. The connections Aristotle made between celestial and corporeal bodies shaped the institutional discourse regarding these fields; scholars cited this Aristotelian natural philosophy when determining right theory and practice of each field.

Alchemy proved a particularly contentious field. The works of institutional scholars reflect varying levels of anxiety and acceptance concerning its legitimacy due to the art verses nature debate that stemmed from Greek philosophical sources. Though he theorized the transmutation of metals was feasible, Thomas Aquinas compared the practice to the artifice performed by demons. Conversely, Roger Bacon promoted alchemy as an art that could improve upon nature, though he warned against exposing the "vulgar" (laity) to its secrets. Recognizing the ambiguity evident in the institutional discourse is important to identifying this discourse in works meant for a general medieval audience, examined in Chapter Three.

Through their efforts to better understand the mechanics of the cosmos through mathematics, observation, and Greek and Arabic cosmological systems, scholars within the community of natural philosophers also contended with the validity of astrological practice. Thomas Aquinas qualified his reconciliation of astrological divinations by connecting their

legitimacy in terms of celestial influence on material objects/corporeal bodies. Robert Grosseteste posited a similar reconciliation, writing that predictions surrounding natural outcomes could be ascertained through observation and an understanding of natural mechanics. The connection of celestial influence on corporeal forms to astrological divinations underpinned institutional medical astrological concepts.

Astrology began shaping medieval medical concepts when translated works such as Abū Ma ‘shar’s *Introductorium* correlated Aristotle’s concept of the four elements influencing celestial bodies to the elementary qualities of the four bodily humors. This correlation formed the basis of numerous treatments in Gilbert Anglicus’s *Compendium*, in which he recommends the use of lunar prognostications and other astrological tools to dictate treatments. Medicine and astronomy/astrology became so synonymous in the Middle Ages that by the fourteenth century, astronomical calendars once created solely for calculating ecclesiastical dates started to contain astrological medical information, as seen in the calendars of the Oxford scholars John Somer and Nicholas of Lynn.

The discourse surrounding the reconciliation by institutional scholars of Aristotelian natural philosophy with observation and Church doctrine has long preoccupied medieval historians. How works directed towards a lay audience received, understood, and represented these natural philosophical notions, however, needs to be explored. The next chapter examines public writings and medical texts to demonstrate lay understanding and representation of institutional ideas, thus overlapping these previously separated spheres of clerical and lay knowledge.

CHAPTER THREE: INSITUTIONAL DISCOUSE IN PUBLIC WRITINGS AND MEDICAL TEXTS

During the fourteenth and fifteenth centuries, writings in the vernacular (Middle English) aimed toward a broader audience began circulating within sectors of medieval society outside of medieval institutions. When writing works for a general audience, Middle English writers incorporated what they believed constituted as important information for this audience.[119] This audience included those who could read English, which encompassed broader sectors of medieval society compared to their Latin literate counterparts. By the fourteenth and fifteenth centuries, the literate English medieval population represented a "heterogeneous group in terms of social status, education, and profession."[120] The growth of a medieval middle class and new professions, urban society, and grammar school system contributed to the spread of literacy beyond institutional scholars and the upper classes. Estimates on the scope of literacy vary, but a more conservative estimate is 30 percent by the fifteenth century, with higher rates in large urban areas.[121]

Though many public writings included information thought important in a traditional clerical medieval context, such as moralistic mystery plays and sermons, public writings and

[119] C. David Benson, *Public Piers Plowman: Modern Scholarship and Late Medieval English Culture* (University Park, PA: The Pennsylvania State University Press, 2004), 113-114.
[120] Päivi Pahta and Irma Taavitsainen, "Vernacularisation of Scientific and Medical Writing in Its Sociohistorical Context," *Medical and Scientific Writing in Late Medieval English* (Cambridge: Cambridge University Press, 2004), 15.
[121] Ibid.

translations of natural philosophical texts also began appearing in the English vernacular.[122] These writings, in turn, exposed the laity to the clerical knowledge of the natural world clerics received and further developed during the twelfth and thirteenth centuries. This resulted in the overlapping of traditionally separated spheres of knowledge regarding the natural world. Conventionally, knowledge transmitted from medieval institutions to the laity centered on religious themes and instructions; however, due to these public writings and Middle English copies of Latin medical texts, clerical discourse on natural philosophy entered the sphere of public knowledge. To understand how the spheres of knowledge overlapped, a side-by-side examination of institutional natural philosophical works, public writings containing the subjects of alchemy, astrology/astronomy and medicine, and copies of Latin medical texts is needed.

Chaucer's Audience

Primary Audience

Following the notion that culture became increasingly mediated through writing throughout the Middle Ages, an examination of Middle English public writings provides a useful avenue of analysis for exploring the cultural reception of natural philosophical fields. A well-known example of a Middle English public writing is Geoffrey Chaucer's *The Canterbury Tales*. Chaucer, born to a wine merchant and spending his adult life in royal and government service as a page, controller of customs on wool, Member of Parliament for Kent, and Clerk of the King's

[122] Päivi Pahta and Irma Taavitsainen, "Vernacularisation of Scientific and Medical Writing in Its Sociohistorical Context," *Medical and Scientific Writings in Late Medieval English*, eds. Irma Taavitsainen and Päivi Pahta (Cambridge: Cambridge University Press, 2004), 1; C. David Benson, *Public Piers Plowman*,113-114.

Works,[123] was relatively well-connected within the literary circles of England.[124] Chaucer's noted entourage, and in turn his immediate primary audience, included those "in and about the civil service of Richard II—knights esquires, and clerks, in situations like his own or just to one side or the other of the social scale."[125] This primary audience alone was fairly diverse; though it included some gentlepersons, others, such as the clerks, "were hardly gentle at all."[126] They also represented the "new men" of Chaucer's time;[127] they expanded their social opportunities and helped shape medieval society outside the traditional confines of land tenure and military service; they enjoyed social mobility, were cosmopolitan, and associated with numerous members of medieval urban life, such as civil servants, lawyer, merchants, as well as the landed gentry.[128]

With his social connections, literary devices that allowed a larger audience to recognize and understand the ideas presented in his work, and consciousness of a diverse audience, Chaucer's *The Canterbury Tales* proved a popular work within a medieval context, with more survived manuscripts than any other Middle English work.[129] His work influenced literary

[123] Jill Mann "Editor's Note," Geoffrey Chaucer, *The Canterbury Tales*, edited with an Introduction and Notes by Jill Mann (London: Penguin Books, 2005), i.
[124] Paul Strohm, *Social Chaucer* (Cambridge: Harvard University Press, 1989), 50-51.
[125] Paul Strohm, "Chaucer's Audience(s): Fictional, Implied, Intended, Actual," *The Chaucer Review* 18, no. 2 (1983) : 143.
[126] Ibid.
[127] Malcolm Richardson, "The Earliest Known Owners of Canterbury Tales MSS and Chaucer's Secondary Audience," *The Chaucer Review* 25, no. 1 (1990) : 17-32.

[128] Strohm, *Social Chaucer*, 1.
[129] C. David Benson, *Public Piers Plowman: Modern Scholarship and Late Medieval English Culture* (University Park: The Pennsylvania State University Press, 2004), xi.

discourse during the fourteenth century and the post-Chaucerian literary system of the fifteenth centuries.[130]

Secondary Audience

As one of his last works, Chaucer wrote *The Canterbury Tales* not only to his primary audience, but to also an intended secondary audience.[131] Chaucer's removal from Westminster-London towards the end of his career, and his increasingly complicated communications with his social circle afterwards, encouraged Chaucer to look beyond his primary audience with a progenic eye. To write for this longer-term audience, Chaucer created a masterwork of "fictional pilgrim tellers and hearers" as a literary vehicle for an audience of distant and future readers. [132] While Chaucer's own primary audience represented a growing and diverse portion of upper and upper-middle English medieval society, his pilgrims constitutes an even more diverse group to include a voice for women, attorneys, merchants, sergeants at law, sergeants, summoners, franklins, pardoners, and more.[133]

To draw and accommodate a more socially-diverse audience, a communicative dimension manifested in Chaucer's literature that shaped his discourse "with the needs and capacities of an intended audience in view."[134] His *The Canterbury Tales* exhibits a performative

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[130] Seth Lerer, *Chaucer and His Readers: Imagining the Author in Late-Medieval England (*Princeton: Princeton University Press, 1993), 3-6.
[131] Malcolm Richardson, "The Earliest Known Owners of Canterbury Tales MSS and Chaucer's Secondary Audience," *The Chaucer Review* 25, no. 1 (1990) : 17-32; Paul Strohm, "Chaucer's Audience(s): Fictional, Implied, Intended, Actual," *The Chaucer Review* 18, no. 2 (1983) : 137-145.

[132] Strohm, *Social Chaucer*, 50, 64-68.
[133] Ibid., 68.
[134] Strohm, *Social Chaucer*, 48.

nature, which in premodern narrative writers accomplished by manifesting their "reality" through didactic language. This included the use of allegories and symbols/tropes commonly recognized by the medieval public to facilitate transmission of ideas.[135] Chaucer's *The Canterbury Tales* exhibits this performative nature through his use of common tropes and a tone that exhibits logocentric coherence, i.e. "what everyone knows," or a common understanding of the shared medieval worldview and values.[136]

In addition to the performative nature of his work, instead of *The Canterbury Tales* exhibiting elements that indicate a one-direction text—from author to audience—his works reflects an active participation from his audience in a collaborative effort in which the text is constructed between Chaucer and his audience "as a kind of ideological bridge."[137] This indicates that when including natural philosophical subjects within his works, Chaucer remained conscious of his intended primary and secondary audiences and their possible reception of his works.[138] Therefore, he incorporated common perceptions of fields such as alchemy and astrology/astronomy, as will be examined in his use of tropes and estates satires, in with his own reception of institutional natural philosophical discourse. This he communicated through the perfomative nature of his work with logocentric tools, such as a univocal (what everyone knows) tone to qualify his natural philosophical perceptions (examined below). In this way, Chaucer used these literary tools to both sort through his own reception of institutional natural philosophy and to communicate this reception to his audience. Likewise, the social diversity of the pilgrims

[135] Henry McDonald, "The Performative Basis of Modern Literary Theory," *Comparative Literature* 55, no. 1 (2003) : 60-61.
[136] H. Marshall Leicester, Jr., "Oure Tonges Différance," *Medieval Texts and Contemporary Readers*, eds. Laurie A. Finke and Martin B. Shichtman (Ithaca: Cornell University Press, 1987), 22-23.
[137] Strohm, 50.
[138] Leicester, "Oure Tonges Différance," 22-23; Strohm, *Social Chaucer*, 68-71.

in his *The Canterbury Tales* reflects Chaucer's understanding of the increasingly socially diverse audience who will receive and respond to his work—a group beyond the immediate social circle to whom his works usually addressed.[139]

Chaucer and Alchemy: The Canon's Yeoman's Prologue and Tale

It is to this socially-diverse audience Chaucer presents his *Canon's Yeoman's Prologue and Tale*, and within it his own ambivalence concerning the natural philosophical discourse on the subject of alchemy. Throughout the work, Chaucer expresses much of the same anxiety seen in Thomas Aquinas's works regarding alchemical practices, as seen in his representation of the Canon. The Canon's Yeoman's "baudy and tortore" is an indicator of the life of failure led by the Canon; as the Host "naively" points out, if the Canon was as successful in his art as the Yeoman claims, this would be reflected in his appearance.[140] The boasts of success during their alchemical practices made by the Yeoman also demonstrate that the Canon and his Yeoman caught up with the group of pilgrims in hopes of conning them.[141]

The literary representations of the Yeoman also reflect Chaucer's criticism of alchemy. Chaucer depicts him as the medieval stereotypical "puffer," a derogatory term used to describe "the manipulator of the fires for an alchemist of the exoteric or uniformed type." The term was also extended to alchemists who sought the practice as a method for getting rich. These alchemists, therefore, were not practicing alchemy for spiritual awareness, but instead for the creation of wealth, and were therefore considered base.[142]

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[139] Lerer, *Chaucer and His Readers*, 68.
[140] Ibid., 45.
[141] Ibid., 44-45.
[142] Robert T. and Laura C. Lambdin, "His Yeman Eek Was Ful of Curteisye," 359.

Throughout the *Prologue* and *Tale*, as mentioned above, the Yeoman uses negative language to describe the Canon and his craft, thus linking the practice of alchemy for worldly gain to evil, and therefore, to failure. This is highlighted further when Chaucer's Yeoman laments over the numerous failed attempts by he and the Canon to transmute baser metals into gold. He describes the practice itself in colorful and crude language, and the negative connotations of the medieval "puffer" trope is evident throughout the Yeoman's descriptions:

Our lampes brenning bothe night and day
To bringe aboute our craft, if that we may;
Our fourneys eek of calcinacioun,
And of watres albificacioun;
Unslekked lym, chalk, and gleyre of an ey,
Poudres diverse, asshes, dong, pisse and cley,
Cered pokets, sal peter, vitriole,
And divers fyres maad of wode and cole;[143]

The Yeoman lists these elements (and more) to describe the failed attempts by he and the Canon to produce the Philosopher's Stone, and the crudeness of Chaucer's choice of elements, the "dong" and "pisse," suggests a satirical quality to Chaucer's description of alchemical practices.

The long list of elements, continuing for several lines beyond the above stanza, also suggests a futile quality to the practice. This is evident in the failed attempts to control the fires used for transmutation in the Canon's workshop:

Er that the pot be on the fyr ydo,
Of metals with a certein quantite,
My lord hem tempreth, and no man but he –
Now he is goon I dar seyn boldely –
For (as men seyn) he can doon craftily,
Algate I woot wel he hath swich a name –
And yet ful ofte he renneth in a blame.
And wite ye how? Ful ofte it happeth so,

[143] Chaucer, *The Canon's Yeoman's Tale*, lines 250-6.

The pot to-breketh, and farewel! al is go.
Thise metals been of so greet violence,
Our walles mowe nat make hem resistence
But if they weren wroght of lym and stoon,
They percen so, and thurgh the wal they goon;
And somme of hem sinken into the ground –
Thus han we lost by tymes many a pound;
And somme are scattered all the floor aboute;
Somme lepe into the roof; withouten doute,
Though that the feend noght in our sighte him shewe,
I trowe he with us be, that ilke shrewe![144]

Here, the Yeoman, speaking "boldely" about the hidden art of the Canon after his departure, describes an explosive failure in the workshop while he attended the fires. The Canon and Yeoman lost another day's work, a common occurrence in which they have "lost by tymes many a pound." Also within the midst of this "greet violence," the Yeoman perceives the appearance of an evil spirit, again, linking this worldly practice to failure and evil. Immediately after the accident, the Canon encourages the Yeoman to keep working, stating "Al though this thing mishappend have as now, / Another tyme it may be wel ynow."[145] As Chaucer demonstrates, failure is just another day's work for the Canon and his Yeoman.

The tone of these passages, the descriptions, and the at times cruder language all point to an appeal to a broader audience for Chaucer's work. The use of the first person and the physical details within the text suggest the performative nature of the work. The images constructed of the Canon and his Yeoman's alchemical practice, such as the explosive nature of their repeated failures and the image of the alchemist and his assistance as "puffers" who desperately throw whatever is available into their fires, also reflect how Chaucer and his audience perceived those

[144] Chaucer, *The Canon's Yeoman's Tale*, lines 346-64.
[145] Ibid., lines 391-2.

whose worldly desires motivated their practice of alchemy. Thus, by end of the *Prologue* and *Tale*, Chaucer fully employs the medieval literary trope of alchemists as "poor men, meanly dressed and living on the fringes of society, who, in spite of repeated failure, cultivated grandiose illusions of wealth in their own minds and those of their victims."[146] In addition, several times within the text the Yeoman links the Canon to the "devel," and describes alchemy as a "slidynge science"; "elvysshe craft"; "cursed craft"; and "elvysshe nyce lore." This is reminiscent of Aquinas's own comparison of alchemy to "the art of the demons."[147]

Chaucer's tone, however, shifts towards the end of the tale when he describes the theoretical possibility of alchemy when those who seek both knowledge and spiritual growth use the art. This occurs in the final sixty-six lines of the tale, in which Chaucer quotes two authoritative sources on alchemy, Arnald of Villanova and material from a translated Arabic treatise on alchemy entitled *Senioris Zadith Tabula Chimica*.[148]

In these final sixty-six lines, Chaucer uses these authorities to demonstrate the theoretical possibility of alchemy if the "adept"[149] possessed the right type of knowledge. He also cautions against approaching the practice without the correct knowledge and motivations:

> 'Lat no man bisy hym this art for to seche,
> But if that he th'entencioun and speche
> Of philosophres understode kan;
> And if he do, he is a lewed man.
> For this science and this conning,' quod he,
> 'Is of the secree of the secretes, pardee.'[150]

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[146] Lerer, *Chaucer and His Readers*, 47.
[147] Thomas Aquinas, *Summa theological* 2.2.77 trans. Fathers of the English Dominican Province in *The Summa Theologica of St. Thomas Aquinas*, 2nd ed (1920), online from New Advent, http://www.newadvent.org/summa/3077.htm (accessed January 19, 2015).
[148] Linden, *Darke Hierogliphicks*, 50-52.
[149] A term used to describe alchemists who practiced alchemy for knowledge-seeking purposes, in contrast to the worldly-motivated "puffer." See Robert T. Lambdin and Laura C. Lamdin, "His Yeman Eek Was Ful of Curteisye," 360.

This short segment warns against those who seek alchemical knowledge without first understanding the philosophical aspects of alchemy. Without this theoretical foundation of the "philosophres," the practitioner will be conned by "this science." Moreover, the "disciple of Plato"[151] is evoked as an authority when explaining the theory behind alchemical practice, and how to attain its wisdom:

"The philosophres sworn were, everichoon,
That they shoulden discovere it unto noon,
Ne in no book it wryte in no manere.
For unto Crist it is so leef and dere
That he wol nat that it discovered be,
But wher it lyketh to his deitee
Man for t'enspyre, and eek for to defend
Whom that him lyketh; lo, this is the ende!"[152]

Those to whom the mysteries of alchemy would be revealed must first, then, understand the knowledge of the "philosophres" and must be chosen by God to be worthy of this knowledge.[153] This reflects Roger Bacon's view of the power of alchemical knowledge to either corrupt when the secrets are revealed "to the vulgar," or to advance people's knowledge of the natural world and to even prolong life, thus using art to improve upon nature.[154]

Furthermore, the evocation of alchemical authorities and the final deference to God suggests that while much of the *Tale* was a vehicle to entertain his audience, the final sixty-six

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[150] Chaucer, *The Canon's Yeoman's Tale*, lines 889-894.
[151] Ibid., line 895.
[152] Ibid., lines 910-918.
[153] The translator's note of lines 916-918 makes this more clear: "Except under (special) circumstances—where it pleases his Godhead to reveal it to one man by inspiration and withhold it from another—and that's the end of the matter." Geoffrey Chaucer, *The General Prologue to the Canterbury Tales and the Canon's Yeoman's Prologue and Tale*, ed. A.V.C. Schmidt (New York: Holmes and Meier Publishers, 1974), 122.
[154] Roger Bacon, *Opus tertium*, in *Part of the Opus tertium of Roger Bacon*, ed. A.G. Little (Aberdeen: The University Press, 1912), xlvi.

lines was a vehicle for instruction and for Chaucer's own views on alchemy. Here his style mimes the logocentric nature of oral communications; he adopts a univocal tone—a "what everybody knows" tone— to convey culturally accepted ideas of morality and ties them to alchemical theory. This connects the ending of *Canon's Yeoman's Tale* to other tales with a similar motivation, notably *The Second Nun's Prologue and Tale,* which precedes the *Canon's Yeoman's Prologue and Tale*, the *Parson's Prologue and Tale*, and *Chaucer's Redaction*. Alchemy, then, is reconciled as an art in the last lines of the Canon's Yeoman's Tale just as the other Tales reconcile Chaucer's "art" of performative storytelling by including pious and instructional elements to his work.[155] Therefore, Chaucer's work is the evidence of Chaucer's reception and internalization of the art versus nature debate that surrounded alchemy within medieval institutions. In the *Canon's Yeoman's Prologue and Tale*, Chaucer presents two conflicting views of alchemy: one that is critical of its practical application when practiced by those who sought wealth, and another that alludes to the theoretical possibility of alchemy and its potential as an art to improve upon nature.

Alchemy and Natural Philosophy in John Gower's *Confessio Amantis*

Regarding Chaucer's knowledge of alchemy, Elias Ashmole asserted in his 1652 *Theatrum Chemicum Brittannicum* that, "Besides he that Reads the latter part of the *Chanon's Yeoman's Tale,* wil easily perceive him to be a *Judicious Philosopher,* and one that fully know

[155] Lee Patterson, "Perpetual Motion: Alchemy and the Technology of the Self" and Mark J. Bruhn's "Art, Anxiety, and Alchemy in the 'Canon's Yeoman's Tale.'"

the *Mistery*."[156] The one who taught him the knowledge necessary to uncover the "Mistery" of alchemy, Ashmole states, was a contemporary and personal friend of Chaucer, John Gower. Indeed, in the *Theatrum Chemicum Britannicum*, Elias Ashmole notes the connection between the two writers, calling Gower Chaucer's "Master" in the "Science" of alchemy:

> Now as Concerning *Chaucer* (the *Author* of this *Tale*) he is ranked amongst the *Hermetick Philosophers*, and his *Master* in this *Science* was *Sir John Gower*, whose familiar and neere acquaintance began at the *Inner Temple* upon *Chaucer's* returne into *England*, for the Troubles of the Times towards the latter end of the *Rich*: the *second's Raigu* had caused him to retire out of their *Danger* into *Holland, Zeland,* and *France*.[157]

Chaucer and Gower were indeed contemporaries, belonging to the same literary circles and often having the other in mind when writing their works.[158] Therefore, they shared a common audience, and exhibit a similar performative nature when writing to their intended audiences.

The connection between the two authors is evident in an intertextual analysis of their most famous works. Gower's knowledge of alchemical theory, as demonstrated in book four of his *Confessio Amantis*, is reflected in Chaucer's work. This is evident in how each writer links the seven primary metals with their corresponding planets. In the *Confessio Amantis*, Gower links silver to the moon, iron to Mars, lead to Saturn, copper to Venus, and quicksilver to Mercury.[159] Chaucer also provides this same information in the *Canon's Yeoman's Tale*.[160] Likewise, both writers provide the same lists of spirits used in transmutation, brimstone, quicksilver, orpiment, and sal ammoniac, and the inclusion of four spirits demonstrates the same departure by both writers from the traditionally accepted orthodoxy of only two spirits—sulfur

[156] Elias Ashmole, *Theatrum Chemicum Brittannicum*, (London: J. Grismond for Nath Brooke, 1652), 470.
[157] Ashmole, *Theatrum Chemicum Brittannicum*, 470.
[158] Strohm, *Social Chaucer*, 68.
[159] Gower, *Confessio Amantis*, bk. 4, lines 2469-2475.
[160] Chaucer, *The Canon's Yeoman's Tale*, lines 272-276.

and mercury.[161] This similar knowledge and departure from the traditional canon of alchemical elements indicates a dialogue between these two authors regarding alchemical theory.

Gower's reception of alchemy within its natural philosophical context is also similar to that of Chaucer's. Gower's work is more encyclopedic in tone than Chaucer's performative one, though he shares Chaucer's performative nature through the use of a univocal (cultural consensus) moral and instructional tone similar to Chaucer's in the end of the *Canon's Yeoman's Tale*. In the lines prior to his "Alchemy" section, in which he transitions from the process of metallurgy to alchemy, Gower demonstrates his favorable view of alchemy:

> Bot hou that metal cam a place
> Thurgh mannes wit and Goddes grace
> The route of philosophres wise
> Controeveden be sondri wise,
> Ferst for to gete it out of myne,
> And after for to trie and fyne.[162]

These metallurgists, in Gower's terms, brought forth and refined metals through a combination of the wit of man and "Goddes grace." He further links the conception of this craft to the "philosophres wise," demonstrating a favorable outlook between this art and its ability to "trie and fyne" (refine) Nature. He solidifies his defense of human's ability to improve upon nature by connecting this craft to alchemy in the lines immediately following his description of metallurgy:

> And also with gret diligence
> Thei founden thilke experience,[163]
> Which cleped is alconomie,[164]
> Wherof the selver multeplie
> Thei made and ek the gold also.[165]

[161] Linden, *Darke Hierogliphicks*, 57.
[162] Gower *Confessio Amantis*, bk. 4, lines 2451-6.
[163] Translator's note: "that experienced science."
[164] Alchemy.
[165] Gower *Confessio Amantis*, bk. 4, lines 2457-61.

In this stanza, Gower demonstrates how the art of metallurgy further improves upon nature with the use of "gret diligence" on the part of the alchemists. He presents alchemy as not only an experienced science that advances the art of metallurgy, but also presents this science as a theoretical possibility. Similar to Chaucer's view on the possibility of transmutation, this is accomplished both with "Goddes grace" and with the "route of philosophres wise."

Both Middle English writers, then, demonstrate an understanding of the institutional debates surrounding alchemical theory and practice. Beyond this understanding, they transmitted this knowledge to a broader audience using vernacular language and a univocal tone. Both men's works were well known within medieval society, and by the early fifteenth century Gower's *Confessio Amanits* was translated into both Portuguese and Spanish, making him the "first English poet to enjoy international recognition."[166] Their status as contemporaries and their similar understanding of alchemical theory demonstrates the intertextual transmission of institutional ideas through Middle English writers, while Chaucer's use of common tropes and both writers' use of univocal tone further illustrate their consciousness of a more diverse audience.

Another field of natural philosophy treated by Chaucer and Gower was astronomy/astrology. As with alchemy, Chaucer's and Gower's works transmit their understanding and reception of institutional astrology/astronomy. To better understand Chaucer's and Gower's knowledge of institutional natural philosophical ideas and how they received and transmitted this to a more diverse audience, an examination of Chaucer's and Gower's

[166] Russell A. Peck, ed. John Gower, *Confessio Amantis* (New York: Holt, Rinehard, and Winston, Inc., 1968), v.

astronomical and astrological knowledge and how they represented this within their works follows.

Institutional Astronomy/Astrology in Chaucer's *Treatise on the Astrolabe*

Written during parts of *The Canterbury Tales,* Chaucer's *Treatise on the Astrolabe* demonstrates the poet's extensive interest in and knowledge of astronomical theory and practice.[167] In the tradition of premodern treatises, Chaucer addressed his work to one person, his ten-year-old son, Lewis, but intended for it to be read by many.[168] Though his *Canterbury Tales* had more popular appeal, his intended audiences for his *Treatise* were most likely those connected to Oxford University, and especially to Merton College,[169] in conjunction with his ten-year-old son, Lewis, a courtly audience, and friends who may have requested the treatise from Chaucer to better understand the astronomical allusions increasingly appearing in his poems.[170] Chaucer, who scholars posit wrote his "*Boece* to keep people from misreading *Troilus and Criseyde*" may have also written *The Treatise on the Astrolabe* so that his audience would better understand the astronomical allusions throughout *The Canterbury Tales*.[171] Furthermore, the use of the vernacular, rather than Latin traditionally used by medieval scholars, and the full,

[167] Osborne, *Time and the Astrolabe*, 31.
[168] Edgar Laird, "Chaucer and Friends: The Audience for the "Treatise on the Astrolabe,' *The Chaucer Review*, 41, no. 4 (2007) : 439.
[169] Osborne, *Time and the Astrolabe*, 14.
[170] Edgar Laird, "Chaucer and Friends: The Audience for the "Treatise on the Astrolabe,' *The Chaucer Review*, 41, no. 4 (2007) : 442.
[171] Ibid.

sometimes simplified explanations of concepts institutional scholars would understand, suggests Chaucer wrote for a broader, more diverse audience.[172]

An examination of Chaucer's understanding and reception of astronomical/astrological knowledge evident in his *Treatise on the Astrolabe*, then, is important to understanding the natural philosophical ideas transmitted to this diverse audience. Examining Chaucer's works provides an important point of analysis because prior to his works, there is "very little in Middle English literature that implies much astronomical competences in its audiences."[173] Chaucer's *Treatise on the Astrolabe* demonstrates not only his interest in institutional learning and the sciences, but, as a widely-known Middle English author with a civic career, it also serves as a vehicle for transmitting natural philosophical ideas.

His primary source when writing the treatise was *De Compositione et operacione*, a Latin translation of an Arabic treatise. He also used the astronomical calendars of John Somer and Nicholas of Lynn, the significance of which will be examined below.[174] In this work, Chaucer demonstrates an understanding of the Arabic sciences transferred to Europe from Iberia, and even incorporated the newer (to Europe) mathematical concept of zero in the work. More important to this discussion is his use of the astrolabe to present the sky in mathematical terms—again, demonstrating a strong grasp of the institutional knowledge of his day—and the creation of a treatise for an audience that is "nat depe ystert in loore," or, not greatly adept in astronomical knowledge.[175] This connects to the discussion above on Chaucer's audience

[172] Ibid.; Eisner, *A Treatise on the Astrolabe*, 15.
[173] Laird, Chaucer and Friends," 441-442.
[174] Eisner, *A Treatise on the Astrolabe*, 15, 19.
[175] Osborn, *Time and the Astrolabe*, 4-5.

regarding his conscious shaping of his texts to his audience, and in this treatise in particular, "he apparently also was affected by the felt presence of an audience having varied interest, one of those being an interest in the astrolabe."[176] Since texts written by institutional scholars discussed natural philosophical subjects as understood topics, this stylistic choice demonstrates Chaucer's attempts to reach an audience beyond the institutions.

Chaucerian scholars disagree over the extent of Chaucer's astrological knowledge, as well as his opinion on astrology and how he represented astrology in his works.[177] Their disagreement demonstrates that as with alchemy, Chaucer's work exhibited an ambivalent stance on astrology due to his understanding of institutional astronomical discourse. In his *Treatise on*

[176] Ibid., 7.

[177] Chauncey Wood, writing in 1968, argues that while Chaucer's pilgrims may exhibit a favorable opinion of astrology, Chaucer's own unfavorable opinion of the practice is evident in his *Treatise on the Astrolabe*. Hamilton M. Smyser, however, counters this in 1970. He posits that Chaucer firmly believed in the possibility of astrological prediction, and that his study of the astrolabe stood as evidence of his desire to make ascensions for himself. Chauncey Wood challenges this idea in 1970 by emphasizing the medieval belief in an orderly universe and the belief that one should follow God's will as close as possible to avoid potential chaos. He again points to the frustrations Chaucer's characters experience when practicing astrology, and how this combined with the medieval idea of an orderly universe made it unlikely that Chaucer condoned or practiced astrology. Stephen Kohl supports Wood's interpretation by arguing that Chaucer rejected judicial (also called horoary) astrology as unchristian. In a stark contrast to the dominating narrative of the earlier 1970s, Dorothy Loomis closes the decade with the argument that due to the prevalence of belief in astrology in thirteenth and fourteenth century Europe, Chaucer likely believed in it. Tom Carter in 1982 provides a more nuanced interpretation, arguing that while Chaucer wrote on both astronomy and astrology, he showed a preference for the former due to its more scientific qualities. Derek Brewer continues the trend of more nuanced interpretation by not overtly stating Chaucer believed or did not believe in astrology; rather, he points to the popularity of astrology in the court of King Richard II, whose mother, Joan of Kent, was a well-known proponent of the practice. C. David Benson supports this idea by pointing to the use of Nicholas of Lynn's *Kalendarium*, which is full of astrological ideas, as evidence that astrology was valid in the late fourteenth century, the period during which Chaucer wrote. In 1999, Edgar Laird reflects Loomis's earlier interpretation concerning Chaucer's interest in astrology be arguing that his interest in the astrolabe stemmed from his desire to make astrological predictions. Marijane Osborn's work supports the argument made twenty years earlier by Carter and posits that while Chaucer exhibit a vast knowledge of astrology, he favored astronomy due to the mathematical principles and observation needed to understand the theory and the natural world, but he was also, at times, ambivalent to the practice. She argues, like Kohl, that Chaucer most likely did not favorably view judicial astrology. Instead, the ambivalence in Chaucer's work—sometimes critical of astrology while other times demonstrating a deep knowledge of the practice—points to his understanding of astrology as aligning at times with its reconciliation by Thomas Aquinas. Though she ultimately argues that Chaucer did not believe hu0mans could accurately interpret the movements on celestial bodies to predict the future (199-217.) This thesis focuses on the debates after the linguistic turn. For an overview of these earlier debates, please see Geoffrey Chaucer, *A Treatise on the Astrolabe*, edited by Sigmund Eisner (Norman, OK: University of Oklahoma Press, 2002) : 37-40.

the Astrolabe, Chaucer appears dismissive of astrology. After explaining methods used by astrologers to predict the actions of people, Chaucer states: "Natheles these been observances of judicial matere and rytes of payens, in which my spirit hath no faith, ne knowing of her horoscopum."[178] He discounts the observations of the astrologers in question by calling the use of judicial astrology ("judicial matere")—the branch of astrology concerned with assessing the influence of the celestial bodies on human actions—the rites of pagans.[179] He asserts he has no faith in these observations, while still continuing to explain to little Lewis astrological practices.

Though Chaucer denounces judicial astrology, he does seem to accept the practice of medical astrology. He states in his *Treatise*:

> And understonde also that whan a hote planete cometh into an hote signe, than encrescitch his hete. And [yif] a planete be colde, than amenusith his coldenesse by cause of the hoot sygne. And by thys conclusion maist thou take ensample in all the signes, be thei most or drie, or moeble or fix, reknyng the quality of the planete, as I first seide. And everiche of these 12 signes hath respecte to a certeyn parcel of the body of a man and hath it in governaunce, as Aries hath thin heved, and Taurus thy nekke and thy throte, Gemini thin armeholes and thin armes, and so further…[180]

In this passage, Chaucer demonstrates an understanding of institutional medical astrology. He describes the qualities of the planets, hot or cold, moist or dry, and how the zodiacal signs connect to the qualities of their planets. He goes on to connect these zodiacal signs to the

[178] Geoffrey Chaucer, *A Treatise on the Astrolabe*, ed. Sigmund Eisner, in *A Variorum Edition of the Works of Geoffrey Chaucer: The Prose Treatises*, vol. VI (Norman, OK: The University of Oklahoma Press, 2002) : II.4, 517-519.
[179] Judicial astrology is the art of forecasting events through astrological calculations, and encompassed natal astrology—the art of determining an individual's personality by constructing an natal chart around the date and time of their birth—and horary astrology—the art of constructing a horoscope to answer a question when at the time it was received by the astrologer.
[180] Geoffrey Chaucer, *A Treatise on the Astrolabe*, I.21 ll. 345-355.

different parts of the human body they govern. Moreover, this passage, together with his later denouncement of judicial astrology, demonstrates Chaucer's understanding of the institutional knowledge and discourse surrounding astrology.

Like Aquinas, Chaucer discredits the practice of judicial astrology; Aquinas refers to the practice as the "operation of the demon,"[181] while Chaucer calls it the "rytes of payens."[182] Both men denounce the aspect of the astrological predictions that discount free-will operations. Aquinas supports aspects of astrological practice, however, such as the ability for astrologers understand how celestial bodies affect human bodies/organs.[183] Likewise, Chaucer also accepts this concept, as seen in his explanation on how the planets and zodiacal signs affect different body parts. In this way, Chaucer's works express similar anxieties and acceptances of astrological practice similar to those expressed by institutional scholars.

Institutional Astronomical/Astronomical Discourse in *The Canterbury Tales*

The anxieties regarding astrological practice expressed by Aquinas is also evident throughout Chaucer's most popular work, *The Canterbury Tales,* parts of which were written in conjunction with his *Treatise on the Astrolabe*.[184] Beyond the univocal ("what everybody knows") voice used in the application of medieval literary tropes to his Canon and Yeoman, Chaucer applies tropes in the form of traditional notions of hierarchy and common estates

[181] Aquinas, *Summa Theologica*, *Ad Tertium* I.I. 115.4. http://www.summatheologica.info/summa/questions/?q=328&a=1708
[182] Geoffrey Chaucer, *A Treatise on the Astrolabe*, II.4, 517.
[183] Aquinas, *Summa Theologica*, *Ad Tertium* I.I. 115.4. http://www.summatheologica.info/summa/questions/?q=328&a=1708
[184] Osborn, *Time and the Astrolabe*, 31.

conventions to his other pilgrims.[185] Alisoun of Bath is a noted example; the traits Chaucer applied to her character contained tropes regarding women recognizable to a medieval audience, and upon which they would base their judgment of the character's words and actions.[186] Due to her bawdy nature, promiscuity, and numerous marriages, her character fails to meet the medieval standards of "perfect wife" and "good wife" described in the Bible,[187] while her fine coverings and shoes "are part of the common property of satire on excesses of apparel in the late Middle Ages [and] are equally signs of wealth, vanity, and desire for male approval."[188] To a medieval audience, the Wife of Bath represented the follies of the Daughters of Eve and of excess.

The Wife of Bath explains the sinful aspects of her behavior using a form of judicial astrology:

> For certes, I am al Venerien
> In feelynge, and myn herte is Marcien.
> Venus me yaf my lust, my likerousness,
> And Mars yaf me sturdy hardynesse;
> Myn ascendent was Taur, and Mars therinne.
> Allas! Allas! That evere love was synne!
> I folwed ay myn inclinacioun
> By vertu of my constellacioun;
> That made me I koude noght withdrawe
> My chamber of Venus from a good Felawe.[189]

[185] H. Marshall Leicester, Jr., "Oure Tonges Différance," 23.
[186] Chaucer's intended representation of women vis-à-vis the Wife of Bath remains a point of contention within Chaucerian scholarship. This thesis does not contribute to this discussion, but rather, places the tropes applied to Chaucer's Wife of Bath within the context of a medieval audience. For more on this debate, see S.H. Rigby, "The Wife of Bath, Christine de Pizan, and the Medeival Case for Women," *The Chaucer Review* 35, no. 2 (2000) : 133-165.
[187] Rigby, "Medieval Case for Women," 134.
[188] John B. Friedman, "Alice of Bath's Astral Destiny: A Re-Appraisal," *The Chaucer Review* vol. 35, no. 2 (2000) : 168.
[189] Chaucer, *The Wife of Bath's Prologue*, lines 609-18.

In this passage from *The Wife of Bath's Prologue*, Alisoun of Bath connects her birth in conjunction with the zodiac sign of Taurus ascending through Venus and Mars to her lusty inclinations; she denies responsibility for her own behavior, stating that it was dictated by the stars. Chaucer's logocentric use of the Wife of Bath—applying common, "what everybody knows" tropes regarding sinful femininity to her character—demonstrates how Chaucer bridged the criticisms of judicial astrology by institutional scholars to his broader audience.

In addition to Chaucer's use of logocentric appeals to transmit his reception of astrological institutional discourse of astrology to his audience, he used a similar univocal tone seen the last sixty-six lines of his *The Canon's Yeoman's Tale*. This occurs towards the end of *The Knight's Tale* during what has become known as "The First Mover Speech." Throughout *The Knight's Tale*, the characters seek the aid of the celestial bodies and their corresponding gods to determine their fate. When one character dies after receiving an astrological sign predicting a favorable outcome (or so he thought), the wizened Duke Theseus speaks at his funeral, warning others against attempts to divine their fates using astrology.[190]

Theseus tells the mourners that "The Firste Moevere of the cause above,"[191] meaning that the eternal, stable creator governs from his celestial sphere and life below adheres to the destiny he planned. While the First Mover provides patterns to discern this destiny that humans can see, only He can perceive the final meaning of these patterns.[192] This reflects Aquinas's assertion that "it is impossible to acquire foreknowledge of the future from an observation from the stars, expect in so far as effects can be foreknown from their causes." He explains that these causes are

[190] Chaucer, *The Knights Tale*, lines 2,987 – 3,074.
[191] Ibid., line 2,987.
[192] Osborn, *Time and the Astrolabe*, 210.

those governed by natural laws, stating "the operation of natural has always some one thing for its term, just as it proceeds from some one principle, which is the form of a natural thing."[193] Likewise, Theseus defines the patterns of destiny visible to humans in terms of natural law:

> Loo the ook, that hath so long a norissshynge
> From tyme that is first bigynneth to sprynge,
> And hath so long a lif, as we may see,
> Yet at the leste wasted is the tree.[194]

Here Theseus points to the example of an oak tree's life cycle as a visible pattern of the divine; he uses this example and similar ones (such as the crumbling of stones and the evaporation of rivers), to demonstrate that the only way in which humans can divine is through understanding and assessing natural patterns. Therefore, the anxiety and acceptance evident in the institutional discourse on astrology/astronomy is evident in Chaucer's public writings and works. The work of his contemporary, John Gower, also demonstrates a similar reception of institutional astrological/astronomical discourse.

Astrology/Astronomy in John Gower's *Confessio Amantis*

While Chaucer used tropes and stereotypes surrounding caste estates to transmit his reception of institutional astrological discourse, in *Confessio* Amantis, John Gower maintains the encyclopedic tone used when discussing alchemy when transmitting his reception of astrology/astronomy. The narrative frame of most of the *Confessio Amantis* is the confessions of

[193] Aquinas, *Summa Theologica*, *Ad Tertium* I.I. 115.4. http://www.summatheologica.info/summa/questions/?q=328&a=1708
[194] Chaucer, *The Knights Tale*, lines 3,017 – 20.

the narrator, Amans (the Lover), to Venus's chaplain, Genius. In Book Seven, however, Genius assumes the role of narrator when Amans requests to be taught wisdom.[195] Genius shares this requested wisdom by instructing Amans on the teachings of Aristotle to his student Alexander the Great. From this authoritative source, Gower (through Genius) introduces astrology/astronomy with: "Things lower down are ruled by the law of the planets, and sometimes that governance foils endeavor. With God's intervention the wise man will rule the stars, and the fates will not cause anything suddenly unfavorable."[196] Through this introduction and its more detailed explanation, John Gower's knowledge of the institutional discourse on astrology/astronomy is evident.

Perhaps the most obvious indicator signaling Gower's knowledge of astrological/astronomical institutional discourse is this stated intention of the text:

> To speke upon Astronomie,
> As it is write in the clergie,
> To tell hou the planets fare,
> Som part I thenke to declare,
> Mi sone, unto thin audience.[197]

Here Gower states he intends to impart upon his audience the wisdom of Astronomie (astronomy) as written by the "clergie" (clergy). And the astrological/astronomical content of the poem does represent an understanding of these learned sources. For example, his assertion that

[195]John Gower, *Confessio Amanits*, ed. Russell A. Peck (New York: Holt, Rinehart and Winston, 1968), xxviii.
[196] John Gower, *Confessio Amantis*, bk 7, lines 630-4 from *Confessio Amantis* vol 3, ed. Russell A Peck, trans. Andrew Galloway (Kalamazoo, Michigan: Medieval Institute Publications, 2004), http://d.lib.rochester.edu/teams/text/peck-gower-confessio-amantis-book-7 (accessed May 20, 2015).
[197] Ibid., lines 665-669

"With God's intervention the wise man will rule the stars" echoes the same statement found in Aquinas's *Summa theologica*.[198]

This idea is evident further into the poem. For example, Gower writes that "Al is thurgh constellacion, / Wherof that som man hath the wele, / And som man hath deseses fele… And thus seith the naturien / Which is an astronomien,"[199] asserting that according to the "The "nuturien" (natural philosopher), who is an "astronomien" (astrologer/astronomer) "constellacion[s]" (constellations) determine the health of people, reflecting Aquinas's notion that the stars influenced corporeal bodies. This influence is limited, however, when people have control over their lower faculties: "That if men weren goode and wise / And plesant unto the Godhede, / Thei scholden noght the sterres drede.[200] In (plainer) English, the star cannot so easily sway those who are in control of their bodily appetites, and through wisdom and religious devotion they can influence favorable celestial outcomes. Indeed, "the wise man rules the stars."

Both Chaucer's and Gower's works transmit aspects of astronomical/astrological institutional discourse to their lay audience. Chaucer's "First Mover Speech" reconciles astrological divination when applied to natural outcomes, while Gower's Genius teaches Amans about astrology/astronomy in terms of Aquinas's celestial influence over free will versus corporeal bodies discussion. The celestial influence on the corporeal body occupied writers in both spheres of works—the institutional clerical and lay public writings. This demonstrates the overlap of learned and lay knowledge as public writings exposed the laity to ideas previously the

[198] Aquinas, *Summa Theologica*, *Ad Tertium* I.I. 115.4. http://www.summatheologica.info/summa/questions/?q=328&a=1708
[199] Gower, *Confessio Amantis*, bk. 7, lines 642 – 650.
[200] Gower, *Confessio Amantis* bk. 7, lines 649-654.

provenance of clerics. The overlapping of spheres becomes even more apparent as astrological/medical knowledge entered the realm of lay practitioners.

Dissemination of Medicine and Astrology: Calendars and Medical Self-help Books

As amongst the most popular and circulated Middle English public writings of their time, Chaucer's *The Canterbury Tales* and John Gower's *Confessio Amantis* reached an audience beyond those who traditionally encountered and interpreted natural philosophical works and ideas. Though many of the works that shaped these writers understanding of institutional natural philosophical discourse remained the domain of institutional scholars, other works, used by Chaucer specifically, enjoyed a larger audience. These works were the calendars of John Somer and Nicholas of Lynn discussed in Chapter Two, which Chaucer cited in his *Treatise on the Astrolabe*.[201]

While the calendars of John Somer and Nicholas of Lynn originated as ecclesiastical tools for calculating important feast dates and Easter, the inclusion of additional astronomical/astrological and complementing medical information resulted in the dissemination of these calendars to the lay population. Moreover, once the lay population received these calendars, they interacted with the texts, adding their own popular understanding of astrological medicine to supplement the institutional information in the calendars.[202] As the calendars increased in popularity, the separate spheres of institutional and popular astrological medical knowledge overlapped. How the laity shaped the texts beyond their original form, and how this

[201] Osborn, *Time and the Astrolabe*, 14.
[202] O'Boyle, "Astrology and Medicine," 1-22.

shaped astrological/medical knowledge during the late Middle Ages (the concept behind intertextual analysis), is important to understanding how texts transmitted institutional natural philosophical ideas and how the lay population received and contributed to that knowledge.

Cornelius O'Boyle's 2005 article "Astrology and Medicine in Later Medieval England: The Calendars of John Somer and Nicholas of Lynn" provides a significantly useful study of the existent copies of the calendars. His study attempts to identify the content included in Somer's and Lynn's original manuscripts—a difficult task due to the popularity of the calendars and how quickly they spread—and what later compliers and translators added to demonstrate who used these calendars, and how the users interacted with and contributed to institutional works. In his study, O'Boyle identified forty-five copies of Somer's calendars, and sixteen of Lynn's, dating from c. 1383 to c. 1463, making these calendars popular within a medieval context.[203] From his examinations of the earlier manuscripts, he identified the contents of Somer's and Lynn's original calendars—the versions prior to additions by later users—as outlined below:

John Somer's Calendar:

- Prologue and Canon
- Table for Converting Roman and Arabic Numerals
- Table of Leap Years
- Table of Moveable Feasts
- Month-by-Month Calendar
- Table of Ruling Planets
- Table of Moon's Position in the Zodiac
- Diagrams of Solar Eclipses
- Diagrams of Lunar Eclipses

[203] O'Boyle, "Astrology and Medicine," 1.

Nicholas of Lynn's Calendar:

- Prologue
- Month-by-Month Calendar
- Tables and Diagrams for Solar Eclipses
- Tables and Diagrams for Lunar Eclipses
- Table of Ascendants and Beginning of Houses
- Table of Ruling Planets
- Table of Moveable Feasts
- Table of Planetary Dignities in Each Zodiacal Sign
- Table of Moon's Position in the Zodiac
- Twelve Canons for the Calendar[204]

Missing from these original manuscripts and added to later copies of the new calendar was a zodiac man, a tool central to medical astrology, and a bloodletting man, an important tool for master and barber surgeons.[205] The zodiac man had a pedagogical purpose; the drawing illustrated to the reader complex medical-astrological philosophy. It also showed the reader how each body part corresponded to one of the twelve zodiacal signs, and its main purpose was medical prognostication.[206] This inclusion deviates from traditional ecclesiastical or astronomical calendars, and suggests that the purpose of the calendars centered on medical lunar prognostications rather than their primary institutional purpose as tools to calculate important ecclesiastical dates. It also indicates that the calendars were useful to medical practitioners, for the zodiac man served as an important reference for knowing when to practice bloodletting and

[204] Ibid., 3-4.
[205] Ibid., 6, 8-10.
[206] Eisner, *Treatise*, 164; O'Boyle, "Astrology and Medicine," 6; Osborn, *Time and the Astrolabe*, 203-4.

surgery on a patient. In fact, Nicolas's calendar details the importance of lunar astrology for bloodletting. [207]

The bloodletting man, like the zodiac man, indicated the astrological conditions favored for bloodletting.[208] The inclusion of the bloodletting man points to the use of these calendars beyond the institutionally-trained physicians. While institutional/university trained medical practitioners studied the concepts underpinning bloodletting, particularly the natural philosophical concept of humors and how their balance coincides with productive bloodletting, the diagrams and explanations describing the processes indicate that the calendars were designed for those who actually performed the procedure, the less educated, more common barber surgeons.[209] These practitioners ranked below the university-trained physicians; in medieval English society, these practitioners were barbers who, in addition to their haircutting services, performed surgery.[210] As members of the lay population in medieval England whose profession required frequent interaction with their fellow townspeople, their exposure both to the institutional natural philosophical medical concepts within Somer's and Lynn's calendars while referring to the bloodletting man makes them a bridge between institutional natural philosophical discourse and the lay population.

Evidence of the use of the calendars by more practical, less educated practitioners, such as barber surgeons who performed bloodletting and other surgical procedures, is best provided in the portable design of the later copies of the calendars, or of books that contained the

[207] O'Boyle, "Astrology and Medicine," 6-7.
[208] Ibid., 8.
[209] Ibid., 13.
[210] Irma Taavitsainen, "A Zodiacal Lunary for Medical Professionals," *Popular and Practical Medicine of Medieval England*, ed. Lister M. Matheson (East Lansing, MI: Colleagues Press, 1994) : 284; Getz, *Medicine in the English*, 8.

calendars.[211] An example of a c. 1406 portable physician's almanac based on the *Kalendarium* of John Somer can be found in the British Library's digitized manuscript collections (see below for the link to this manuscript).[212] Measuring 180 x 80 mm, the parchment almanac folded into six parts, the folded leaves sewn together through a tab located at the lower edges.[213] A hole was pierced through the tab, and sometimes a ring added, from which a chain or cord could be attached. When folded, owners transported these portable parchment almanacs to the patient via their pocket or a pouch suspended from their waist. Of the fifty identified folded books, sixteen contain copies of Somer's and Lynn's calendars, attesting to their popularity and common use.[214]

In addition to the explanations of astronomical information well understood by institutional scholars, the inclusion of the zodiac and bloodletting man, and its portable nature, John Somer's calendars also included Arabic to Roman numerals conversion tables. This demonstrates that he expected a broader audience for his calendars—one less familiar with the newer mathematics transmitted to England via the Arabic translations of ancient works and who would be accustomed to the more prevalent and common use of Roman numerals. The tables vanish from later copies by the fifteenth century, however, demonstrating that Arabic numbers became more popularly known.[215] Also indicative of a less learned, more common audience was the inclusion of basic astronomical concepts in the calendars, explaining to the reader in the

[212] Harely MS 5311, *Physician's Folding Almanac*, 1406 British Library: Digitised Manuscripts, http://www.bl.uk/manuscripts/FullDisplay.aspx?ref=Harley_MS_5311 (accessed March 10, 2015).
[213] Ibid.
[214] O'Boyle, "Astrology and Medicine," 10-11.
[215] Ibid., 4.

vernacular an eclipse, providing simple diagrams of zodiac signs and of the geocentric universe—explanations and diagrams not needed for an institutional audience.[216]

As with the calendars, less formally educated medical practitioners also owned and used Middle English translations of institutional Latin medical texts, especially since Latin remained the dominant language of natural philosophical/medical teachings until the seventeenth-century.[217] Translated c.1400, *The Middle English Gilbertus Anglicus*, the vernacular translation of Gilbertus Anglicus's *Compendium of Medicine* is another important example of how institutional medical knowledge dispersed into the general lay population.[218] As discussed in the preceding chapter, the *Compendium* provided a vast array of natural philosophical medical theory and recipes. The recipes, which number in the thousands, proved a useful source of medical remedies for the various levels of medical practitioners in medieval English society. This translation gave its readers simple guides for diagnosis as well as definitions of Latin medical terms. In this way, the copies of this translation may have functioned as early examples of "self-help" manuals; the translations compiled important concepts of institutional natural philosophical medicine and rendered them easily digestible for popular consumption. [219]

Since the work is a translation from the institutional Latin source, the Aristotelian, Hippocratic, and Islamic medical knowledge that shaped a natural philosophical understanding of medicine is evident in the Middle English version. For example, when prescribing treatment

[216] Ibid., 14-15.
[217] Getz, "Gilbertus Anglicus," 18; Pahta and Taavitsainen, "Vernacularisation of Scientific and Medical Writing," 8; Taavitsainen, "Transferring Classical Discourse," 38.
[218] Getz, "Gilbertus Anglicus," 17.
[219] Ibid.

for *apoplexie* (apoplexy),[220] *The Middle English Gilbertus Anglicus* connects the affliction to the humors and to astrological concepts of medicine, providing the reader with an explanation and solution created by institutional natural philosophical discourse:

> Apoplexie that cometh in the waxyng of [the] moone is incurable, and namely if it be the more apoplexi. But if it cometh in the wanyng of the moone, it is not so greuous. And if he desireth diuerse metis, and as soon as the seeth them, he hath abhominacion of them, it betokeneth deeth. And if he hath not such tokens, he may be y-holpen by medicynes. And if it be of blode, let hem blede in the heed veyne of the arme, if he be of stronge complexion. And that is a soucreigne remedy in eche apoplexie, of what humour that it be. If the body be ful of humoures and if it be of eny othir humour than of blode, let his body be purgid with stonge medicynes, as with iera [a]logodion, or iera pigra, or theodo/ricon, or stomaticon, or with thes pillules if it be of fleume or melencoloy.[221]

This passage instructs the practitioner on how to provide a prognosis for apoplexy in astrological terms. If the disease afflicted the patience during the moon's waxing phases, then death is inevitable. However, the disease is curable during the waning of the moon.

In addition to using lunar prognostication, the text instructs the practitioner on institutional humoral medical-based treatments for the disease. For example, if too much blood causes an imbalance of the humors, then the practitioner should bleed the patient via a vein in his arm. If an imbalance caused by too much phlegm is the issue, then treatment with strong

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[220] The medieval understanding of apoplexy derived from Greek and Islamic medicine, particularly Galen and Avicenna, respectively. Apoplexy was a more serious form of epilepsy in which the victim loses consciousness and often dies. See: Owsei Temkin, *The Falling Sickness: A History of Epilepsy from the Greeks to the Beginning of Modern Neurology*, 2nd ed. (Baltimore: The Johns Hopkins University Press, 1971), https://books.google.com/books?id=w33hgy52XKkC&pg=PT139&lpg=PT139&dq=medieval+apoplexie&source=bl&ots=gKWgBYlJGF&sig=xbKsjG6KKwWTG-wNbCOvvVAbBbs&hl=en&sa=X&ei=aG50VZGkKYOqggTg8IPwBw&ved=0CDcQ6AEwBA#v=onepage&q=medieval%20apoplexie&f=false (accessed April 19, 2015).

[221] *The Middle English Gilbertus Anglicus*, in *Healing and Society in Medieval England: A Middle English Translation of the Pharmaceutical Writings of Gilbertus Anglicus*, ed. Faye M. Getz (Madison: The University of Wisconsin Press, 1991), 29, https://books.google.com/books?id=MZy81Wyt_FUC&pg=PR4&lpg=PR4&dq=Healing+and+Society+in+Medieval+England&source=bl&ots=8bL63XzPCR&sig=ZFhGFN8Ue2uqMGiVboJNJ5hQrgM&hl=en&sa=X&ei=w2B0Ve3cMomkgwS2y4HYCQ&ved=0CEMQ6AEwBg#v=onepage&q=humour&f=false (accessed April 19, 2015).

medicine is recommended. The use of lunar prognostication and humoral theory to treat this disease, then, demonstrates that *The Middle English Gilbertus Anglicus* exposed its readers, and possibly their patients, to the natural philosophical discourse used by institutional scholars.

Medical instruction centered on humoral medicine is also found in copies of the *Liber uricrisiarum*, originally written by the Dominican Friar and English medical writer, Henry Daniel (fl. ca. 1379). Twenty-two manuscripts contain this treatise, and the texts contain evidence of an intended lay audience. One copy made during the third quarter of the fifteenth century, for example, appears to be for Richard Dob, a barber surgeon of London.[222] Like the *Middle English Gilbertus Anglicus*, these medical texts derived from an institutional scholar, and as such, contain natural philosophical notions of the body. As a uroscopy text (uroscopy was the medieval medical practice of analyzing urine to determine health/prognosis of a patient), the *Liber uricrisiarum* instructs the reader on the connection between urine and the four humors:

> As seyth Gilis in his text and all autctores and commentoures, this is [a] discripciown of vryn [urine]…[Vryn is] a late and a suptyle meltyng and clenesygn of bloode and of humuris…Item, id est also, I sey 'a meltyng, a clensing,' of the blode and of the humuris for this skyll: For right as thou sest…right so the vryn is pressed…Vnderstond that massa sanguinis is not els but a collectiown, id is, a gedering togidre, of the 4 humuris…[223]

Here the text explains that urine is a "meltyng and clenesygn of bloode and of humuris," (melting and cleansing of the blood and of humors) and it contains a "gedering togidre, of the 4 humuris" (gathering together of the four humors).

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[222] C. W. Dutschke, R.H. Rouse, and Richard S. Dunn, *Guide to Medieval and Renaissance Manuscripts in the Huntington Library* (San Marino, CA: Huntington Library, 1989), ed. Sharon K, Goetz, 2003, http://bancroft.berkeley.edu/digitalscriptorium/huntington/HM505.html (accessed March 20, 2015).
[223] Henry Daniel, "Henry Daniel's *Liber uricrisiarum*," *Popular and Practical Science of Medieval England*, ed. Lister M. Matheson (East Lansing, MI: Colleagues Press, 1994), 195-6.

After connecting the nature of urine to the four humors, the text explains aspects of identifying poor health through urine examination:

> And tharfore yu moost take hede at goodness of the seignes and wykkydnes, & noght anely at the nowmbre of thame. For Galyen sayes opon Ypocras' Empidiis that if first in the begynnynge of the seiknes com a blak uryn,…And undrystand blak colour is this 7 rewlys, ryght as I said in the rewle next before this 2 rewles…Theophile in hys Bok of Uryns sais that if the uryn in a fe[ver] causonides have an ypostasis blak.[224]

This passage exhibits an authoritative tone. The reader is told they "moost take hede" (must take heed), for example. This authoritative voice is further accentuated by the evocation of medical authorities, such as Galen. This control of the reader's perception of the text[225] shares similarities to the pious, univocal tone and evocation of authorities Chaucer adapted when transmitting his own perception of natural philosophical ideas to his lay audience. Institutional natural philosophical ideas, then, reached a lay audience through medical texts due to a combination of their practicality for barber surgeons, such the best times for bloodletting, through their portability and accessibility (folded books), and through adapting authoritative, univocal tones to underscore the validity and importance of the institutional-developed ideas.

Conclusion: Bridges for Natural Philosophical Discourse

The public writings of Middle English authors and the medical texts used by lay medical practitioners demonstrate that broader sectors of English medieval society did receive,

[224] Henry Daniel, *Liber uricrisiarum*m 145-6.
[225] Irma Taavitsainen, "Transferring Classical Discourse Conventions into the Vernacular," *Medical and Scientific Writing in Late Medieval English*, eds. Irma Taavitsainen and Päivi Pahta (Cambridge: Cambridge University Press, 2004), 55

understand, and interact with medieval institutional knowledge. Their public writings and treatise contain the same ambivalence towards alchemy and astrology of their institutional counterparts. Moreover, by representing institutional natural philosophy using common medieval tropes and a univocal tone, these writings created a bridge between an institutional and lay understanding of the natural world. Chaucer's criticism of alchemy, for example is apparent to a lay audience through his use of crude humor and the commonly recognized "puffer" trope; likewise, the univocal, pious tone adapted to permit the pursuit of alchemical knowledge for spiritual growth informs his lay audience of the same right theory and practice outlined by the institutional philosophers.

The astrological/medical knowledge evident in medical works created for lay practitioners present another bridge between institutional and lay knowledge. Calendars contained didactic tools helpful to lay medical practitioners such as barber surgeons. Furthermore, the portable nature of some of the calendars, as seen in the folded books, gave mobility to the natural philosophical ideas these texts contained. These features, combined with their evocation of natural philosophical authorities when citing their knowledge, blurred the lines between institutional and lay medical knowledge; indeed, these traditionally separate spheres of knowledge often overlapped as what was once clerical/learned knowledge began entering the domain of the laity.

CONCLUSION: BRIDGING DISCOURSE: CONNECTIONS BETWEEN INSTITUTIONAL AND LAY TEXTS

As English became the dominant language of England and vernacular texts entered the public discourse, the traditional proverbial walls of the medieval ivory tower, within which clerics isolated from the general populace hoarded all medieval philosophical knowledge, crumbled and the spheres of clerical and public knowledge overlapped. While scholars focused on the development of institutional and public knowledge as separate fields, this thesis blends the two bodies of knowledge by demonstrating that the laity received institutional natural philosophical ideas in public writings and medical texts.

Institutional Alchemical Discourse in Public Writings

As a field of natural philosophy, alchemy is perhaps the most contentious within and beyond medieval institutional walls. Due to the anxiety and tensions surrounding alchemical theory, this particular branch of natural philosophical knowledge provided a way to connect the clerical discourse to that of the laity. Institutional scholars' treatment of alchemy reflected ambivalence towards the field echoed in the public writings of Chaucer and Gower.

Clerics, such as Robert Grosseteste and Roger Bacon, treated alchemy as a viable extension of Aristotelian knowledge that can enhance humanity and its understanding of the natural world if fostered and developed by right practice and theory. Robert Grosseteste, in his *De artibus liberalibus*, supports the possibility of the transmutation of metals, and intertwines

alchemy with astrology, explaining how the qualities of planets combine to produce metals.[226] In his *Opus tertium*, Roger Bacon outlines the important role of alchemy in the movement to reform scholastic science, and he championed alchemy as the art that could prolong human life.[227]

A similar treatment of alchemy is presented in both Chaucer's and Gower's public writings. Both writers demonstrate theoretical knowledge of the seven planets and their corresponding metals.[228] Regarding reception, as seen in the discussion of the final sixty-six lines of *The Canon's Yeoman's Tale* in his *The Canterbury Tales*, Chaucer reflects the arguments first posited by Grosseteste and Bacon by postulating the theoretical possibility of alchemy if the "adept" possessed and developed the correct knowledge and motivations when practicing alchemy. Likewise, John Gower's *Confessio Amantis* also reflects the ideas of Grosseteste and Bacon regarding the potential for alchemy to improve upon nature through a combination of "Goddes grace" and "gret diligence."[229]

Medieval clerics also expressed an anxiety towards alchemy as a field, and some classified it as a pseudoscience. Alfred of Sareshel translated Avicenna's *The Book of Remedy* (falsely attributed to Aristotle), which attacked the transmutation process as false.[230] Thomas Aquinas's *Summa theologica* and *Scriptum super libros sententiarum magistri Petri Lombardi episcopi Parisiensis* (*Commentary on the Sentences of Peter Lombard*) also contributed to the anxiety surrounding alchemy when he compared the art of creating alchemical gold with the

[226] James McEvoy, *The Philosophy of Robert Grosseteste* (Oxford: Clarendon Press, 1982), 165.
[227] Bacon, *Opus tertium*, xlvi.
[228] Geoffrey Chaucer, *The Canon's Yeoman's Tale*, lines 272-276; Gower, *Confessio Amantis*, bk. 4, lines 2469-2475.
[229] Gower *Confessio Amantis*, bk. 4, lines 2457-61.
[230] Newman, "Technology and Alchemical Debate, 427.

method of art used by demons to perform false and ephemeral illusions.[231] This work is representative of the art versus nature debate discussed in Chapter Two, and contributed to the ambivalence surrounding alchemical theory in medieval institutions.

This anxiety is also evident in Chaucer's work. Chaucer's use of recognizable tropes, such as the "puffer" trope commonly connected to alchemists, as well as crude language and devil imagery to illustrate the failure tied to a worldly pursuit of alchemy reflects his reception of the art versus nature debate. Though he does not completely denounce the art, like Aquinas, he does qualify his reconciliation of alchemy by positing it should only be practiced by the learned for pious reasons.[232] This echoes Roger Bacon's own anxiety when he asserts to Clement IV that alchemical theory should not reach the vulgar.[233] The works of the English writers, then, mirror the ambivalent discourse surrounding alchemical theory and practice evident in institutional works.

Institutional Astrology/Astronomical Discourse in Public Writings

A similar ambivalence is evident in the institutional discourse surrounding astrology/astronomy. This ambivalence started, in part, from attempts to reconcile the three dominating Greek and Arabic models of the universe—the Aristotelian, Ptolemaic, and al-Bitrujian. Robert Grosseteste, for example, believed in the ultimate superiority of the Aristotelian model, but also noted its flaws and how the competing models addressed those flaws. This led him to create his comprehensive treatise on the universe, *De sphera*, in which attempted to

[231] Ibid., 437-8.
[232] Chaucer, *The Canon's Yeoman's Tale*, lines 910-918.
[233] Bacon, *Opus tertium*, xlvi.

reconcile the philosophical underpinnings of Aristotle's notion of planetary motion with the other models.[234] Working from his understanding formed in *De sphera* of how elemental matter worked on celestial bodies, Grosseteste's other astrological/astronomical treatises describe how these fundamental concepts of cosmological theory can be used to predict future events. Here, Grosseteste demonstrates an acceptance of astrology as it relates to the Aristotelian astronomical model of the cosmos.

Thomas Aquinas's *Summa theologica* demonstrates the cleric's own acceptance of astrological divinations, though he is more anxious about the practice than Grosseteste, stating that the astrologers' ability to "foretell the truth" in human matters is due to "the interference of the demons."[235] However, he also reconciled some aspects of astrological divination. He, like Grosseteste, based his notions of astrology from Aristotelian natural philosophy, and concludes while celestial bodies affect material objects, such as corporeal human bodies, they do not directly impact the human soul/free will.[236] Furthermore, while the stars can influence those who allow their bodily passions to control them, those governed by their minds prevail over the inclinations of the body; it is the strong-willed and mindful who can identify celestial influence and use it to better understand natural outcomes. This reconciliation led Aquinas to support the astrologer's creed that "the wise man rules the stars."[237]

Chaucer's *Treatise on the Astrolabe* and his *The Canterbury Tales* both contain aspects of this ambivalent institutional discourse. His comparison of judicial astrology to the rites of pagans shares similarities with Aquinas's comparison of the practice to demonic knowledge.

[234] Southern, *Robert Grosseteste,* 142-3.
[235] Aquinas, *Summa Theologica, Ad Tertium* I.I. 115.4. http://www.summatheologica.info/summa/questions/?q=328&a=1708
[236] Ibid.
[237] Ibid.

Chaucer does accept astrology's role when practiced in medicine and when divining events dictated by natural law, which mirrors the language in both Aquinas's and Grosseteste's works. Furthermore, he communicated his reception of astrological/astronomical institutional discourse to his lay audience using tropes/estates satires to demonstrate his anxiety, and a univocal, pious tone when qualifying acceptable aspects of the "science."

Gower's *Confessio Amantis* also demonstrates a familiarity with the institutional discourse regarding astrology/astronomy. His work references the "clergie" (clergy) and the "nutrurien" (natural philosophers), and he presents their teachings using the narrative framework of Aristotle—their own natural philosophical authority—teaching these concepts to his student, Alexander the Great. Like Grosseteste, Aquinas, and his contemporary Chaucer, Gower discusses the influence of celestial objects on humans in a corporeal context. Furthermore, his work posits that through wisdom and religious devotion, people can influence favorable celestial outcomes, an idea from Aquinas's *Summa theologica*.

Institutional Medical Discourse in Vernacular Works

While public writings transmitted natural philosophical ideas to the laity through the use of tropes/estates satires with performative elements, such as the logocentric univocal tone, to blend the traditional oral with the newly emerging written methods of transmitting ideas, natural philosophy in medical texts reached the laity through different methods. The Latin institutional medical texts and the vernacular lay medical texts were closely interrelated. Since the vernacular texts were often translations of the Latin texts of the university-style medicine, these texts transmitted the natural philosophical ideas incorporated into medieval English medicine to those

who practiced medicine outside of medieval institutions.[238] The vernacular medical tradition, then, emerged from "the background of already established conventions of scientific writing in Latin."[239] When compared to their institutional counterparts, the copies of John Somer's and Nicholas of Lynn's calendars and *The Middle English Gilbertus Anglicus* provide a strong example of this.

The original calendars created by John Somer and Nicholas of Lynn functioned as astronomical tables used for calculating the date for Easter and other important ecclesiastical feast days. The inclusion of additional astrological/astronomical information, such as the tables of ruling planets and the moon's position in the zodiac led to other astrological additions in later copies, such as the zodiac man and the bloodletting man. These more easily comprehended diagrams made these calendars more accessible to a non-institutional audience, particularly the lay barber surgeons who typically performed bloodletting and minor surgical procedures in medieval England. Therefore, through their use of the calendars to access the didactic zodiac and bloodletting men, these lay practitioners were also exposed to the institutional elements of the calendars. Additionally, their frequent contact with various members of medieval society combined with the portable nature of the calendars appearing in folded books allowed these practitioners to transmit institutional knowledge to a larger lay audience.

Like John Somer's and Nicholas of Lynn's calendars, institutional medical knowledge from Gilbert Anglicus's *Compendium Medicinae* overlapped into lay medical knowledge. He compiled and commented on Aristotelian natural philosophical ideas combined with Hippocratic medical concepts to create thousands of recipes and remedies for various ailments. The copies of

[238] Getz, *Medicine*, 35.
[239] Paivi Pahta and Irma Taavitsainen, "Vernacularisation of Scientific and Medical Writing," 1.

the *Middle English Gilbertus Anglicus* rendered institutional medical information of the Latin *Gilbertus* more accessible for a lay audience; these copies compiled the important natural philosophical concepts, defined Latin terms, and explained institutional medical theory such as humoral-based treatments and lunar prognostications. Similarly, other Middle English medical texts, such as copies of Henry Daniel's *Liber uricrisiarum*, provided institutional medical information for lay practitioners. Translators wrote these copies using authoritative tones and cited medical authorities to communicate the importance of the medical concepts to a lay audience. With their didactic tools, portability, accessible language, and strong, authoritative tones to control their reader's perception, these texts helped transmit institutional natural philosophical ideas to English lay practitioners and their patients.

Conclusion: Bridging Discourses: Connecting Institutional and Lay Natural Philosophical Texts

Three branches of medieval knowledge provide a useful basis of analysis when determining the transmission of natural philosophical thought into greater medieval English society and culture. Institutional scholars studied the theoretical components of alchemy, astronomy/astrology, and medicine as ancient knowledge of these branches of thought became available. Likewise, Middle English public writers and compliers/translators of Latin medical texts studied the institutional discourse and transmitted it broader sectors of English medieval society. By combining the lay understanding of alchemy, astrology, and medicine with their institutional counterparts, Middle English writers, such as Geoffrey Chaucer and John Gower, and Middle English copies of the works by John Somer, Nicholas of Lynn, Gilbertus Anglicus

and Henry Daniel, functioned as bridges between the institutional and lay understanding of these fields.

Examining Middle English public writings, texts, and copies of Latin works, then, provides an important avenue of analysis when exploring the transmission of medieval natural philosophical understanding of the world beyond the walls of medieval institutions. These works demonstrate that natural philosophy did not remain in an institutional vacuum. Instead, the spheres of institutional and lay knowledge traditionally separated by medieval historians overlapped as the clerics and laity began sharing a similar understanding of the philosophical underpinnings of the natural world. The methodological basis of this study is significant to further exploration and analysis of how the clerics and laity shared knowledge beyond religious instruction; the transmission of medieval clerical knowledge extended beyond teaching and providing sacraments and Biblical instruction, and the laity were more than passive consumers of this instruction. Instead, these two groups began exploring and sharing a similar understanding of the natural world.

LIST OF REFERENCES

Primary Sources

Aquinas, Thomas. *Summa theological* 2.2.77. Translated by Fathers of the English Dominican Province in *The Summa Theologica of St. Thomas Aquinas*, 2nd ed. (1920), online from New Advent, http://www.newadvent.org/summa/3077.htm.

_____. *Summa Theologica*, *Ad Tertium* I.I. 115.4. http://www.summatheologica.info/summa/questions/?q=328&a=1708

Aristotle, *On the Heavens*. Translated by J.L. Stocks in The Internet Classics Archive, http://classics.mit.edu/Aristotle/heavens.2.ii.html.

Ashmole, Elias. *Theatrum Chemicum Brittannicum*. London: J. Grismond for Nath Brooke, 1652.

Bacon, Roger. *Opus tertium*. in *Part of the Opus tertium of Roger Bacon*. Edited and Translated by A.G. Little. Aberdeen: The University Press, 1912.

Chaucer, Geoffrey. *A Treatise on the Astrolabe*. Edited by Sigmund Eisner, in *A Variorum Edition of the Works of Geoffrey Chaucer: The Prose Treatises*, vol. VI. Norman, OK: The University of Oklahoma Press, 2002.

_____. *The Canterbury Tales*, edited by Jill Mann. London: Penguin Books, 2005.

_____. *The Wife of Bath's Prologue and Tale*. *The Canterbury Tales*. In *The Riverside Chaucer* ,3rd ed. Edited by Larry D. Benson. Boston: Houghton Mifflin Co., 1987.

_____. *The Knights Tale. The Canterbury Tales*. In *The Riverside Chaucer* ,3rd ed. Edited by Larry D. Benson. Boston: Houghton Mifflin Co., 1987.

_____. *The General Prologue to the Canterbury Tales and the Canon's Yeoman's Prologue and Tale*. Edited by A.V.C. Schmidt. New York: Holmes and Meier Publishers, 1974).

Daniel, Henry."Henry Daniel's *Liber uricrisiarum*," *Popular and Practical Science of Medieval England*, edited by Lister M. Matheson, East Lansing, MI: Colleagues Press, 1994.

Gower, John. *Confessio Amantis*. Vol 2. Edited by Russell A Peck. Translated by Andrew Galloway. Kalamazoo, Michigan: Medieval Institute Publications, 2004.

Gower, John. *Confessio Amantis* vol 3. Edited by Russell A Peck. Translated by Andrew Galloway. Kalamazoo, Michigan: Medieval Institute Publications, 2004. http://d.lib.rochester.edu/teams/text/peck-gower-confessio-amantis-book-7

Harely MS 5311. *Physician's Folding Almanac, 1406*. British Library: Digitised Manuscripts. http://www.bl.uk/manuscripts/FullDisplay.aspx?ref=Harley_MS_5311.

The Middle English Gilbertus Anglicus. In *Healing and Society in Medieval England: A Middle English Translation of the Pharmaceutical Writings of Gilbertus Anglicus*. Edited by Faye M. Getz. Madison: The University of Wisconsin Press, 1991. https://books.google.com/books?id=MZy81Wyt_FUC&pg=PR4&lpg=PR4&dq=Healing+and+Society+in+Medieval+England&source=bl&ots=8bL63XzPCR&sig=ZFhGFN8Ue2uqMGiVboJNJ5hQrgM&hl=en&sa=X&ei=w2B0Ve3cMomkgwS2y4HYCQ&ved=0CEMQ6AEwBg#v=onepage&q=humour&f=false.

Secondary Sources

Barthes, Roland. "From Work to Text." *Textual Strategies: Perspectives in Poststructuralist Criticism*. Edited by Josue V. Harari. Ithaca, NY: Cornell University Press, 1979.

Benson, David C. *Public Pier's Plowman.*University Park, PA: The Pennsylvania State University Press, 2004.

Boas, Marie. *Robert Boyle and Seventeenth-Century Chemistry*. Cambridge: Cambridge University Press, 1958.

Bruhn, Mark J. "Art, Anxiety, and Alchemy in the 'Canon's Yeoman's Tale.'" *Chaucer's Pilgrims: An Historical Guide to the Pilgrims in The Canterbury Tales*. Edited by Laura C. Lambdin and Robert T. Lambdin. Westport, Connecticut: Greenwood Press, 1996.

Chalmers, Alan. "Boyle and the Origins of Modern Chemistry: Newman Tried in the Fire." *Studies in History and Philosophy of Science*, 41 (2010) : 1-10.

Chism, Christine N."I Demed Hym Som Chanoun For To Be." *Chaucer's Pilgrims: An Historical Guide to the Pilgrims in The Canterbury Tales*. Edited by Laura C. Lambdin and Robert T. Lambdin. Westport, Connecticut: Greenwood Press, 1996.

Cohen, Floris H. *The Scientific Revolution: A Historiographical Inquiry*. Chicago: University of Chicago Press, 1994.

Crombie, A.C. *Robert Grosseteste and the Origins of Experimental Science 1100 – 1700.* Oxford: The Clarendon Press, 1953, Reprinted, Oxford: Oxford University Press, 1962.

Curry, Walther Clyde. *Chaucer and the Mediaeval Sciences.* New York: Oxford University Press, 1926.

Dutschke, C.W. R.H. Rouse, and Richard S. Dunn. *Guide to Medieval and Renaissance Manuscripts in the Huntington Library*. San Marino, CA: Huntington Library, 1989. Edited by Sharon K, Goetz, 2003. http://bancroft.berkeley.edu/digitalscriptorium/huntington/HM505.html

Finke, Laura A. and Martin B. Shichtman. "Introduction: Critical Theory and the Study of the Middle Ages." *Medieval Texts and Contemporary Readers*. Edited by Laurie A. Finke and Martin B. Shichtman. Ithaca: Cornell University Press, 1987.

French, Roger. "Foretelling the Future: Arabic Astrology and English Medicine in the Late Twelfth Century." *Isis* 87, no. 3 (1996) : 453 – 480.

Friedman, John B. "Alice of Bath's Astral Destiny: A Re-Appraisal." *The Chaucer Review* vol. 35, no. 2 (2000) : 166 – 181.

Getz, Marie Faye. "The Pharmaceutical Writings of Gilbertus Anglicus." *Pharmacy in History* 34, no 1 (1992) : 17 – 25.

Getz, Faye. *Medicine in the English Middle Ages.* Princeton: Princeton University Press, 1998.

Grant, Edward. *Physical Science in the Middle Ages.* Cambridge: Cambridge University Press, 1979.

_____. "Celestial Motions in the Late Middle Ages." *Early Science and Medicine* 2, no. 2 (1997) : 129 – 148.

Hannam James. *The Genesis of Science: How the Christian Middle Ages Launched the Scientific Revolution*. Washington, D.C.: Regnery Publishing, 2011.

Homer Haskins, Charles Homer. *Studies in the History of Mediaeval Science*. Cambridge: Harvard University Press, 1924.

Hopkins, John Arthur. *Alchemy: Child of Greek Philosophy.* New York: AMS Press, 1967.

Knapp, Peggy A. "The Work of Alchemy." *Journal of Medieval and Early Modern Studies* 30, no. 2 (2000) : 575-599.

Knowles, David. *The Evolution of Medieval Thought*. New York: Random House, 1962.

Laird, Edgar. "Chaucer and Friends: The Audience for the "Treatise on the Astrolabe,' *The Chaucer Review*, 41, no. 4 (2007) : 439 – 444.

Lambdin, Robert T. and Laura C. "His Yeman Eek Was Ful of Curteisye." *Chaucer's Pilgrims: An Historical Guide to the Pilgrims in The Canterbury Tales*. Edited by Laura C. Lambdin and Robert T. Lambdin. Westport, Connecticut: Greenwood Press, 1996.

Leicester, Marshall H. "Oure Tonges Différance: Textuality and Deconstruction in Chaucer." *Medieval Texts and Contemporary Readers*. edited by Laurie A. Finke and Martin B. Shichtman. Ithaca: Cornell University Press, 1987.

Lerer, Seth. *Chaucer and His Readers: Imagining the Author in Late-Medieval England.* Princeton: Princeton University Press, 1993.

Lindberg, David C. "Medieval Science and Its Religious Context." *Osiris* 10, no. 2 (1995) : 60 – 79.

Lévi-Strauss, Claude. *The Raw and the Cooked*, translated by John and Doreen Weightman. New York: Harper, 1975.

Linden, Stanton J. *Darke Hierogliphicks: Alchemy in English Literature from Chaucer to the Restoration.* Lexington: The University of Chicago Press, 1996.

Mathematics and Its Applications to Science and Natural Philosophy in the Middle Ages: Essays in Honor of Marshall Clagett. Edited by Edward Grant and John E. Murdoch. Cambridge: Cambridge University Press, 1987.

McDonald, Henry. "The Performative Basis of Modern Literary Theory." *Comparative Literature* 55, no. 1 (2003) : 55-77.

McEvoy, James. *The Philosophy of Robert Grosseteste*. Oxford: Clarendon Press, 1982.

Moore, R.I. *The Origins of European Dissent*. Allen Lane, 1913. Reprinted Toronto: University of Toronto Press, 2005.

Newman, William. "Technology and Alchemical Debate in the Late Middle Ages." *Isis* 80, no. 3 (1989) : 423 - 445.

Newman, William R. and Lawrence M. Principe. *Alchemy Tried in the Fire: Starkey, Boyle, and the Fate of Helmontian Cymistry*. Chicago: University of Chicago Press, 2002.

Newman, William R. *Atoms and Alchemy: Chymistry and the Experimental Origins of the Scientific Revolution*. Chicago: University of Chicago Press, 2006.

O'Boyle, Cornelius. "Astrology and Medicine in Later Medieval England: The Calendars of John Somer and Nicholas of Lynn." *Sudhoffs Archiv*, Bd. 89, H.1 (2005) : 1-22.

Olser, Margaret. *Reconfiguring the World: Nature, God, and Human Understanding from the Middle Ages to Early Modern Europe.* Baltimore: John Hopkins University Press, 2010.

Ogrinc, Will H.L. "Western Society and Alchemy from 1200 to 1500." *Journal of Medieval History* 6, no. 1 (1980) : 103 – 132..

Osborn, Marijane. *Time and the Astrolabe in the Canterbury Tales*. Norman, OK: University of Oklahoma Press, 2002.

Pahta, Päivi and Irma Taavitsainen. ""Vernacularisation of Scientific and Medical Writing in Its Sociohistorical Context." *Medical and Scientific Writing in Late Medieval English*. Edited by Irma Taavitsainen and Päivi Pahta. Cambridge: Cambridge University Press, 2004.

Patterson, Lee. "Perpetual Motion: Alchemy and the Technology of the Self." *Studies in the Age of Chaucer* 15 (1993) : 25 – 57.

Pereira, Michela. "Alchemy and the Use of Vernacular Languages in the Late Middle Ages." *Speculum* 74, no. 2 (1999) : 336-356.

_____. "Alchemy and Hermeticism: An Introduction to this Issue," *Early Science and Medicine* 5, no. 2 (2000) : 115-120.

Peters, Ursula. "From Social History to the Poetics of the Visual: Philology of the Middle Ages as Cultural History." *Journal of English and Germanic Philology* 105, no. 1 (2006) : 185 – 206.

Pingree, David. "From Alexandria to Baghdad to Byzantium: The Transmission of Astrology." *International Journal of the Classical Tradition* 8, no. 1 (2001), 3 -37.

Popular and Practical Science in Medieval England. Edited by Lister M. Matheson. East Lansing, Michigan: Colleagues Press, Inc., 1994.

Rigby, S.H. "The Wife of Bath, Christine de Pizan, and the Medeival Case for Women." *The Chaucer Review* 35, no. 2 (2000) : 133-165.

Rochberg-Halton, F. "Elements of the Babylonian Contribution to Hellenistic Astrology, " *Journal of the American Oriental Society* 108, no. 1 (1988) : 51 – 62.

Somerset, Fiona. *Clerical Discourse and Lay Audience in Late Medieval England*. Cambridge: Cambridge University Press, 1998.

Southern, R.W. *Robert Grosseteste: The Growth of an English Mind in Medieval Europe* 2nd ed. Oxford: Clarendon Press, 1992.

Strohm, Paul. *Social Chaucer.* Cambridge: Harvard University Press, 1989.

Taavitsainen, Irma. "A Zodiacal Lunary for Medical Professionals." *Popular and Practical Medicine of Medieval England.* Edited by Lister M. Matheson. East Lansing, MI: Colleagues Press, 1994.

_____. "Transferring Classical Discourse Conventions into the Vernacular." *Medical and Scientific Writing in Late Medieval English*. Edited by Irma Taavitsainen and Päivi Pahta. Cambridge: Cambridge University Press, 2004.

Taavitsainen, Irma and Päivi Phata. "Vernacularisation of Medical Writing in English: A Corpus-Based Study of Scholasticism. *Early Science and Medicine*, vol. 3 no. 2 (1998) : 157-185.

Talbot, C.H. *Medicine in Medieval England.* London: Oldbourne, 1967.

Temkin, Owsei. *The Falling Sickness: A History of Epilepsy from the Greeks to the Beginning of Modern Neurology* 2nd ed. Baltimore: The Johns Hopkins University Press, 1971. https://books.google.com/books?id=w33hgy52XKkC&pg=PT139&lpg=PT139&dq=medieval+apoplexie&source=bl&ots=gKWgBYlJGF&sig=xbKsjG6KKwWTG-wNbCOvvVAbBbs&hl=en&sa=X&ei=aG50VZGkKYOqggTg8IPwBw&ved=0CDcQ6AEwBA#v=onepage&q=medieval%20apoplexie&f=false

Thorndike, Lynn. *A History of Magic and Experimental Science During the First Thirteen Centuries of Our Era* vol. 1. New York: Columbia University Press, 1923.

Turner, Wendy J. "The Legal Regulation and Licensing of Alchemy in Late Medieval England." *Law and Magic: A Collection of Essays*. Edited by Christine A Corcos. Durham, North Carolina: Carolina Academic Press, 2010.

Voigts, Linda Ehrsam. "What's the Word? Bilingualism in Late-Medieval England." *Speculum* vol. 71, no. 4 (1996) : 813-826.

White, Dickson. *History of the Warfare of Science with Theology and Christendom.* New York: D. Appleton and Company, 1898.